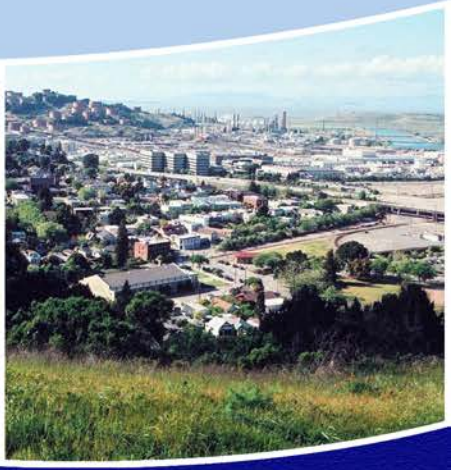
Richmond

VEOLIA WATER







WWTP FACILITY PLAN

FINAL DRAFT • SEPTEMBER 2016

carollo

Engineers...Working Wonders With Water®

CITY OF RICHMOND AND VEOLIA WATER

WWTP FACILITY PLAN

FINAL DRAFT
September 2016

2700 YGNACIO VALLEY ROAD, SUITE 300 • WALNUT CREEK, CALIFORNIA 94598 • P. 925.932.1710 • F. 925.930.0208
pw://Carollo/Documents/Client/CA/Veolia/10034A00/Deliverables/Facility Plan Report/Master TOC

CITY OF RICHMOND AND VEOLIA WATER

WWTP FACILITY PLAN

TABLE OF CONTENTS

Page No.

LIST OF ABBREVIATIONS

EXECUTIVE SUMMARY

CHAPTER 1 - PROJECT BACKGROUND 1-1

1.1 INTRODUCTION AND PURPOSE 1-1
1.2 FACILITY PLAN SCOPE 1-3
1.3 REPORT ORGANIZATION 1-4

CHAPTER 2 - WASTEWATER FLOWS AND LOADS 2-1

2.1 INTRODUCTION 2-1
2.2 DEFINITIONS 2-1
2.3 HISTORICAL INFLUENT FLOWS AND LOADS 2-1
2.3.1 Data Collection 2-1
2.3.2 Flow and Load Data 2-3
2.3.3 Peaking Factors 2-7
2.3.4 Domestic Wastewater Per Capita Flows and Loads 2-7
2.3.5 Commercial/Industrial Flows and Loads 2-9
2.3.6 Leachate Flows and Loads 2-9
2.4 FLOW AND LOAD PROJECTIONS 2-10
2.4.1 Flows 2-10
2.5 PROJECTED CONVENTIONAL POLLUTANT LOADS 2-11
2.5.1 Ammonia Projections 2-12
2.6 SUMMARY OF FLOW AND LOAD DESIGN CRITERIA 2-12

CHAPTER 3 - EXISTING TREATMENT PROCESS PERFORMANCE AND CAPACITY 3-1

3.1 INTRODUCTION 3-1
3.2 DESCRIPTION OF EXISTING FACILITIES 3-1
3.2.1 Liquid Treatment Processes 3-1
3.2.2 Solids Treatment Processes 3-2
3.3 EXISTING TREATMENT PLANT PERFORMANCE 3-5
3.3.1 Overall Treatment Plant Performance 3-5
3.3.2 Individual Unit Process Performance 3-12
3.4 CAPACITY ANALYSIS 3-27
3.4.1 Hydraulic Capacity 3-27
3.4.2 Treatment Capacity 3-29

CHAPTER 4 - REGULATORY REQUIREMENTS AND CONSIDERATIONS 4-1

4.1 INTRODUCTION 4-1
4.2 SUMMARY OF FINDINGS AND CONCLUSIONS 4-1
4.3 OVERVIEW OF CURRENT WATER QUALITY REQUIREMENTS 4-3

4.3.1 Permit Effluent Limits....4-3
4.3.2 Other Permit Effluent Provisions....4-10
4.3.3 San Francisco Bay Nutrients Watershed Permit....4-11
4.4 ASSESSMENT OF FUTURE WATER QUALITY REGULATIONS....4-12
4.4.1 Nutrient Removal....4-12
4.4.2 Microconstituents....4-13
4.4.3 Toxicity....4-14
4.5 ASSESSMENT OF WASTEWATER SOLIDS REGULATIONS....4-15
4.5.1 Federal Regulations....4-15
4.5.2 State Regulations....4-20
4.5.3 Local Agency Regulations....4-21
4.5.4 Future Regulatory Considerations for Biosolids Disposal....4-22
4.6 ASSESSMENT OF AIR QUALITY REGULATIONS....4-25
4.6.1 State Regulations....4-25
4.6.2 Bay Area Air Quality Management District Regulations....4-26
4.6.3 Greenhouse Gas Emissions....4-28
4.7 CROSS-MEDIA IMPACTS....4-30
4.8 FUTURE REGULATORY SCENARIOS....4-30

CHAPTER 5 - CONDITION ASSESSMENT AND CRITICALITY EVALUATION....5-1

5.1 INTRODUCTION....5-1
5.2 KEY FINDINGS AND RECOMMENDATIONS....5-1
5.3 2010 MASTER PLAN CONDITION AND CRITICALITY ASSESSMENT....5-2
5.3.1 Condition Assessment....5-2
5.3.2 Criticality Assessment....5-3
5.3.3 Master Plan Rehabilitation and Replacement Recommendations....5-3
5.4 CONDITION ASSESSMENT FOR CRITICAL AND NEAR-TERM PROJECTS....5-3
5.4.1 Preliminary Treatment....5-4
5.4.2 Secondary Treatment....5-4
5.4.3 Disinfection....5-6
5.4.4 Solids Handling....5-6
5.4.5 WWTP SCADA System and PLCs....5-8
5.4.6 SCADA System for Collection System Lift Stations....5-8
5.4.7 Miscellaneous Facilities....5-9
5.5 UPDATE TO R&R RECOMMENDATIONS....5-10
5.5.1 Near-Term R&R Recommendations....5-10
5.5.2 Long-Term R&R Recommendations....5-13

CHAPTER 6 - CRITICAL PROJECTS....6-1

6.1 INTRODUCTION....6-1
6.2 SITE LAYOUT OF CRITICAL PROJECTS....6-1
6.3 BASIS OF COSTS FOR ALTERNATIVES ANALYSIS....6-1
6.4 SCREENING AND GRIT REMOVAL IMPROVEMENTS....6-2
6.4.1 Background and Project Driver....6-2
6.4.2 Basis of Design....6-3
6.4.3 Recommended Improvements....6-3
6.5 SECONDARY TREATMENT IMPROVEMENTS....6-6
6.5.1 Aeration System Upgrades....6-6
6.5.2 Secondary Clarifier Improvements....6-8
6.6 NUTRIENT REMOVAL STUDY....6-10

6.7 SOLIDS DEWATERING/DISPOSAL 6-10
6.7.1 Background 6-10
6.7.2 Basis of Design 6-12
6.7.3 Alternatives Analysis 6-12
6.7.4 Recommended Improvements 6-16
6.7.5 Digested Sludge Storage 6-16
6.7.6 Biosolids Disposal Options 6-18
6.7.7 Centrate/Filtrate Management 6-22

CHAPTER 7 - NEAR-TERM PROJECTS 7-1

7.1 INTRODUCTION 7-1
7.2 SITE LAYOUT OF NEAR-TERM PROJECTS 7-2
7.3 BASIS OF COSTS FOR ALTERNATIVES ANALYSIS 7-2
7.4 LEVEL 1 NUTRIENT REMOVAL IMPROVEMENTS 7-2
7.4.1 Background 7-2
7.4.2 Basis of Design 7-2
7.4.3 Recommended Improvements 7-2
7.5 THICKENING FACILITY 7-3
7.5.1 Background 7-3
7.5.2 Basis of Design 7-3
7.5.3 Alternatives Analysis 7-4
7.5.4 Recommended Improvements 7-6
7.6 SODIUM BISULFITE SYSTEM REPLACEMENT 7-8
7.6.1 Background 7-8
7.6.2 Basis of Design 7-8
7.6.3 Recommended Improvements 7-9
7.7 DIGESTER GAS FACILITIES REPAIR 7-10
7.7.1 Background 7-10
7.7.2 Recommended Improvements 7-10
7.8 COGENERATION FACILITY 7-11
7.8.1 Background 7-11
7.8.2 Basis of Design 7-12
7.8.3 Cogeneration Technologies 7-12
7.8.4 Alternatives Analysis and Recommendation 7-14
7.9 COLLECTION SYSTEM SCADA UPGRADES 7-15
7.9.1 Background 7-15
7.9.2 Basis of Design 7-15
7.9.3 Recommendations 7-16
7.10 WWTP SCADA AND PLC UPGRADES 7-17
7.10.1 Background 7-17
7.10.2 Basis of Design 7-17
7.10.3 Recommendations 7-18
7.10.4 Project Considerations 7-18
7.11 3-WATER SYSTEM IMPROVEMENTS 7-20
7.11.1 Background 7-20
7.11.2 Basis of Design 7-21
7.11.3 Recommended Improvements 7-22
7.12 WWTP LIGHTING IMPROVEMENTS 7-22
7.12.1 Background 7-22
7.12.2 Recommended Improvements 7-23
7.13 WWTP PAVING IMPROVEMENTS 7-24

7.13.1 Background 7-24
7.13.2 Recommended Improvements 7-24
7.14 SITE PROTECTION FROM ROCK SLIDES 7-24
7.14.1 Background 7-24
7.14.2 Alternatives Analysis 7-29
7.14.3 Recommended Improvements 7-29
7.15 SEISMIC UPGRADES FOR SLUDGE CONTROL BUILDING 7-30
7.15.1 Background 7-30
7.15.2 Building Analysis 7-30
7.16 LOW-LIFT EFFLUENT PUMP STATION 7-31
7.16.1 Background 7-31
7.16.2 Basis of Design 7-31
7.16.3 Recommended Improvements 7-31

CHAPTER 8 - LONG-TERM PROJECTS 8-1

8.1 INTRODUCTION 8-1
8.2 SITE LAYOUT OF LONG-TERM PROJECTS 8-1
8.3 BASIS OF COSTS FOR ALTERNATIVES ANALYSIS 8-1
8.4 COMPARISON OF CAS AND MBR FOR NUTRIENT REMOVAL 8-2
8.5 LEVEL 2 NUTRIENT REMOVAL IMPROVEMENTS 8-2
8.5.1 Background 8-2
8.5.2 Basis of Design 8-3
8.5.3 Recommended Improvements 8-3
8.6 LEVEL 3 NUTRIENT REMOVAL IMPROVEMENTS 8-4
8.6.1 Background 8-4
8.6.2 Basis of Design 8-5
8.6.3 Recommended Improvements 8-5
8.7 WET WEATHER IMPROVEMENTS 8-6
8.7.1 Background 8-6
8.7.2 Basis of Design 8-6
8.7.3 Recommended Improvements 8-6

CHAPTER 9 - RECYCLED WATER FEASIBILITY 9-1

9.1 INTRODUCTION 9-1
9.2 EBMUD WATER RECYCLING PROGRAM 9-1
9.2.1 Existing Recycled Water Facilities 9-2
9.2.2 Current and Projected Recycled Water Demand and Supply 9-2
9.2.3 Current Recycled Water Quality Requirements 9-2
9.3 SALINITY REDUCTION 9-5
9.3.1 Influent Salinity Data Analysis 9-5
9.3.2 Salinity Reduction Alternatives 9-6
9.4 NUTRIENT REMOVAL 9-8
9.4.1 Nutrient Removal Alternatives 9-9
9.5 RECYCLED WATER CONVEYANCE 9-13
9.5.1 Recycled Water Conveyance Alternatives 9-15
9.6 INTERAGENCY COORDINATION 9-19
9.6.1 Recycled Water Partner Agencies 9-20
9.6.2 Review of Institutional Drivers and Obstacles to Richmond Reuse 9-24

CHAPTER 10 - CAPITAL IMPROVEMENT PLAN 10-1

10.1 INTRODUCTION 10-1
10.2 KEY FINDINGS AND RECOMMENDATIONS 10-1
10.3 APPROACH TO DEVELOPING CIP 10-2
10.3.1 Project Drivers 10-2
10.3.2 Project Durations 10-7
10.3.3 Implementation Schedule 10-7
10.3.4 Basis of Costs 10-8
10.3.5 Development of Rehabilitation and Replacement Projects 10-10
10.4 RECOMMENDED CIP 10-11
10.4.1 Critical Projects 10-11
10.4.2 Near-Term Projects 10-12
10.4.3 Long-Term Projects 10-13

LIST OF APPENDICES

APPENDIX A CIP Summary Table
APPENDIX B WWTP Hydraulic Profile at 7 mgd
APPENDIX C WWTP Hydraulic Profile at 55 mgd
APPENDIX D NPDES Permit
APPENDIX E Mercury and PCBs Watershed Permit
APPENDIX F Nutrients Watershed Permit
APPENDIX G BAAQMD Permit
APPENDIX H Condition Assessment
APPENDIX I Cogeneration Cost Analysis

LIST OF TABLES

Table 2.1 Wastewater Flow and Loading Definitions 2-2
Table 2.2 Historical Flows and Loads 2-3
Table 2.3 Historical Influent Ammonia Loadings 2-6
Table 2.4 Historical Peaking Factors 2-7
Table 2.5 Domestic Per Capita Flows and Loads 2-8
Table 2.6 Historical Per Capita Ammonia Loads 2-8
Table 2.7 Historical Commercial/Industrial Flow and Load Data 2-9
Table 2.8 Projected Flows and Loads 2-13

Table 3.1 Effluent Concentrations of Toxic Substances 3-12
Table 3.2 Bar Screen Performance Data 3-13
Table 3.3 Primary Clarification Performance Data 3-14
Table 3.4 Aeration Basin Performance Data 3-18
Table 3.5 Secondary Clarification Performance Data 3-25
Table 3.6 Disinfection Performance Data 3-26
Table 3.7 Treatment Capacity Rating 3-30

Table 4.1 Effluent Limits in 2012 NPDES Permit 4-5
Table 4.2 Mercury Effluent Limits in San Francisco Bay Mercury Watershed Permit 4-6
Table 4.3 PCB Effluent Limits in San Francisco Bay Mercury and PCB Watershed Permit 4-8
Table 4.4 Anticipated Regulatory Targets for Nutrient Removal 4-11
Table 4.5 Pollutant Limits for Land Applied Biosolids 4-16
Table 4.6 40 CFR 503 Biosolids Regulations – Pathogen Reduction Requirements 4-17
Table 4.7 40 CFR 503 Biosolids Regulations – Vector Attraction Reduction Requirements 4-18
Table 4.8 ATCM Emission Standards for New Stationary Emergency Standby Diesel-Fueled CI Engines in g/bhp-hr (g/kW-hr) 4-26
Table 4.9 SCAQMD Rule 1110.2 Emission Standards for Internal Combustion Engines 4-28
Table 4.10 BAAQMD Regulation 9, Rule 8 Emission Standards for Internal Combustion Engines 4-28
Table 4.11 Greenhouse Gas Emissions Thresholds for Reporting Years 2011 and Beyond 4-29
Table 4.12 Summary of Regulatory Issues and Potential Solutions 4-32

Table 5.1 Condition Ranking Scale 5-2

Table 6.1 O&M Unit Costs 6-2
Table 6.2 Current and Future Sludge Production 6-12
Table 6.3 Summary of Advantages and Disadvantages of Dewatering Technology 6-14
Table 6.4 Performance Comparison of Biosolids Dewatering Alternatives 6-15
Table 6.5 Design Criteria for Centrifuge Dewatering 6-16

Table 7.1 Current and Future WAS Production 7-4
Table 7.2 Performance Comparison of WAS Thickening Alternatives 7-5

Table 7.3 WAS Thickening Alternative Analysis 7-5
Table 7.4 Evaluation Summary of Dewatering Alternatives 7-6
Table 7.5 Design Criteria for WAS Thickening 7-6
Table 7.5 Design Criteria for SBS System 7-9
Table 7.6 Cogeneration Alternative Analysis 7-14
Table 7.7 Current and Projected 3W Demands 7-22

Table 9.1 Current and Projected EBMUD Recycled Water Demand 9-4
Table 9.2 RARE Influent (Secondary Effluent) Water Quality Requirements 9-4
Table 9.3 Cost Comparison of CAS and MBR 9-13
Table 9.4 Summary of Conveyance Alternatives 9-19

Table 10.1 Capital Cost Estimating Approach 10-9
Table 10.2 Project Factor Applied to Construction Cost 10-9

LIST OF FIGURES

Figure 1.1 Wastewater Infrastructure 1-2

Figure 2.1 Daily Influent Flow 2-4
Figure 2.2 Influent BOD and TSS Load 2-5

Figure 3.1 WWTP Site Layout and Flow Schematic 3-3
Figure 3.2 Existing Process Flow Diagram 3-4
Figure 3.3 Effluent BOD Concentration 3-6
Figure 3.4 Effluent TSS Concentration 3-8
Figure 3.5 Influent and Effluent Ammonia Concentration 3-9
Figure 3.6 Total Coliform Bacteria (5-Day Median) 3-11
Figure 3.7 Primary Clarifier Overflow Rate 3-15
Figure 3.8 Aeration Basin Mixed Liquor Suspended Solids (MLSS) Concentration 3-19
Figure 3.9 Secondary Treatment Process Solids Retention Time (SRT) 3-20
Figure 3.10 Aeration Basin Sludge Volume Index (SVI) 3-21
Figure 3.11 Secondary Clarifier Surface Overflow Rate 3-24

Figure 4.1 Potential Scenario Implementation Schedule for Nutrient Removal 4-4
Figure 4.2 Total Mercury from Municipal Wastewater Dischargers to the San Francisco Bay 4-7
Figure 4.3 Total PCBs from Municipal Wastewater Discharges to the San Francisco Bay 4-9
Figure 4.4 Status of Biosolids Land Application Ordinances by County 4-24
Figure 4.5 Cross-Media Impacts: Key Wastewater Regulatory Issues 4-31

Figure 5.1 Pavement Condition Assessment 5-11
Figure 5.2 Existing Plant Lighting System 5-12

Figure 6.1 Dewatering Facility Layout 6-17

Figure 7.1 Thickening Facility Layout 7-7
Figure 7.2 Lighting System after Phase 1 Improvements 7-25

Figure 7.3 Lighting System after Phase 2 Improvements 7-26
Figure 7.4 Lighting System after Phase 3 Improvements 7-27
Figure 7.5 Pavement Replacement 7-28

Figure 8.1 MLE and Contact Stabilization Process Configurations 8-7

Figure 9.1 Process Flow Diagram of NRWRP and RARE Facilities 9-3
Figure 9.2 Hourly Influent Conductivity and Tidal Water Surface Elevation 9-7
Figure 9.3 Site Layout of CAS Alternative 9-11
Figure 9.4 Site Layout of Split Flow CAS/MBR Alternative 9-14
Figure 9.5 RW Conveyance Alternative 1 - Existing Outfall and Existing Pipeline to RARE 9-16
Figure 9.6 RW Conveyance Alternative 2 - Existing Outfall and New Pipeline to RARE 9-17
Figure 9.7 RW Conveyance Alternative 3 - New Pipeline to RARE 9-18

Figure 10.1 Summary of 10-Year CIP Costs 10-3
Figure 10.2 Summary of Facility Plan CIP Costs 10-4
Figure 10.3 Facility Plan CIP Cash Flow 10-5
Figure 10.4 Site Layout of Recommended Projects 10-6

LIST OF ABBREVIATIONS

ABAG	Association of Bay Area Governments
ADA (F or L)	average day annual (flow or load)
ADMM (F or L)	average day maximum month (flow or load)
ADW (F or L)	average day dry weather (flow or load)
AEIP	air emission inventory plan
AEIR	air emission inventory report
APCD	Air Pollution Control District
APCO	Air Pollution Control Officer
AQMD	Air Quality Management District
BACT	best available control technology
BMP	best management practices
BOD	five-day biochemical oxygen demand
CAA	Clean Air Act
CARB	California Air Resources Board
$CBOD_5$	carbonaceous BOD5
cf	cubic feet/cubic foot
cfm	cubic feet per minute
cfs	cubic feet per second
CIWMB	California Integrated Waste Management Board
CWA	Clean Water Act
cy	cubic yards
DAFT	dissolved air flotation thickener
DHS	California Department of Health Services
DO	dissolved oxygen
DWR	Department of Water Resources
EBEP	Enclosed Bays and Estuaries Plan
EBMUD	East Bay Municipal Utility District
EDU	Equivalent Dwelling Unit
ENRCCI	ENR Construction Cost Index
EPA	Environmental Protection Agency
EQB	equalization storage basin
ft	feet
gal	gallons
gpcd	gallons per capita per day
gpd	gallons per day
gpd/sf	gallons per day per square foot
gpd/EDU	gallons per day per equivalent dwelling unit
gph	gallons per hour
gpm	gallons per minute

Hp	horsepower
HRT	hydraulic retention time
kW	kilowatts
lbs BOD_5/day	pounds of 5-day biochemical oxygen demand per day
lbs BOD_5/1,000cf/day	pounds of 5-day biochemical oxygen demand per 1,000 cubic feet per day
lbs/day	pounds per day
lbs/day/sq ft	pounds per day per square feet
lbs/hr/sq ft	pound per hour per square feet
lb VS/day/cf	pounds of volatile solids per day per cubic foot
lf	linear feet
MG	million gallons
mgd	million gallons per day
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids
mW	megawatts
NAAQS	National Ambient Air Quality Standards
NH_3-N	ammonia-nitrogen
ng/L	nanogram per liter
NPDES	National Pollutant Discharge Elimination System
NSR	New Source Review
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PFRP	Process for Further Reducing Pathogens
P4	Priority Pollutant Pretreatment Program
POTW	publicly owned treatment works
ppb	parts per billion
ppd	pounds per day
PPD	Pollution Policy Document
ppd/EDU	pounds per day per equivalent dwelling unit
ppcd	pounds per capita per day
ppm	parts per million
psi	pounds per square inch
psig	pounds per square inch gauge
PSRP	Process for Significantly Reducing Pathogens
PTO	permit to operate
PHWWF	peak hour wet weather flow
$PHWWF_2$	peak hour wet weather flow for the 2-year return event
$PHVVWF_{100}$	peak hour wet weather flow for the 100-year return event
PWWF	peak wet weather flow

RAS	return activated sludge
RO	reverse osmosis
RSSD	Richmond Sanitary Sewer District No. 1
RSS	Richmond Sanitary Service
RWQCB	Regional Water Quality Control Board
scfm	standard cubic feet per minute
sf	square feet
SIP	State Implementation Plan
SRT	solids retention time
STLC	soluble threshold limit concentration
SWRCB	State Water Resources Control Board
TAP	Toxics Action Plan
T-BACT	toxics best available control technology
THM	trihalomethane
TKN	total kjeldahl nitrogen
TOCL	total organic chlorine compounds
TN	total nitrogen
tpd	tons per day
TRE	toxicity reduction evaluation
TSS	total suspended solids
TTLC	total threshold limit concentration
TWAS	thickened waste activated sludge
UV	ultraviolet
µg/L	microgram per liter
VLR	volumetric loading rate
VOC	volatile organic compound
VS	volatile solids
WAS	waste activated sludge
WCA	West County Agency
WCWD	West County Wastewater District
WCCSL	West Contra Costa Sanitary Landfill
WPCP	Water Pollution Control Plant
WSE	water surface elevation

EXECUTIVE SUMMARY

1.1 INTRODUCTION AND PURPOSE OF PLAN

The Richmond Sanitary Sewer District No. 1 (RSSD) provides wastewater treatment and effluent disposal services for most of the City of Richmond (City) and a small area within unincorporated Contra Costa County limits in the San Francisco Bay Area. Under contract with the City, Veolia Water North America (Veolia) operates and maintains the RSSD facilities, which include a wastewater collection system, the Water Pollution Control Plant (WWTP), and an effluent disposal system.

In 2010, the City and Veolia initiated the Wastewater Treatment Master Plan (2010 Master Plan). This plan provided a comprehensive evaluation of the WWTP and recommended a capital improvement plan (CIP) to address its needs through 2040. Since starting the 2010 Master Plan, the City and Veolia have implemented some of the critical projects identified in the CIP. The most significant projects that have been implemented include: a wet weather pump station and an equalization storage tank to minimize overflows in the collection system; upgrades to the digester and heating/mixing system; and replacement of the aging and deteriorated electrical distribution system.

While these projects have improved the plant's overall reliability, several critical projects identified in the 2010 Master Plan have not been implemented. As a result, in 2015, the City and Veolia initiated the Wastewater Treatment Facility Plan to provide updated recommendations for the critical projects identified in the 2010 Master Plan. The Facility Plan also addresses additional critical treatment plant needs that plant staff has identified since the adoption of the 2010 Master Plan. These projects are recommended for implementation within the next 10± years.

To support long-term planning, the Facility Plan also includes a high-level update to the WWTP's long-term needs and includes recommendations for long-term projects that are anticipated to be needed through 2045±. The long-term recommendations are based on current understanding of anticipated regulations. These long-term projects are important to consider to ensure that all site planning and financial considerations are addressed.

Long-term projects identified in the 2010 Master Plan, such as rehabilitation and replacement (R&R) projects, that have less impact on the overall site layout and CIP costs were not reevaluated. These projects were, however, included in the Facility Plan CIP to provide a complete high-level estimate of CIP costs through 2045±.

The purpose of the Facility Plan is to:

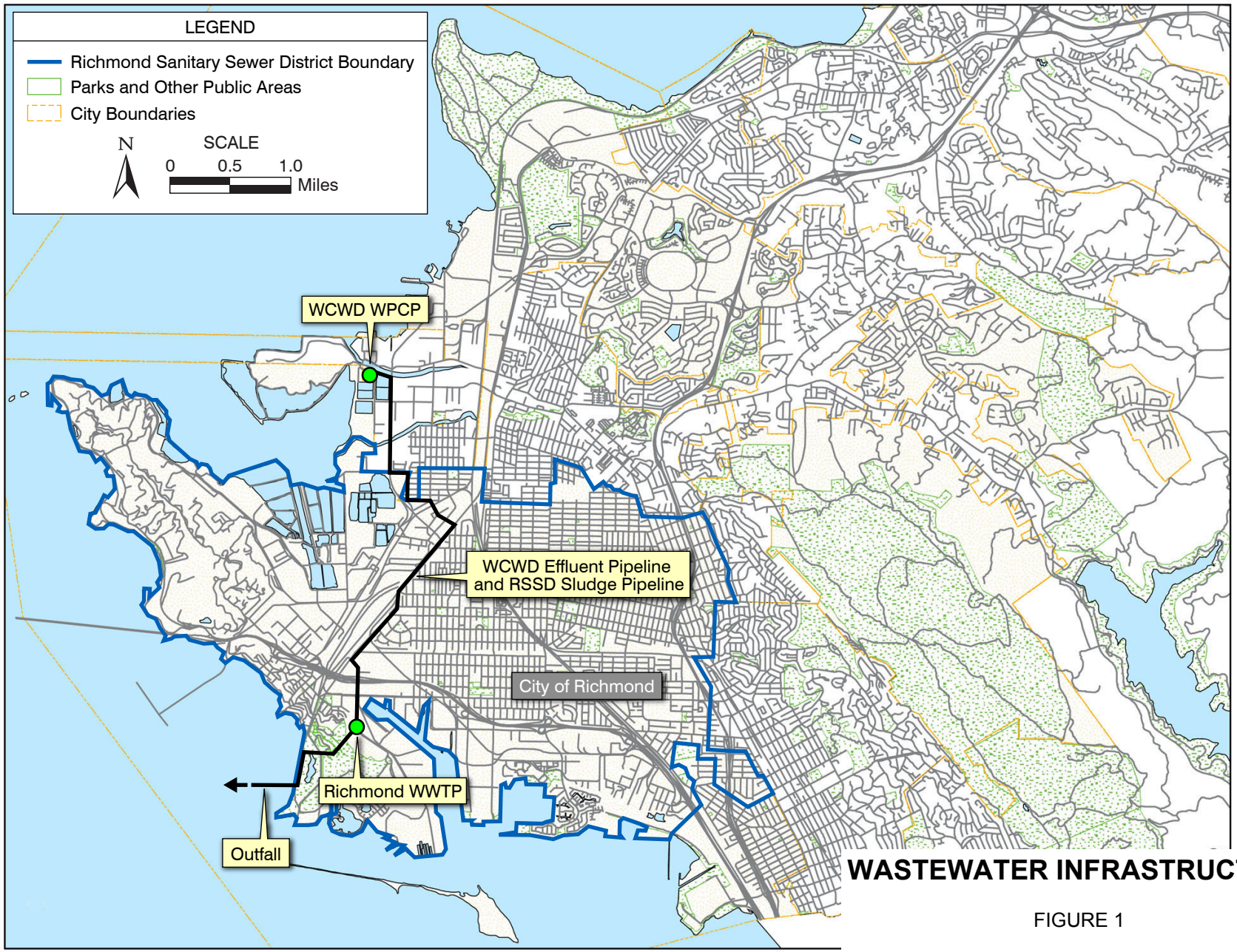
- Evaluate the current and projected flows and loads to the WWTP.
- Evaluate the performance and capacity of the existing treatment process to reliably meet the existing discharge requirements.
- Review current and anticipated regulations governing final effluent, solids treatment and use/disposal, and air emissions.
- Evaluate the overall condition of facilities affected by the critical and near-term projects.
- Evaluate alternatives and develop project recommendations to address the WWTP's critical, near-term, and long-term needs.
- Evaluate the feasibility of providing the WWTP effluent to EBMUD for reuse, which would be consistent with the City's environmental and sustainability initiatives.
- Develop a capital improvement plan (CIP) that identifies needs for critical and near-term improvements, as well as potential long-term improvements.

1.2 EXISTING FACILITIES

Wastewater from residential, commercial, and industrial customers flows to the City's WWTP through an extensive network of underground sewer pipelines known as the wastewater collection system. The WWTP provides secondary treatment and disinfection of the wastewater flows. Treated effluent from the WWTP is combined with effluent from the WCWD Water Pollution Control Plant (WPCP) and ultimately discharged to the San Francisco Bay through a deep-water outfall. Currently, biosolids from the WWTP are pumped to the WCWD WPCP for dewatering, drying, and eventual disposal at a nearby landfill. Figure 1 shows the WWTP's location, the RSSD service area, and the location of other facilities that interact with the WWTP.

Constructed in 1953, the WWTP was originally built as a primary treatment facility. Since then, it has been upgraded to accommodate growth and changes in regulations. In 1967, the WWTP was upgraded to provide secondary treatment. Smaller upgrade projects have been completed, including the addition of another secondary clarifier in 1990 and the rehabilitation of various aging assets.

Despite these upgrades, many more improvements are required to restore the plant to modern standards. Most treatment structures are at least 45 years old. Collectively, the aging facilities jeopardize the treatment plant's ability to meet current discharge requirements.



WASTEWATER INFRASTRUCTURE

FIGURE 1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f35-11034.ai

The City and WCWD entered into an agreement to end the practice of pumping the WWTP's biosolids to the WCWD WPCP for treatment and disposal by January 1, 2016. This practice, however, has not yet been discontinued. As a result, the City is paying penalty fees to WCWD. To meet the terms of the agreement and avoid increasing biosolids disposal costs, a dewatering facility will be needed at the WWTP site. The City would then be responsible for the disposal of dewatered biosolids.

1.3 PLANNING ASSUMPTIONS

1.3.1 Service Area and Growth

The service area includes residential, commercial, and industrial development. Per the City's 2012 General Plan and Association of Bay Area Governments (ABAG) population project data, the service area population is projected to increase by about 1.0 percent per year. Assuming this growth rate, the ADWF is expected to increase from 5.8 mgd to 7.4 mgd by 2040±.

1.3.2 Regulations

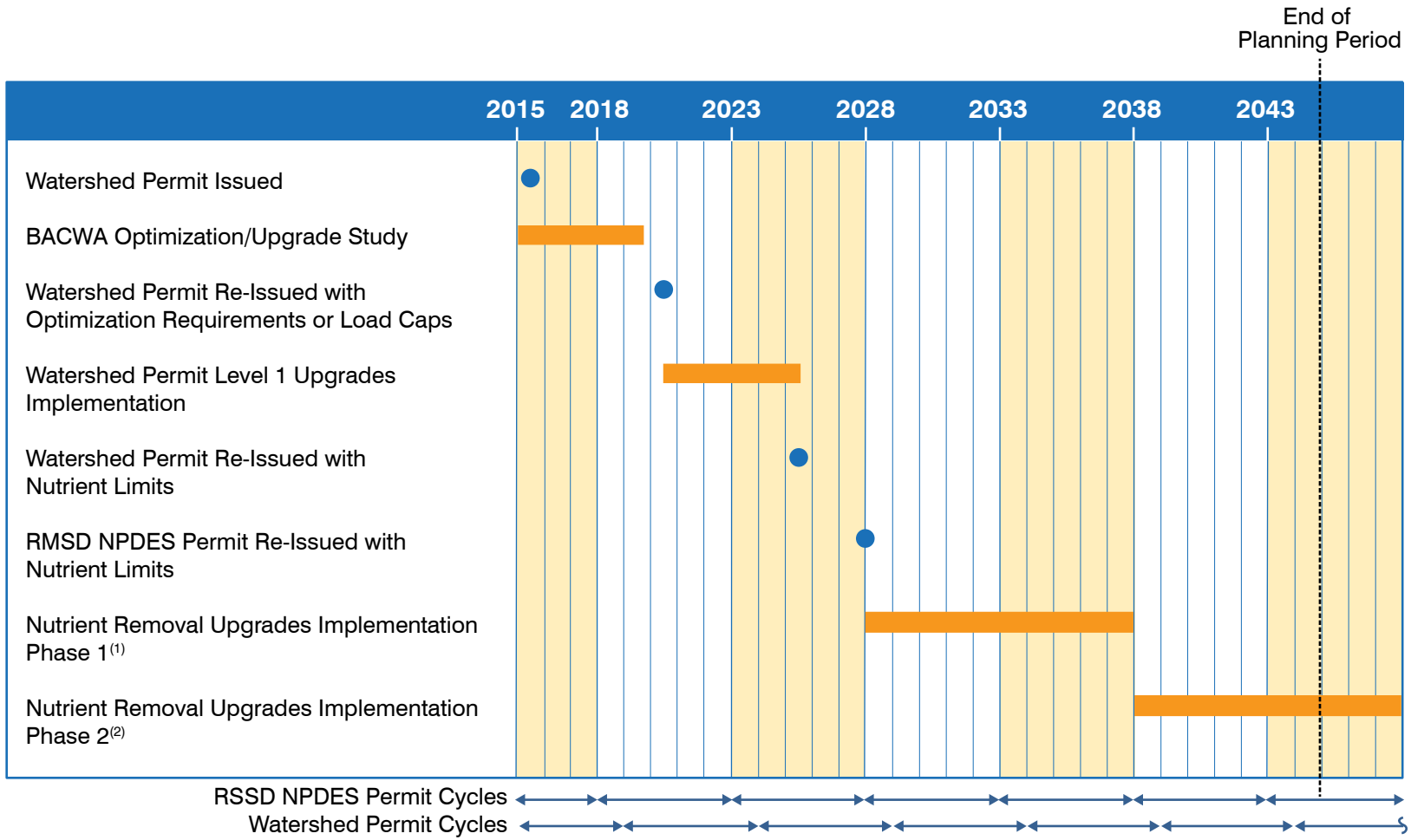
The WWTP has adequately met the regulatory requirements governing final effluent, solids treatment and use/disposal, and air emissions. However, critical improvements to the WWTP are required to more reliably meet the final effluent requirements in the current National Pollutant Discharge Elimination System (NPDES) permit. Furthermore, regulations for final effluent and solids treatment and use/disposal are anticipated to become more stringent and are expected to have an increasing impact on the future operations and expansion of the WWTP.

Figure 2 shows the anticipated timing for possible changes in the NPDES requirements for nutrients, specifically nitrogen and phosphorus, over the next 30± years. As the figure shows, the requirements are anticipated to be issued over time in three phases: Levels 1, 2, and 3.

While the timing and scope of these requirements are uncertain at this time, planning efforts assumed that the City would be required to meet an ammonia limit of 2 mg/L and a total nitrogen limit of 6-15 mg/L within the next 20 years.

As noted above, the City's current practice of pumping biosolids to the WCWD WPCP will need to be discontinued. This will require that the City provide biosolids dewatering at the WWTP and dewatered biosolids disposal.

In the near-term, it is anticipated the WWTP should be able to continue disposing of biosolids to a nearby landfill. However, disposing of biosolids at landfills and land applying biosolids is becoming increasingly restricted. California legislation requires reducing waste being sent to a landfill by 75 percent by 2020. In addition to this, the state will eliminate diversion credit for green waste used as alternative daily cover by 2020 and is pushing to



Notes:

(1) At this time, the Watershed Permit limits and timing have not been established. The assumed Phase 1 would include upgrades to meet Level 2 or Level 3 nutrient removal targets based on 2015 BACWA Nutrient Optimization/Upgrade Scoping and Evaluation Plan. The provisional nutrient limits are as follows:

Level 2: (NH_3 < 2 mg/L, TN < 15 mg/L, TP < 1 mg/L)

Level 3: (NH_3 < 2 mg/L, TN < 6 mg/L, TP < 0.3 mg/L)

(2) Phase 2 would be required if the nutrient limits are issued in two phases. Under this scenario, Phase 1 would be to meet Level 1 limits; Phase 2 would be to meet Level 2 limits.

POTENTIAL SCENARIO – IMPLEMENTATION SCHEDULE FOR NUTRIENT REMOVAL

FIGURE 2

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f36-10034.ai

divert 100 percent of organic waste (e.g., biosolids) from landfills by 2025. Due to this legislation, the use of biosolids as landfill alternative daily cover will likely be significantly reduced or eliminated. Therefore, it is recommended the City develop a plan for alternative biosolids use and/or disposal scenarios.

1.4 ASSESSMENT OF EXISTING FACILITIES

1.4.1 Treatment Performance and Capacity

The WWTP's performance and capacity were assessed based on an evaluation of five years of operating data. Overall, the WWTP has performed adequately with respect to compliance with the effluent requirements included in the current NPDES permit. Some permit exceedances have occurred, largely due to mechanical failures of aging equipment.

According to the NPDES permit, the facility currently has a rated secondary treatment capacity of 16 mgd for ADWF and 20 mgd for PWWF. The primary treatment facilities have a peak capacity of 40 mgd. When flows exceed 20 mgd, excess primary effluent flows to the chlorine contact tank, where it is blended with the secondary effluent. The blended effluent must meet secondary treatment discharge limits.

To determine the capacity of the WWTP and outfall, a hydraulic and process capacity assessment was performed. The results of this assessment are listed below.

- The WWTP and outfall have sufficient hydraulic capacity to accommodate peak flows through the treatment plant. However, at peak flows under high tide conditions, the water surface elevations in the treatment plant increase and adversely impact treatment process performance. It is recommended that a low-lift effluent pump station be implemented to address this issue.
- The ADMMF capacity of the liquid treatment process is 15 mgd and is limited by the capacity of the aeration basins. It is recommended improvements be made to the aeration system to increase the treatment capacity of the aeration basins in order to treat projected flows and loads.
- The ADWF capacity of the liquid treatment process with all units in service is 8.2 mgd and is limited by the capacity of the aeration basins. It should be noted that there is not enough aeration basin capacity to take one of the two basins out of service during dry weather flows. It is recommended that capacity improvements be made to the aeration basins to more reliably treat current and projected flows and loads. These improvements would also allow for one aeration basin to be taken out of service during dry weather flow for routine maintenance.
- The ADMMF and ADWF capacity of the solids treatment process is 19 mgd and 13 mgd, respectively. The solids process capacity is limited by the capacity of the dissolved air flotation thickener (DAFT), which is used for sludge thickening. It

should be noted that there is only one functional DAFT, so there is no redundant capacity for thickening. It is recommended the thickening facilities be upgraded to include one redundant unit. This would increase the reliability of sludge thickening and allow for routine maintenance.

1.4.2 Condition Assessment

A comprehensive condition assessment of the WWTP assets was performed as part of the 2010 Master Plan. Equipment rehabilitation and replacement (R&R) projects were developed and prioritized based on the condition assessment and a criticality assessment of the various assets.

Through the 2015 Facility Plan condition assessment, the findings of the 2010 Master Plan condition assessment were updated. Specific emphasis was given to facilities that would be impacted by the critical and near-term projects recommended for implementation within the next 10± years.

Since the 2010 Master Plan, the highest priority R&R projects have been implemented. The remaining R&R projects are still considered high priority, and it is recommended they be implemented within the next 5 to 10± years. Long-term R&R recommendations from the 2010 Master Plan are carried forward in this Facility Plan to support long-term planning. The R&R projects and their priority are discussed in detail in Chapters 5 and 10 of the Facility Plan.

1.5 RECYCLED WATER FEASIBILITY

An analysis was conducted to determine the feasibility of conveying secondary effluent from the WWTP to EBMUD's reclamation facilities for reuse. The analysis was developed to facilitate future decisions regarding implementation of a recycled water project at the WWTP. Alternatives were developed to treat secondary effluent to EBMUD's water quality requirements, with the goal of sending that effluent to EBMUD's reclamation facilities. Feasibility of implementing a recycled water project will depend on the timing, scope, and method of funding for the project. Given that this feasibility analysis needs further refinement, a recycled water project is not included in the recommended CIP included in Chapter 10.

1.6 FUTURE NEEDS AND PROJECT TRIGGERS

A CIP was developed for the Facility Plan that identifies critical and near-term projects required at the WWTP over the next 10± years, as well as long-term projects required beyond the 10-year planning horizon. Capital projects were identified and defined at the planning-level to address the WWTP's needs determined through the regulatory review and the performance, capacity, and condition assessments.

The analysis identified the following project triggers:

- **Rehabilitation and Replacement.** Risk of failure of a vital facility or asset requires rehabilitation or replacement.
- **Regulatory Requirement.** Future regulations require adjustments and improvements to the WWTP.
- **Improved Performance Benefit.** Process improvements to increase reliability and reduce risk.
- **Policy Decision.** Improvements based on policy direction.

In developing the overall implementation schedule for the WWTP, three major phases of improvements were identified:

- **Critical Projects.** Projects recommended for implementation within the next 5± years. These projects are critical because they are considered essential to being in compliance with the current NPDES discharge permit and biosolids disposal agreement with WCWD. In addition, some of these improvements would also reduce health and safety impacts to plant staff.
- **Near-Term Projects.** Projects recommended for implementation within the next 5 to 10± years. These projects are required to replace and rehabilitate aging infrastructure that is essential to reliable plant operations.
- **Long-Term Projects.** Projects recommended for implementation in the next 10 to 30± years. These projects are anticipated to be required to meet future flows and loads and future regulations, specifically with respect to nutrient removal and the treatment of wet weather flows.

1.7 KEY FEATURES OF THE RECOMMENDED NEAR-TERM CIP

1.7.1 Critical Projects

1.7.1.1 Improved Treated Water Quality

Significant upgrades to the existing headworks and secondary treatment process are recommended to improve treatment performance, improve the WWTP's ability to reliably remove BOD and TSS, and reduce health and safety impacts to plant staff. The secondary treatment improvements are an initial phase of work that would need to be completed prior to the long-term improvements required to meet anticipated nutrient removal requirements (specifically for total nitrogen and phosphorous).

1.7.1.2 Biosolids Dewatering and Disposal

To meet the terms of the biosolids disposal agreement with WCWD, a dewatering facility must be implemented at the WWTP site. As part of the Dewatering Facility project, the City

would need to develop biosolids disposal plans and agreements with a landfill or other entity that will accept the dewatered biosolids. To minimize costs, it is recommended the City dispose of biosolids at a nearby landfill until it is no longer feasible.

For long-term planning, other biosolids disposal options need to be considered. It is recommended the City include a biosolids post-processing project in the CIP and reserve site space for a biosolids post-processing facility. A post-processing facility would further treat the dewatered solids (e.g. through drying or composting) to make them higher quality and/or a marketable product, which would allow for more disposal options.

The dewatering facility would generate a liquid waste stream (centrate) that would likely require treatment. The centrate would increase the total ammonia load to the treatment process. The Regional Water Quality Control Board (RWQCB) may require the City to treat this additional ammonia load. If that is the case, additional improvements would be required, such as side-stream treatment, and the project cost of the Dewatering Facility Project would likely increase by about $8 to 10.5 million.

1.7.2 Near-Term Projects

1.7.2.1 Addressing Aging Infrastructure

Most of the WWTP infrastructure is approaching or is beyond its anticipated service life or is recommended for replacement for various reasons. As a result, most of the long-term projects include replacement or rehabilitation of those assets. The WWTP assets would be replaced or rebuilt to provide more efficient and cost-effective treatment by using new technologies and maximizing the use of existing infrastructure where possible.

1.7.2.2 Nutrient Removal

To meet the Level 1 Nutrient Removal Requirements, the existing aeration basins may need to be upgraded to provide seasonal nitrogen removal during dry weather periods. For planning purposes, a Level 1 Nutrient Removal Improvements project has been included in the CIP. The scope of this project should be revisited and updated as the Level 1 requirements become more defined and certain.

1.8 KEY FEATURES OF THE RECOMMENDED LONG-TERM CIP

1.8.1 Long-Term Projects

1.8.1.1 Nutrient Removal

To address long-term anticipated regulations for nutrient removal, it is recommended the secondary treatment process be expanded and modified. To meet the Level 2 Nutrient Removal Requirements, it is recommended an additional four aeration basins (6 aeration basins total) and a chemically enhanced primary treatment (CEPT) facility be implemented. To meet the Level 3 Nutrient Removal Requirements, it is recommended denitrification

filters be implemented. The scope of these projects should be revisited and updated as the Level 2 and 3 requirements become more defined and certain.

1.8.1.2 Wet Weather Capacity Improvements

If regulations require eliminating wet weather blending, wet weather capacity improvements are recommended to increase the treatment capacity of the secondary treatment process to 40 mgd. This could be achieved with the six aeration basins that would be implemented to address nutrient removal requirements, as well as the replacement of the three existing secondary clarifiers with three new secondary clarifiers of a similar size. The new secondary clarifiers would be designed to accommodate peak flow.

1.9 TEN-YEAR CIP

Over the next ten years, the City's main area of focus in the CIP will be implementing improvements for improved treatment performance and to replace and rehabilitate assets. These improvements are critical to maintaining reliable operation of the WWTP to be in compliance with current regulations.

Figure 3 shows the total cost of the 10-year CIP, which is $117 million. These costs were developed at a planning level, which is a Class 5 estimate as defined by the Association for the Advancement of Cost Engineering. This is intended to be a conservative estimate based on the information available at the time the cost estimate was prepared. Project costs include allowances for contingency, engineering, design, permitting, and construction administration. To better represent future costs at the time of construction, costs were escalated to the midpoint of construction.

Figure 4 shows the proposed implementation schedule, and Figure 5 shows a site layout of the recommended projects included in the Facility Plan CIP. A list of the recommended projects is provided below.

1.9.1 Process Improvements

- Screening and Grit Removal Improvements.
- Secondary Treatment Improvements.
  - Aeration System Upgrades.
  - Secondary Clarifier Improvements.
- Nutrient Removal Study.

1.9.2 Policy-Driven Improvements

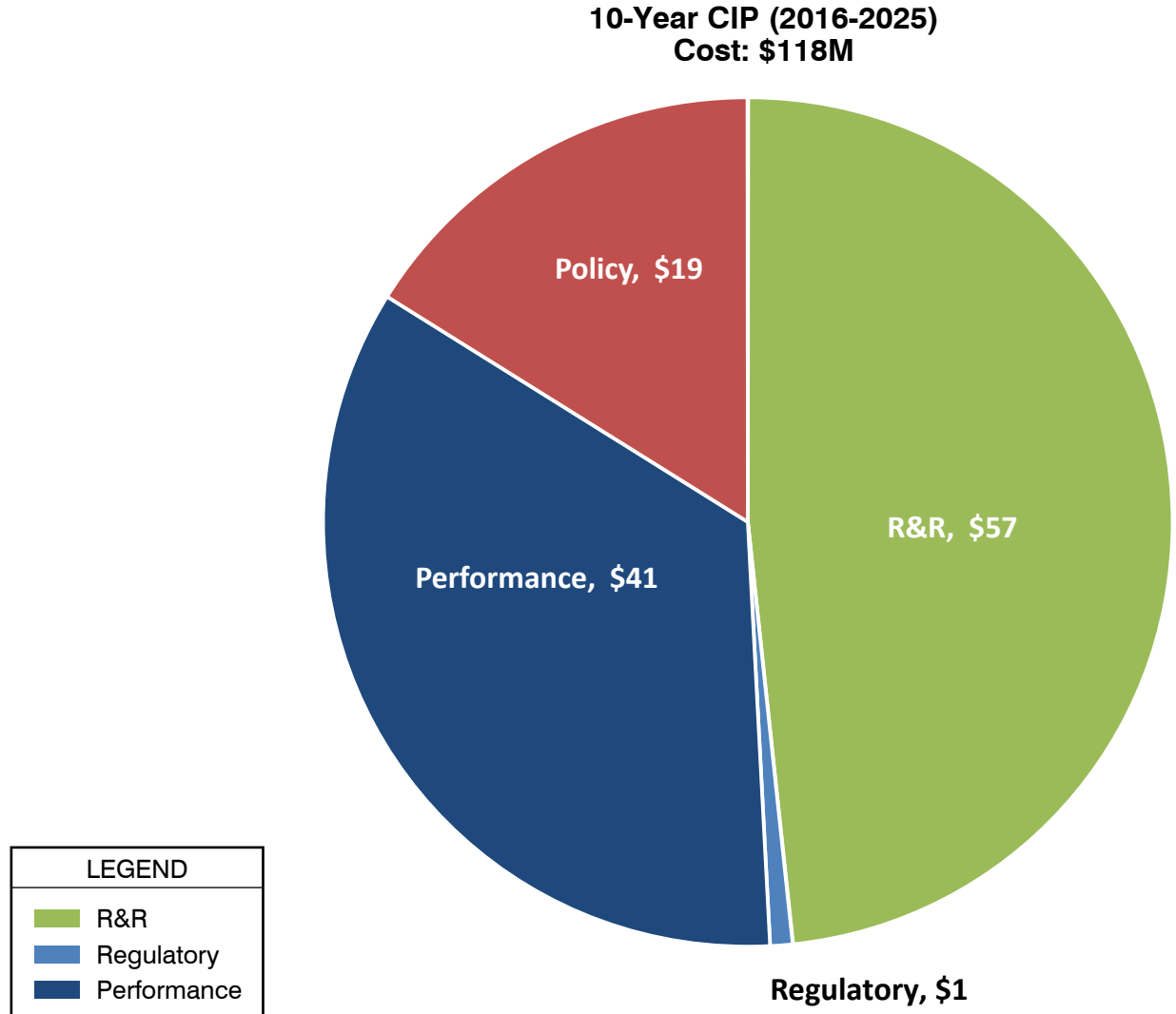
- Dewatering Facility.

1.9.3 Regulatory Improvements

- Level 1 Nutrient Removal Improvements

1.9.4 Rehabilitation Improvements

- Thickening Facility.
- Sodium Bisulfite System Replacement.
- Digester Gas Facilities Repair.
- Collection System SCADA Upgrades.
- WWTP SCADA Upgrades.
- 3-Water System Improvements.
- WWTP Lighting and Paving Improvements.
- Site Protection from Rock Slides.
- Low-Lift Effluent Pump Station.
- Priority 1, 2, 3, and 4 Rehabilitation and Replacement Projects.



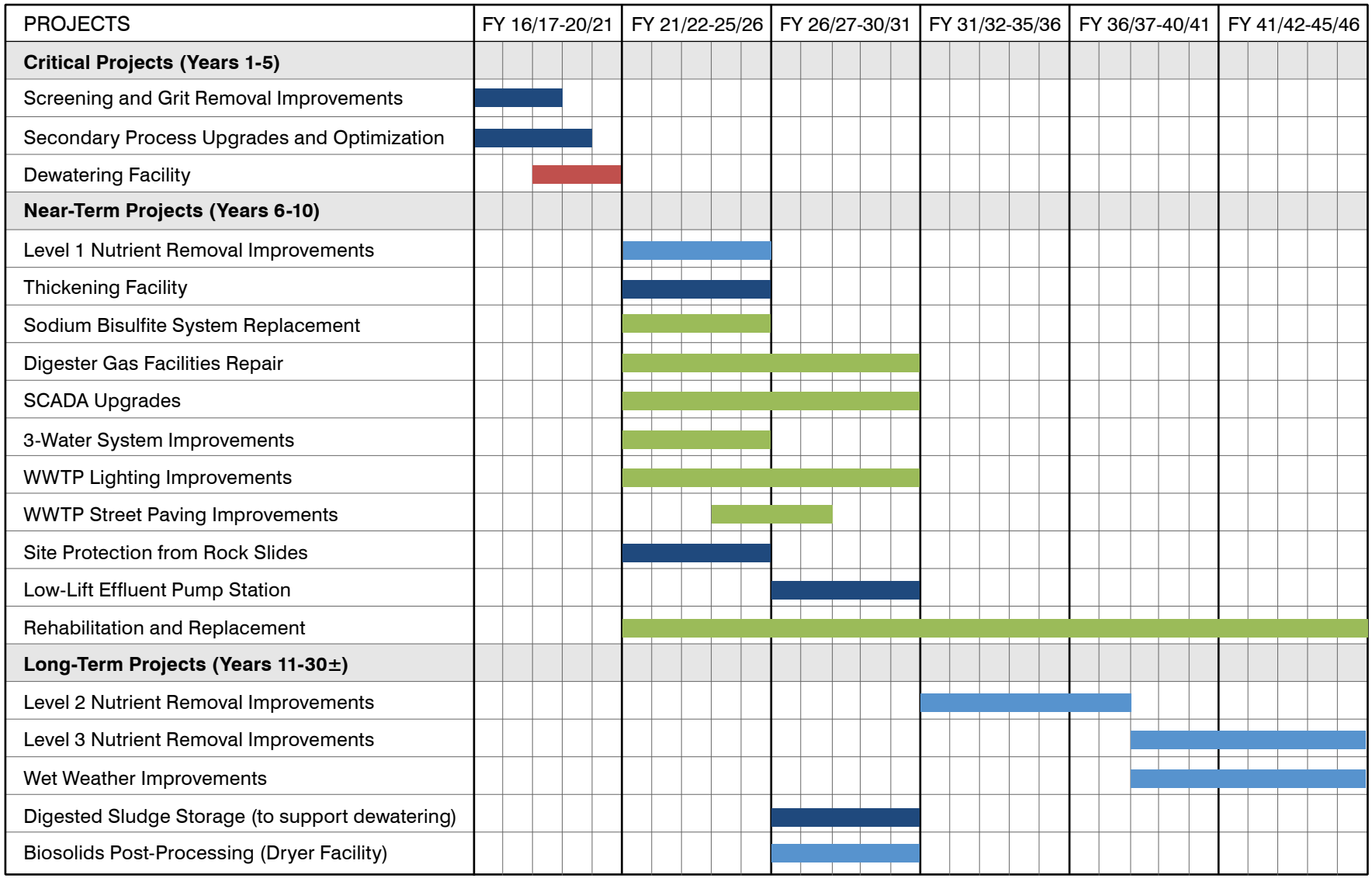
SUMMARY OF 10-YEAR CIP COSTS

FIGURE 3

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f43-11034.ai



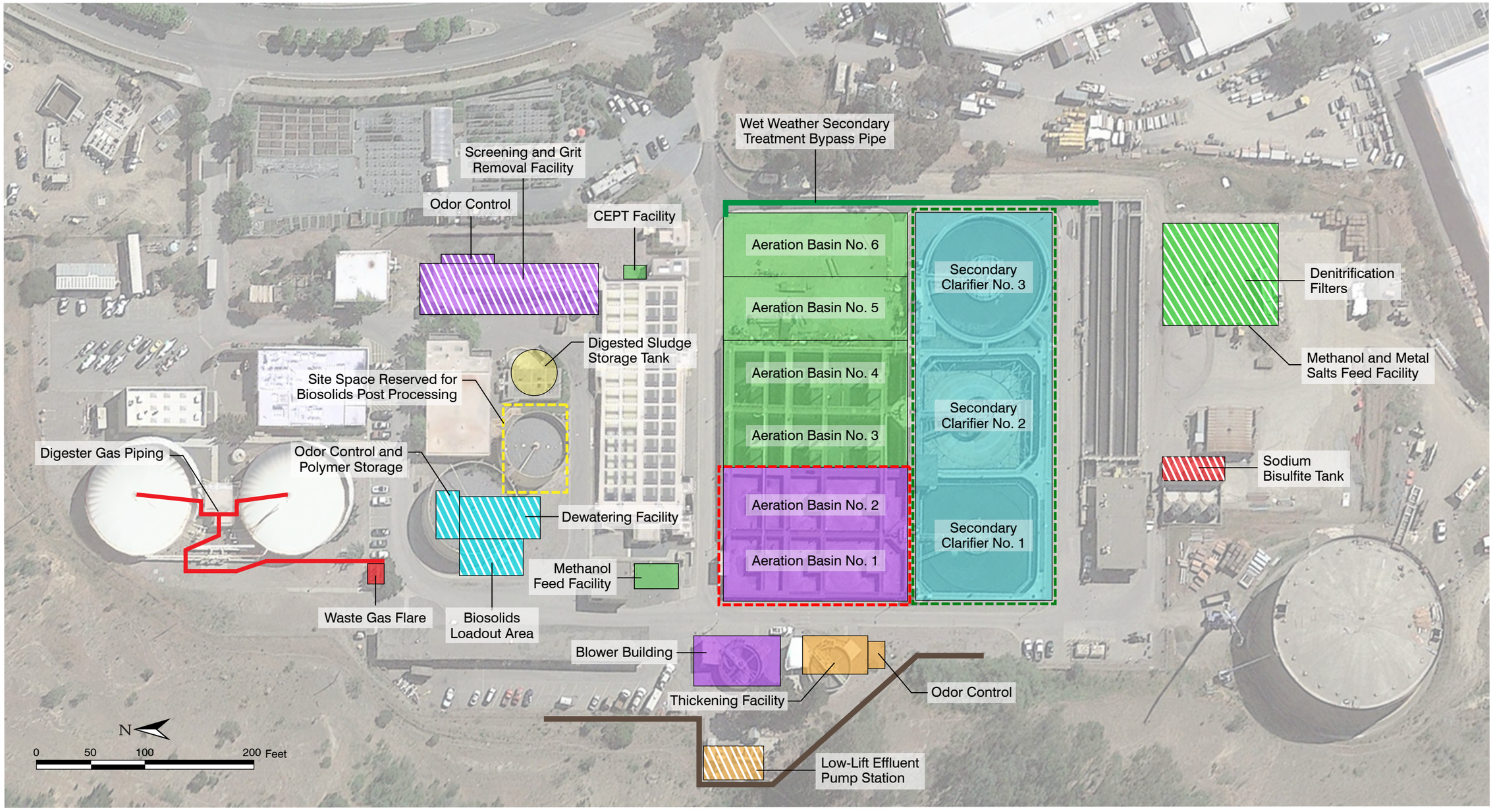
PROJECT IMPLEMENTATION SCHEDULE

FIGURE 4

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f41-11034.ai



Critical Projects
- Screenings and Grit Removal Improvements
- Aeration System Upgrades
- Secondary Clarifier Improvements
- Dewatering Facility

Near-Term Projects
- Thickening Facility
- Sodium Bisulfite System Replacement
- Digester Gas Piping and Waste Gas Flare Rehabilitation
- Low-Lift Effluent Pump Station
- Site Protection from Rock Slides
- Level 1 Nutrient Removal Improvements

Not Shown:
- Collection System SCADA Upgrades
- WWTP SCADA Upgrades
- 3-Water System Improvements
- WWTP Lighting Improvements
- WWTP Street Paving Improvements

Long-Term Projects
- Level 2 Nutrient Removal Improvements
- Level 3 Nutrient Removal Improvements
- Wet Weather Improvements
- Digested Sludge Storage

SITE LAYOUT OF RECOMMENDED PROJECTS

FIGURE 5

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f37-10034.ai

Chapter 1

PROJECT BACKGROUND

1.1 INTRODUCTION AND PURPOSE

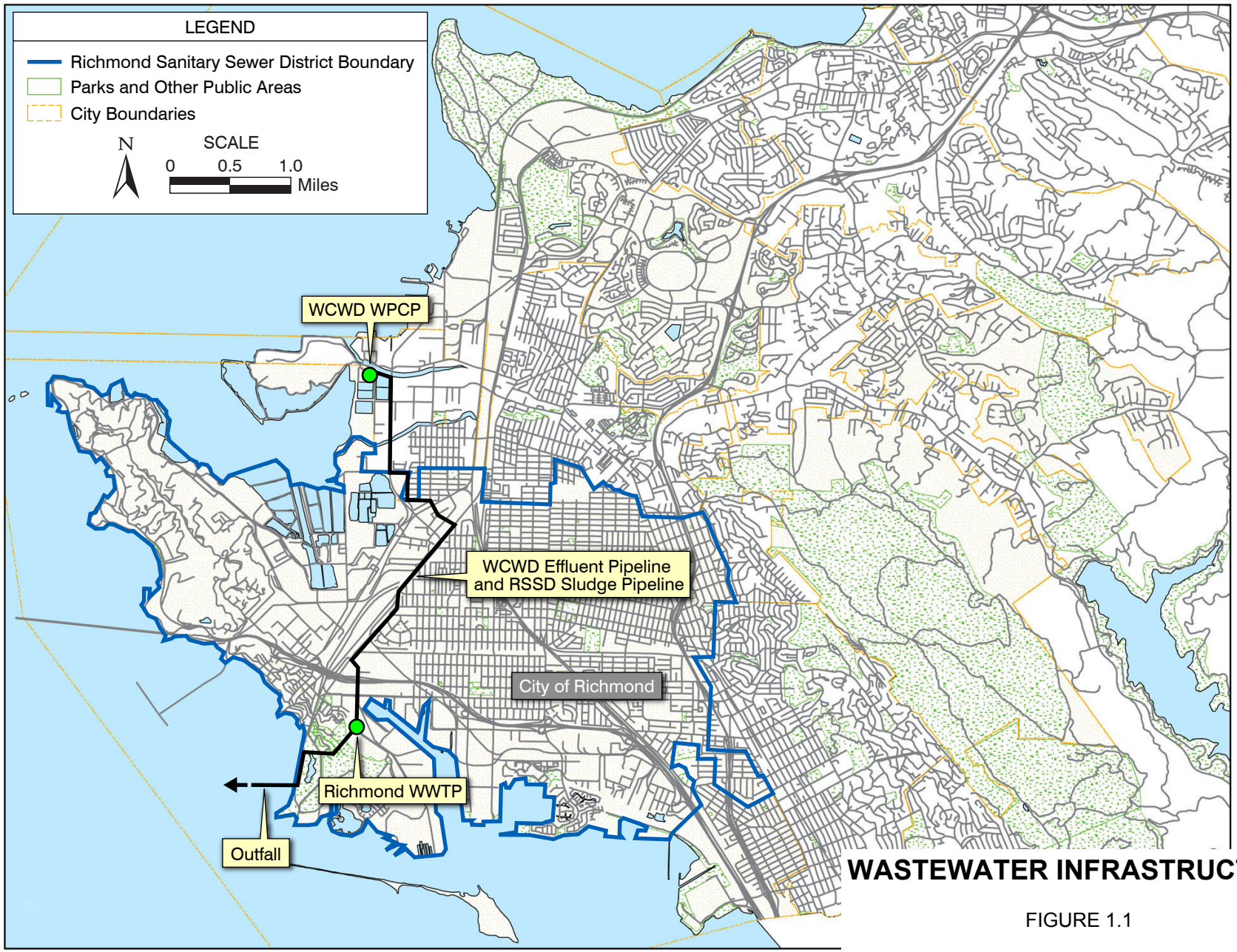
Richmond Sanitary Sewer District Number One (RSSD) and the West County Wastewater District (WCWD) provide wastewater services for communities in the greater portion of west County Costa County. The two districts operate separate wastewater treatment plants under the authority of the West County Agency (WCA), which was formed by a Joint Powers Agreement in February 1977.

Veolia Water North America (Veolia), under contract with the City of Richmond (City), operates and maintains the wastewater collection system, wastewater treatment facility, and effluent disposal system of RSSD, which serves commercial, residential, and industrial development within most of the City. Wastewater is conveyed from the City's wastewater collection system to RSSD's Water Pollution Control Plant (WWTP). Treated effluent from the WWTP is combined with effluent from the WCWD Water Pollution Control Plant (WPCP), and the combined effluent is discharged through a deep-water outfall into the San Francisco Bay. Digested sludge from the WWTP is currently pumped to sludge drying beds owned and operated by WCWD. Figure 1.1 shows the location of the WWTP, the RSSD service area, and the location of other facilities that interact with the WWTP.

In 2010, Veolia hired Carollo Engineers, Inc. (Carollo) to produce the Richmond Wastewater Treatment Master Plan (2010 Master Plan). The 2010 Master Plan performed a comprehensive evaluation of the treatment plant, including a flow and loads projection, a hydraulic and process capacity evaluation, discussion of future regulatory requirements, a plant condition assessment, a treatment alternative analysis, an investigation of sustainable design elements and strategies, and a recommended capital improvement plan through 2045.

The Facility Plan focuses on the critical projects identified in the Master Plan and additional critical treatment plant needs identified by plant staff since the adoption of the 2010 Master Plan. These projects are referred to as critical and near-term projects throughout the Facility Plan and are recommended for implementation in the next 10± years.

Although the primary focus of the Facility Plan is the critical and near-term projects, the Facility Plan also includes a high-level evaluation of long-term projects that are anticipated to be needed in the next 10 to 30± years, through 2045±. These long-term projects are important to consider to ensure the WWTP site space is used efficiently and capital improvement projects are prioritized appropriately. Long-term projects that are anticipated to have a significant impact on the overall site layout and capital improvement costs were evaluated at a high-level. Long-term projects identified in the 2010 Master Plan, such as rehabilitation and replacement (R&R) projects, that have less impact on the overall site



WASTEWATER INFRASTRUCTURE

FIGURE 1.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f24-11034.ai

layout and CIP costs were not re-evaluated. They were, however, included in the Facility Plan CIP to provide a complete high-level estimate of CIP costs through 2045±.

The purpose of the Facility Plan is to:

- Provide an updated evaluation of the current and projected flows and loads to the WWTP.
- Provide an updated evaluation of the capability of the existing treatment process to reliably meet the existing discharge requirements.
- Provide an updated evaluation of current and anticipated regulations governing final effluent, solids treatment and use/disposal, and air emissions.
- Provide an update evaluation of the overall condition of the facilities that will be impacted by the critical and near-term projects.
- Evaluate alternatives and develop project recommendations to address the critical, near-term, and long-term needs of the WWTP.
- Evaluate the feasibility of providing the WWTP effluent to EBMUD for reuse, which would be consistent with the City's environmental and sustainability initiatives.
- Develop a capital improvement plan (CIP) that identifies needs for critical and near term improvements, as well as potential long-term improvements.

1.2 FACILITY PLAN SCOPE

In order to plan ahead and provide short-term direction for wastewater facility modifications, Veolia and the City authorized the preparation of a Facility Plan for Critical Projects in August 2015. The Facility Plan addresses critical, near-term, and long-term needs through the year 2045±, with a focus on the critical and near-term needs. The Facility Plan will allow Veolia and the City to reliably meet existing secondary treatment requirements by proceeding with a cost effective rehabilitation and replacement program.

In addition, the Facility Plan looks beyond the existing secondary treatment requirements to future levels of treatment which may include nitrification, nutrient removal, prohibition of wet weather bypassing, as well as present potential alternatives to the current practice of disposing of biosolids at landfills. As a planning document, the Facility Plan is designed to help in establishing a capital improvement plan (CIP) for the WWTP. The CIP provides facility layouts, an implementation schedule, and planning level costs for each recommended project.

1.3 REPORT ORGANIZATION

The Facility Plan is organized into ten chapters, followed by appendices that provide more detailed information and supporting documentation of the results and recommendations of this study. The chapters are described below.

Executive Summary - Summarizes the major findings of the Facility Plan.

Chapter 1 - Project Background. Presents a background of the treatment plant and discusses the scope of the study.

Chapter 2 - Wastewater Flows and Loads. Presents flow and load projections updated with 2015 data and extending through the year 2040.

Chapter 3 - Existing Treatment Process Performance and Capacity. Evaluates the historical treatment plan process performance, including an analysis of each major unit process. Establishes a capacity rating for each major unit process.

Chapter 4 - Regulatory Requirements and Considerations. Summarizes current and future regulations governing final effluent, solids treatment and use/disposal, and air emissions

Chapter 5 - Condition Assessment and Criticality Evaluation. Describes the condition of the major treatment plant facilities.

Chapter 6 - Critical Projects. Evaluates alternatives and develops recommendations for critical projects that are recommended for implementation within the next 5± years.

Chapter 7 - Near-Term Projects. Evaluates alternatives and develops recommendations for near-term projects that are recommended for implementation in 5 to 10± years.

Chapter 8 - Long-Term Projects. Evaluates alternatives and develops recommendations for long-term projects that are recommended for implementation in 10 to 30± years.

Chapter 9 - Recycled Water Feasibility. Summarizes the feasibility of supplying WWTP effluent to EBMUD's reclamation facilities for reuse.

Chapter 10 - Capital Improvement Plan. Recommends an implementation plan based on the findings of the Facility Plan. Compiles a list of capital improvement projects and includes a cost loaded schedule for use by the City and Veolia in preparation of an updated financial plan.

Chapter 2

WASTEWATER FLOWS AND LOADS

2.1 INTRODUCTION

This chapter summarizes the historical and projected influent flows and loads to the WWTP. Daily data from January 2010 through December 2015 was reviewed to evaluate historical influent flows and loads. In this analysis, the parameters of concern include flow, biochemical oxygen demand (BOD), total suspended solids (TSS), ammonia, and conductivity (measure of salinity). This data and the projected population growth were used to develop the flow and load projections. These projections were then used to identify which facilities at the WWTP need to be expanded or upgraded.

2.2 DEFINITIONS

Although the permitted (NPDES) capacity of the WWTP is determined based on the average dry weather flow (ADWF) of the plant, the WWTP must be able to handle the daily and seasonal variations in influent flows and loads. In fact, capacity limitations for various processes are often observed during the peak flow and load conditions, not during ADWF conditions. For reference, Table 2.1 summarizes the definitions of various flow and load conditions and their relevance to wastewater planning.

2.3 HISTORICAL INFLUENT FLOWS AND LOADS

The WWTP receives all wastewater flows collected within the RSSD service area and stormwater collected at the plant site. In addition to raw wastewater, the WWTP also receives leachate flow from the West Contra Costa Sanitary Landfill (WCCSL).

The raw wastewater from the collection system consists of two types of flows: domestic (residential) and commercial/industrial. On average, there are 1,800 commercial and industrial users that discharge wastewater into the collection system. To monitor commercial/industrial flows, the City collects total yearly flow, BOD load, and TSS load data for each commercial/industrial user.

2.3.1 Data Collection

2.3.1.1 Flow

Influent flow is measured by a FlowShark flow meter located upstream of the headworks. The influent flowmeter was installed in 2008. Until the fall of 2014, the flow meter was calibrated to measure a peak flow of 40 million gallons per day (mgd), which corresponds to the permitted wet weather capacity of the Influent Pump Station. As a result, flow rates above 40 mgd were reported as 40 mgd.

Table 2.1 Wastewater Flow and Loading Definitions WWTP Facility Plan City of Richmond and Veolia Water		
Term	**Definition**	**Purpose**
ADWF or ADWL	**Average Dry Weather Flow (or Load)** The average daily flow or loading occurring over the three consecutive lowest flow months of the year.	Permitted capacity of the WWTP and used to develop base wastewater flow and loading projections
ADAF or ADAL	**Average Daily Annual Flow (or Load)** The average daily flow or loading for an annual period.	To size sludge digestion and on-site sludge drying facilities.
ADMMF or ADMML	**Average Daily Maximum Month Flow (or Load)** The average daily flow occurring during the peak flow month of the year, or the average daily organic or suspended solids loading occurring during the peak loading month of the year. Peak flow and peak loadings do not necessarily occur in the same month.	To size certain wastewater treatment facilities to meet 30-day NPDES permit requirements
Max Day Flow or Load	**Maximum Day Flow or Load** The maximum single day flow or load recorded for the year.	Sizing of hydraulic facilities, secondary treatment facilities, process aeration, and biological nutrient removal facilities
PHWWF	**Peak Hour Wet Weather Flow (10-year, 24 Hour Storm)** The peak hour flow resulting from a rainfall event with a 10-year return frequency and a 24-hour rainfall period.	To set plant hydraulic capacity

In severe wet weather events, however, influent flows have exceeded 40 mgd. This is known because the effluent flow meter, located downstream of the treatment facilities, has recorded effluent flows in excess of 40 mgd. These higher effluent flows are due in part to onsite plant stormwater runoff, which can be up to 3 to 4 mgd, entering the headworks downstream of the influent flow meter. Operational efforts to remove as much wastewater as possible from the collection system prior to storm events in order to minimize sanitary sewer overflows has also led to flows greater than 40 mgd being routed through the plant. Since the installation of the wet weather storage tank, this practice has been discontinued as all flows larger than 40 mgd are diverted to the wet weather pump station and storage tank.

2.3.1.2 Load

Raw wastewater is sampled at the influent pump station, at a location upstream of where in-plant recycle streams are returned and leachate flows enter the plant. The BOD and TSS

data collected prior to 2012 was variable and higher than previously collected data. Based on discussions with operations staff, this was likely due to the fact the sample tube and suction line were too close to the bottom of the headworks tank and were collecting an unrepresentative sample. To correct this issue, the sample tube and suction line location was adjusted in 2012. Given these sampling issues, only influent BOD and TSS data from 2013 to 2015 were used for load projections.

2.3.2 Flow and Load Data

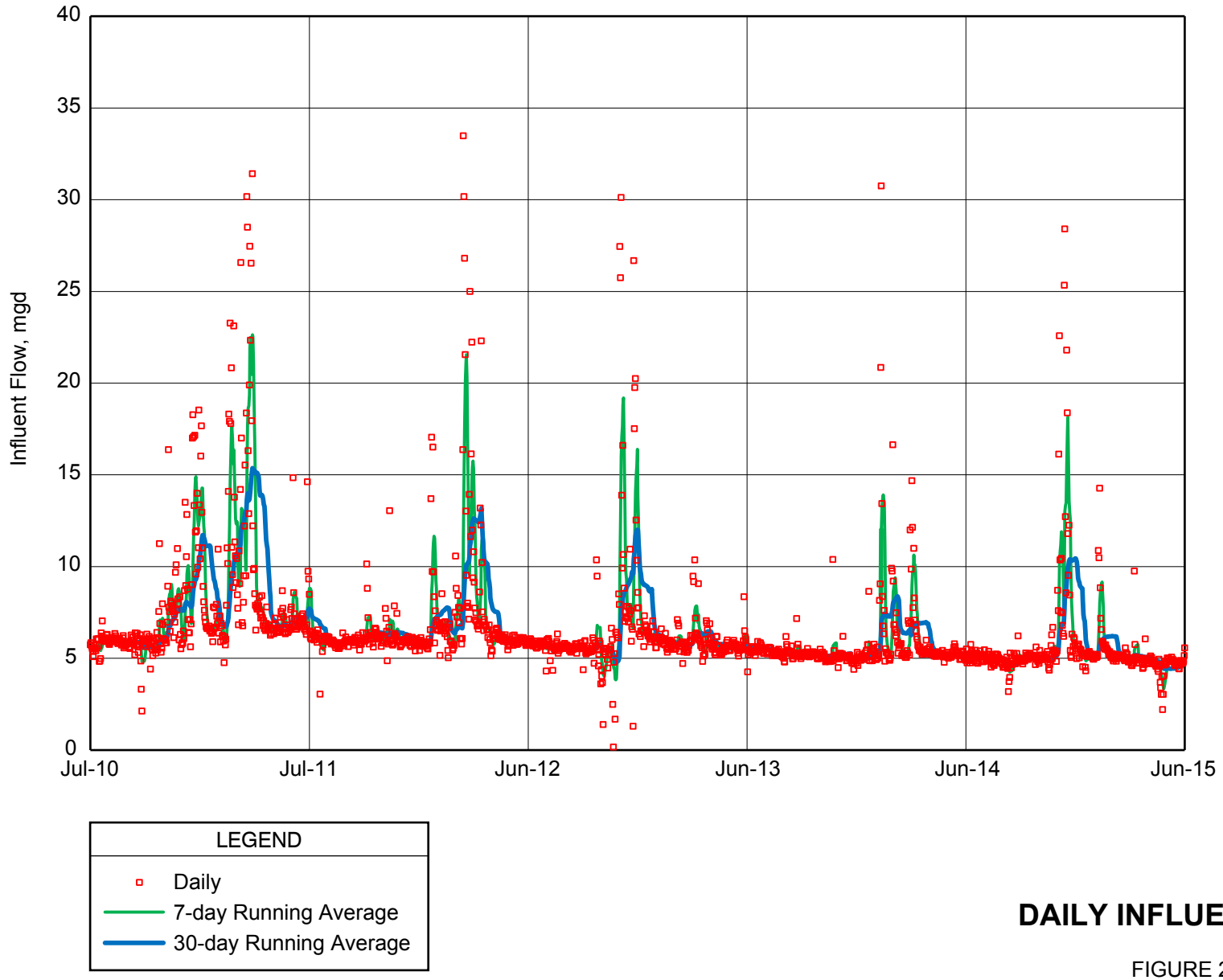
Daily influent flow and load data was evaluated from July 2010 through June 2015. A summary of this data is provided in Table 2.2. This data is for the combined influent consisting of both domestic and commercial/industrial flows.

Table 2.2 Historical Flows and Loads
WWTP Facility Plan
City of Richmond and Veolia Water

Condition	2010	2011	2012	2013	2014	2015	Average
ADW							
Flow, mgd	5.8	5.9	5.4	5.1	4.9	4.4	5.6(1)
BOD, ppd	25,300	24,800	11,200	15,900	13,800	11,900	13,900(2)
TSS, ppd	62,700	31,300	15,900	21,200	14,800	13,700	16,600(2)
ADA							
Flow, mgd	7.5	7.7	7.2	5.6	6.0	4.9	7.0(1)
BOD, ppd	20,100	24,500	15,300	14,300	15,800	12,600	14,200(2)
BOD, mg/L	350	430	280	310	320	310	240
TSS, ppd	38,900	37,200	22,500	19,800	20,100	13,800	17,900(2)
TSS, mg/L	680	630	390	430	420	340	310
ADMM							
Flow, mgd	12.8	15.4	13.2	10.7	10.4	10.3	13.0(1)
BOD, ppd	47,700	43,800	36,200	18,000	22,700	18,700	19,800(2)
TSS, ppd	143,600	56,800	60,700	27,400	35,400	19,700	27,500(2)
Max Day							
Flow, mgd	22.2	31.4	33.5	10.4	30.8	14.3	24.4(1)
BOD, ppd	194,200	132,700	69,100	33,900	76,500	31,900	47,400(2)
TSS, ppd	550,500	213,400	119,500	61,800	80,600	44,300	62,200(2)
PHWW							
Flow, mgd(3)	39.99	39.98	39.98	26.18	47.27	39.44	36.5(1)

Notes:
(1) Excludes the 2014 and 2015 values due to the drought.
(2) Excludes the 2010, 2011, and 2012 values due to sampling issues that caused faulty readings.
(3) The influent pumps are capped at 40 mgd.

Figure 2.1 illustrates the historical daily, 7-day average, and 30-day average influent flow to the WWTP as measured by the influent flow meter. The influent BOD and TSS loadings from January 2012 through June 2015 are shown in Figure 2.2.



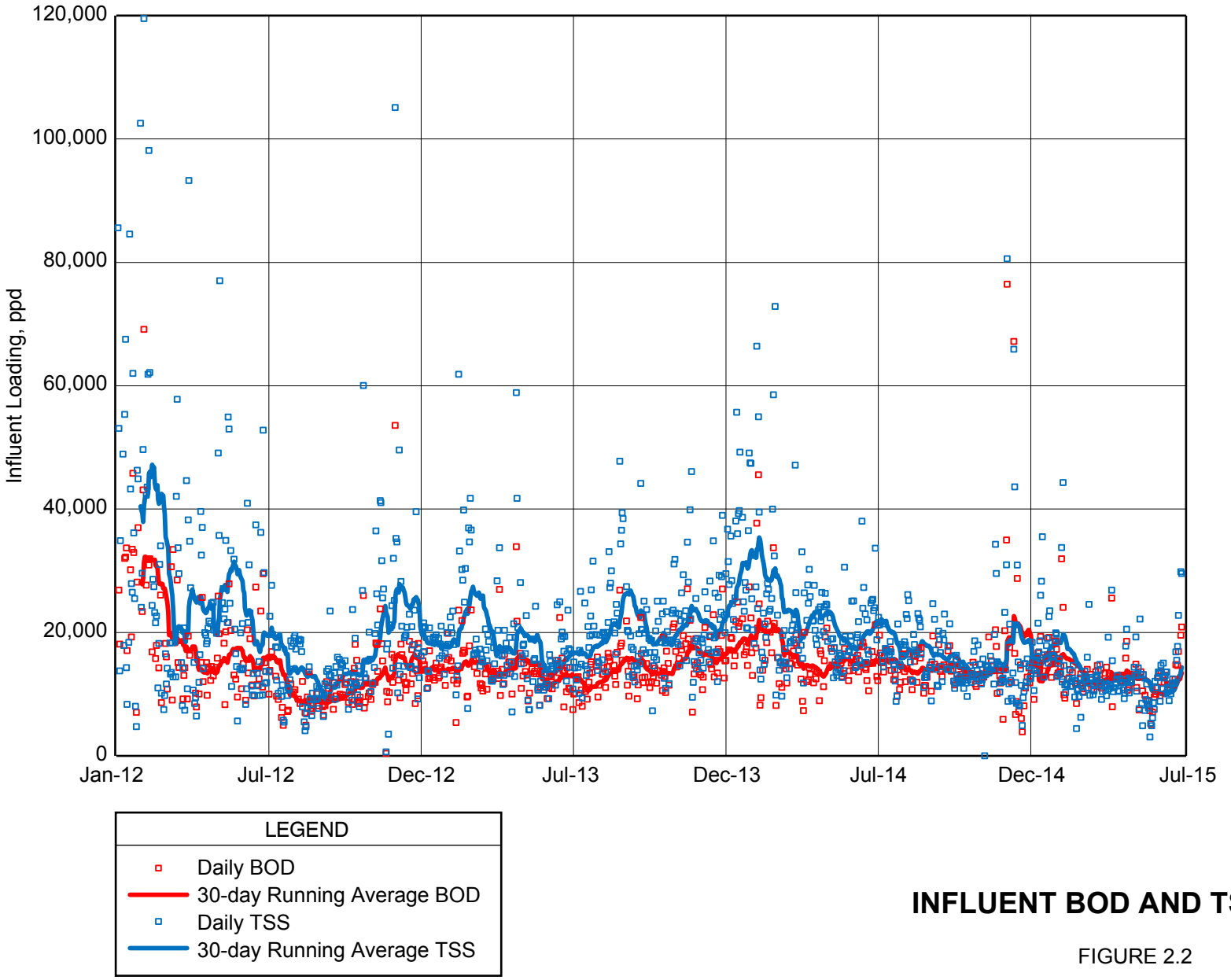
DAILY INFLUENT FLOW

FIGURE 2.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f6-11034.ai



INFLUENT BOD AND TSS LOAD

FIGURE 2.2

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f7-11034.ai

2.3.2.1 Conductivity

The influent conductivity has decreased since the 2010 Master Plan; however, it is still significantly higher than typical domestic wastewater. Municipalities that use surface water for potable water supply, typically generate wastewaters with a conductivity of 500 to 1,000 microsiemens per centimeter (µmho/cm). As reported in the 2010 Master Plan, from 2003 to 2008, the influent conductivity was 5,900 µmho/cm. From 2013 to 2015, the average influent conductivity was 3,400 µmho/cm.

The high influent conductivity indicates a large quantity of water from the San Francisco Bay is likely infiltrating into the collection system. (Further discussion of this can be found in Chapter 9.) The influent conductivity has decreased since the 2010 Master Plan because improvements were implemented in the collection system to reduce infiltration of seawater from the SF Bay into the collection system. Per the 2011 Collection System Master Plan, Veolia completed projects in 2010 to reduce the volume of tidal inflow into the sewer system. Projects included the installation of a duck-bill check valve and a flap gate on the existing overflow structures to the Richmond Harbor.

2.3.2.2 Ammonia

Ammonia (NH_3) was analyzed over the last 5 years, although limited data exists. The annual average, dry weather, and maximum month ammonia loadings, along with the number of samples taken each year, are shown in Table 2.3. The influent ammonia is also shown on Figure 3.5. The majority of the samples were collected in 2014 and 2015. The average concentration in 2014 was 31 milligrams per liter (mg/L), which corresponds to a per capita loading of 0.018 ppcd. The average concentration in 2015 was 56 milligrams per liter (mg/L), which corresponds to a per capita loading of 0.031 ppcd.

Given typical domestic per capita ammonia loadings are about 0.02 ppcd, the high ammonia loading in 2015 was likely due to industrial sources. For planning purposes, it is assumed that high ammonia loads from industrial sources would be addressed through the City's pretreatment program for industrial sources. Therefore, the typical per capital loading of 0.02 ppcd was used for the load projections.

Table 2.3 Historical Influent Ammonia Loadings
WWTP Facility Plan
City of Richmond and Veolia Water

Condition	2010	2011	2012	2013	2014	2015
Number of Samples	14	0	1	2	24	38
ADW, ppd	1,890	--	--	--	1,260	2,170
ADA, ppd	2,060	--	1,920	1,520	1,380	2,360
ADA, mg/L	38	--	42	31	31	56
ADMM, ppd	4,740	--	--	--	1,780	3,540

As discussed in the Executive Summary and Chapter 4, it is anticipated there will be future regulations that require ammonia and total nitrogen removal. It is recommended the City collect influent ammonia data on a more frequent basis (i.e. daily) to support the planning and design for the improvements required for those regulations. It is also recommended the City determine which industrial user(s) contributes high ammonia loading.

2.3.3 Peaking Factors

Using the data summarized in Table 2.2, influent flow and load peaking factors were developed. Peaking factors represent the various flow conditions as a ratio to the average dry weather flow or load. The individual peaking factors for each year, as well as the average peaking factors, are summarized in Table 2.4. In general, the peaking factors are similar for the various constituents evaluated and within the expected range for a municipal wastewater treatment facility.

Table 2.4 Historical Peaking Factors
WWTP Facility Plan
City of Richmond and Veolia Water

Condition	2010	2011	2012	2013	2014	2015	Average
ADA to ADW							
Flow	1.30	1.30	1.34	1.09	1.22	1.11	1.26(1)
BOD	0.79	0.99	1.37	0.90	1.14	1.06	1.03(2)
TSS	0.62	1.19	1.42	0.93	1.36	1.01	1.10(2)
NH_3	1.09	--	--	--	1.10	1.09	1.09(3)
ADMM to ADW							
Flow	2.22	2.59	2.46	2.09	2.13	2.34	2.34(1)
BOD	1.89	1.77	3.23	1.13	1.64	1.57	1.45(2)
TSS	2.29	1.81	3.82	1.29	2.39	1.44	1.71(2)
NH_3	2.51	--	--	--	1.41	1.63	1.52(3)
PHWW to ADW							
Flow	6.91	6.75	7.46	5.10	9.62	9.01	6.55(1)

Notes:
(1) Excludes the 2014 and 2015 values due to the drought.
(2) Excludes the 2010, 2011, and 2012 values due to sampling issues that caused faulty readings.
(3) Excludes the 2010, 2011, 2012, and 2013 values because only limited data was available.

2.3.4 Domestic Wastewater Per Capita Flows and Loads

Historical domestic wastewater per capita ADW flow and load values were determined by subtracting commercial/industrial values from the overall wastewater values to get the domestic values. These domestic ADW values were then divided by the population to get per capita values. The flow, BOD load, and TSS load per capita values are presented in Table 2.5. The only available ammonia data was for the combined domestic and commercial/industrial flow. Therefore, the per capita values are higher than typical domestic loadings due to the contribution of industrial loadings. The ammonia per capita values are presented in Table 2.6.

Table 2.5 Domestic Per Capita Flows and Loads
WWTP Facility Plan
City of Richmond and Veolia Water

Year	Population[1]	ADW			Per Capita Averages		
		Flow, mgd	BOD Load, ppd	TSS Load, ppd	Flow, gpd/capita	BOD Load, ppd/capita	TSS Load, ppd/capita
2010	67,670	4.5	[2]	[2]	67	[2]	[2]
2011	68,120	4.7	[2]	[2]	70	[2]	[2]
2012	68,290	4.3	[2]	[2]	63	[2]	[2]
2013	68,870	4.1	13,400	19,000	59	0.20	0.28
2014	69,430	3.9	11,900	13,200	56	0.17	0.19
2015	70,330	3.4	10,100	11,800	49	0.14	0.17
Avg	--	4.2	11,800	14,700	61	0.17	0.21

Notes:
(1) Population data based on Department of Finance Records.
(2) Data is excluded due to sampling issues that caused faulty readings.

Table 2.6 Historical Per Capita Ammonia Loads
WWTP Facility Plan
City of Richmond and Veolia Water

Year	Population[1]	Number of Samples	Domestic ADWL (ppd)	Per Capita NH_3 Load (ppd/capita)
2010	67,670	14	1,890	0.028
2011	68,120	0	--	--
2012	68,290	1	--	--
2013	68,870	2	--	--
2014	69,430	24	1,260	0.018
2015	70,330	38	2,170	0.031
Average	--	--	1,770	0.025[2]

Notes:
(1) Population data based on Department of Finance Records.
(2) Excludes 2010, 2011, 2012, and 2013 values because only limited data was available.

2.3.5 Commercial/Industrial Flows and Loads

Historical commercial/industrial flows and loads are shown in Table 2.7. Since monthly data was not available for these customers, peaking factors for commercial/industrial flows and loads were assumed to be the same as overall plant influent peaking factors. Since 2010, the average annual commercial/industrial BOD and TSS loads were 2,200 ppd and 2,800 ppd, respectively. These loads make up approximately 13 percent of the overall plant influent BOD load and 11 percent of the overall plant influent TSS load.

Table 2.7 Historical Commercial/Industrial Flow and Load Data
WWTP Facility Plan
City of Richmond and Veolia Water

Condition[1]	2010	2011	2012	2013	2014	2015	Average
ADW[2]							
Flow, mgd	0.96	0.91	0.78	0.95	0.83	0.84	0.88
BOD, ppd[3]	3,240	2,250	1,490	2,470	1,910	1,770	2,190
TSS, ppd[3]	6,900	3,540	1,680	2,210	1,620	1,870	2,970
ADA							
Flow, mgd	1.24	1.19	1.04	1.04	1.02	0.94	1.08
BOD, ppd[3]	2,570	2,220	2,030	2,220	2,190	1,870	2,180
BOD, mg/L[3]	250	220	230	260	260	240	240
TSS, ppd[3]	4,280	4,200	2,380	2,060	2,200	1,880	2,830
TSS, mg/L[3]	410	430	270	240	260	240	310
ADMM[2]							
Flow, mgd	2.75	3.08	2.56	2.17	2.17	2.20	2.49
BOD, ppd[3]	4,850	3,920	6,570	2,510	3,600	2,940	4,070
TSS, ppd[3]	9,810	7,630	9,090	2,670	5,260	2,700	6,190

Notes:
(1) Based on industrial flow information from 2010 to 2015.
(2) Assumed that industrial peaking factors were the same as overall influent peaking factors for each year.
(3) Loadings and concentrations are rounded to the nearest ten.

2.3.6 Leachate Flows and Loads

The WWTP receives an average of 10,500 gallons per day (gpd) of leachate. This is approximately 0.2 percent of plant influent flows. Based on available data from 2009 to 2013, the average concentrations of the leachate are as follows:

- BOD: 83 mg/L.
- TSS: 99 mg/L.
- Chlorides: 5,140 mg/L.
- Total Dissolved Solids (TDS): 8,420 mg/L.
- Ammonia: 410 mg/L.

The BOD and TSS load from the leachate accounts for about 0.05 percent of the total influent load. The ammonia load from the leachate accounts for about 2 percent of the total influent load. Given that leachate flows and loads represent a small fraction of the overall influent flows and loads, they were not used to develop flow and load projections for planning purposes.

Based on plant process performance, the high chlorides and TDS do not appear to be detrimental to the wastewater treatment. The leachate TDS accounts for less than 1 percent of the total influent TDS.

2.4 FLOW AND LOAD PROJECTIONS

Both domestic and commercial/industrial wastewater flows were projected separately. Domestic flows and loads were projected based on a per capita flow/load and population projections for the service area. The population projection used was 1.0 percent per year, based on Association of Bay Area Governments (ABAG) population projection data for the City of Richmond. This is also consistent with the City's 20121 General Plan.

2.4.1 Flows

Domestic flows were projected using population projections and an estimated per capita flow. As shown previously, the per capita domestic flow from 2010 to 2015 ranged from 49 gallons per capita day (gpcd) to 70 gpcd. Due to this variability, a conservative value of 70 gpcd was selected as a per capita flow for master planning.

The combined per capita flow (which includes domestic and industrial flows) ranged from 62 gpcd to 87 gpcd. These combined per capita flows are lower than the combined per capita flows observed in the 2010 Master Plan, which ranged from 92 gpcd to 100 gpcd. The lower per capita values are likely a result of water conservation and the recent drought. The decrease in per capita flows is consistent with what other wastewater agencies have observed over the past 5 years.

Industrial/commercial flows were projected separately assuming a constant growth rate. A growth rate of 1.0 percent was chosen to be consistent with population growth. The average commercial/industrial flow observed over the last five years was chosen to be the starting value for the commercial/industrial growth flow projection.

The flow projections are presented in Table 2.8. The ADAF and ADMMF were calculated using peaking factors of 1.26 and 2.34 from Table 2.4.

The projected 2040 ADWF is 7.4 mgd, which is lower than the 2040 ADWF of 10.8 mgd projected in the 2010 Master Plan. The flow projections are lower due to decreases in projected population and wastewater per capita estimates. However, because growth rates are highly variable, the population growth in the RSSD service area and influent flow to the

WWTP should be evaluated at regular intervals to verify that the flow projections remain on target.

2.4.1.1 Peak Hour Wet Weather Flow

The Wet Weather Storage Project, completed in 2015, determined that the build-out PHWWF is 67 mgd. This flow corresponds to a storm between a 10-year, 24-hour storm and a 10-year, 48-hour storm. The wet weather storage facility is designed to store excess flows, limiting flow through the WWTP to 40 mgd. Therefore, for the purpose of the Facility Plan, a future wet weather design capacity of 40 mgd was adopted.

2.5 PROJECTED CONVENTIONAL POLLUTANT LOADS

Similar to flow projections, domestic and commercial/industrial wastewater loads were projected separately. Domestic loads were projected based on the projected population multiplied by a per capita load, analogously to domestic flow projections. Projections were developed for dry weather loadings.

As stated previously, it is likely that the high BOD and TSS loads observed from 2010 to 2012 were due to inconsistent influent TSS and BOD readings. Therefore, only per capita loads from 2013 to 2015 were considered in the chosen average value. The average BOD per capita loading from 2013 to 2015 was 0.17 ppd/capita, which is lower than a typical per capita BOD loading of 0.20 ppd/capita. Therefore, to be conservative, a BOD per capita of 0.19 ppd/capita was chosen for projections. The average TSS per capita loading from 2013 to 2015 was 0.21 ppd/capita, which is higher than a typical per capita TSS loading of 0.19 ppd/capita. This higher value was chosen for TSS projections, as it would yield a more conservative projection.

Industrial/commercial BOD and TSS loads were projected separately assuming a constant concentration. BOD and TSS concentrations of 250 mg/L and 310 mg/L, respectively, were used for the projection.

The BOD and TSS load projections are provided in Table 2.8. The ADAL and ADMML were calculated using the average peaking factors previously presented in Table 2.4.

The combined ADW BOD loading is expected to increase from approximately 15,500 ppd to approximately 19,800 ppd in 2040, which is lower than the 2010 Master Plan projected 2040 ADW BOD load of 25,700 ppd. The combined ADW TSS loading is expected to increase from approximately 17,100 lbs/day to approximately 21,900 lbs/day in 2040, which is also significantly lower than the 2010 Master Plan projected 2040 ADW TSS load of 41,000 lbs/day. Similar to the flow projections, the load projections are lower because the population growth is projected to be lower and the per capita loadings have decreased.

2.5.1 Ammonia Projections

Since limited ammonia sampling data was available, ammonia loads were projected slightly differently than BOD and TSS loads. The City does not record industrial/commercial ammonia loads, so industrial/commercial loading was not projected separately. Instead, a combined per capita loading was calculated and used along with population projections to estimate future ammonia loadings. As previously discussed, an average ammonia load per capita of 0.02 ppd/capita was used for ammonia projections. Table 2.8 shows the projected 2040 ammonia loadings.

2.6 SUMMARY OF FLOW AND LOAD DESIGN CRITERIA

A summary of existing and future flow and load design criteria is included in Table 2.8. These design criteria were used to develop alternatives to reliably treat existing and future flows and loads.

Table 2.8 Projected Flows and Loads
WWTP Facility Plan
City of Richmond and Veolia Water

Condition	Per Capita Value (gpcd or ppd/capita)	Peaking Factor	Current[(1)]	Projected 2040[(1)]
Service Area Population			70,300	97,200
ADW				
Domestic				
Flow, mgd	70	1.00	4.9	6.3
BOD, ppd	0.19	1.00	13,400	17,100
TSS, ppd	0.21	1.00	14,800	18,900
Commercial/Industrial				
Flow, mgd	--	1.00	0.86	1.10
BOD, ppd	--	1.00	2,120	2,710
TSS, ppd	--	1.00	2,340	3,000
Combined				
Flow, mgd	--	1.00	5.8	7.4
BOD, ppd	--	1.00	15,500	19,800
TSS, ppd	--	1.00	17,100	21,900
NH_3-N, ppd	0.02	1.00	1,400	1,800
ADA (Combined Flow)				
Flow, mgd		1.26	7.3	9.3
BOD, ppd		1.03	16,000	20,400
BOD, mg/L			260	260
TSS, ppd		1.10	18,800	24,100
TSS, mg/L			310	310
NH_3-N, ppd		1.09	1,500	2,000
NH_3-N, mg/L			20	20
ADMM (Combined Flow)				
Flow, mgd		2.34	13.5	17.3
BOD, ppd		1.45	22,500	28,700
TSS, ppd		1.71	29,200	37,400
NH_3-N, ppd		1.52	2,100	2,700
PHWW (Combined Flow)				
Flow, mgd			40	40

Note:
(1) Loadings are rounded to the nearest hundred, and concentrations are rounded to the nearest ten.

Chapter 3

EXISTING TREATMENT PROCESS PERFORMANCE AND CAPACITY

3.1 INTRODUCTION

This chapter provides an overview of the WWTP, a description of the facilities, and summarizes the performance and capacity assessment. The assessments were conducted to identify current and future capital improvement needs at the WWTP. The performance assessment evaluated the historical treatment performance of the WWTP treatment process. The results of the assessment were used to identify process improvement needs and to establish recommended design operating criteria. The capacity assessment evaluated the treatment and hydraulic capacity of each major unit process.

3.2 DESCRIPTION OF EXISTING FACILITIES

The WWTP is a secondary treatment facility. The National Pollutant Discharge Elimination System (NPDES) permit states that the facility has a secondary treatment capacity of 16.0 mgd for average day dry weather flow and 20 mgd for peak wet weather flow (40 mgd for primary treatment).

Treatment consists of screening, grit removal, primary treatment, secondary treatment with activated sludge, and disinfection. The treated effluent from the plant is combined with effluent from the West County Wastewater District (WCWD) and discharged through a deep-water outfall, originating at the WWTP site, into the San Francisco Bay.

Solids processing consists of dissolved air flotation thickening (DAFT) and anaerobic digestion. Digested sludge from the WWTP is currently pumped to the WCWD WPCP, where it is dewatered in sludge drying lagoons. Once dewatered, the sludge is transported by truck by the owners of the West Contra Costa Sanitary Landfill (WCCSL) to one of their active landfills, where it is used as alternative daily cover.

A site layout and flow schematic of the existing WWTP treatment facilities are shown in Figure 3.1. A process flow diagram is shown in Figure 3.2. A brief description of the liquid and solids treatment processes at the WWTP is presented below.

3.2.1 Liquid Treatment Processes

Flows from the RSSD collection system are conveyed to the WWTP via a 66-inch trunk sewer pipeline. As discussed in Chapter 2, in addition to raw wastewater, the WWTP also receives leachate from the WCCSL. The leachate is conveyed from the WCCSL to the plant headworks via a 6" sludge/leachate pipeline. The leachate is conveyed to the plant intermittently (between the hours of 4 AM and 4 PM).

Flows from the collection system flow through the Influent Flow Meter upstream of the plant headworks. At the plant headworks, the flow is combined with the leachate, onsite plant

stormwater runoff, and plant recycle flows. The combined flow is conveyed through a mechanical bar screen and into the two wet wells of the Influent Pump Station. From there, the flow is pumped into the grit chambers. Flow from the grit chambers is conveyed by gravity throughout the rest of the plant and outfall.

Following grit removal, the wastewater flows to two rectangular primary clarifiers. Then, primary effluent flows to secondary treatment, which consists of two mechanically aerated aeration basins, and two square secondary clarifiers and one circular secondary clarifiers. Following clarification, the flow is chlorinated in one of two parallel chlorine contact basins. The disinfected effluent is combined with WCWD effluent, dechlorinated, and discharged to the San Francisco Bay via the deep-water outfall.

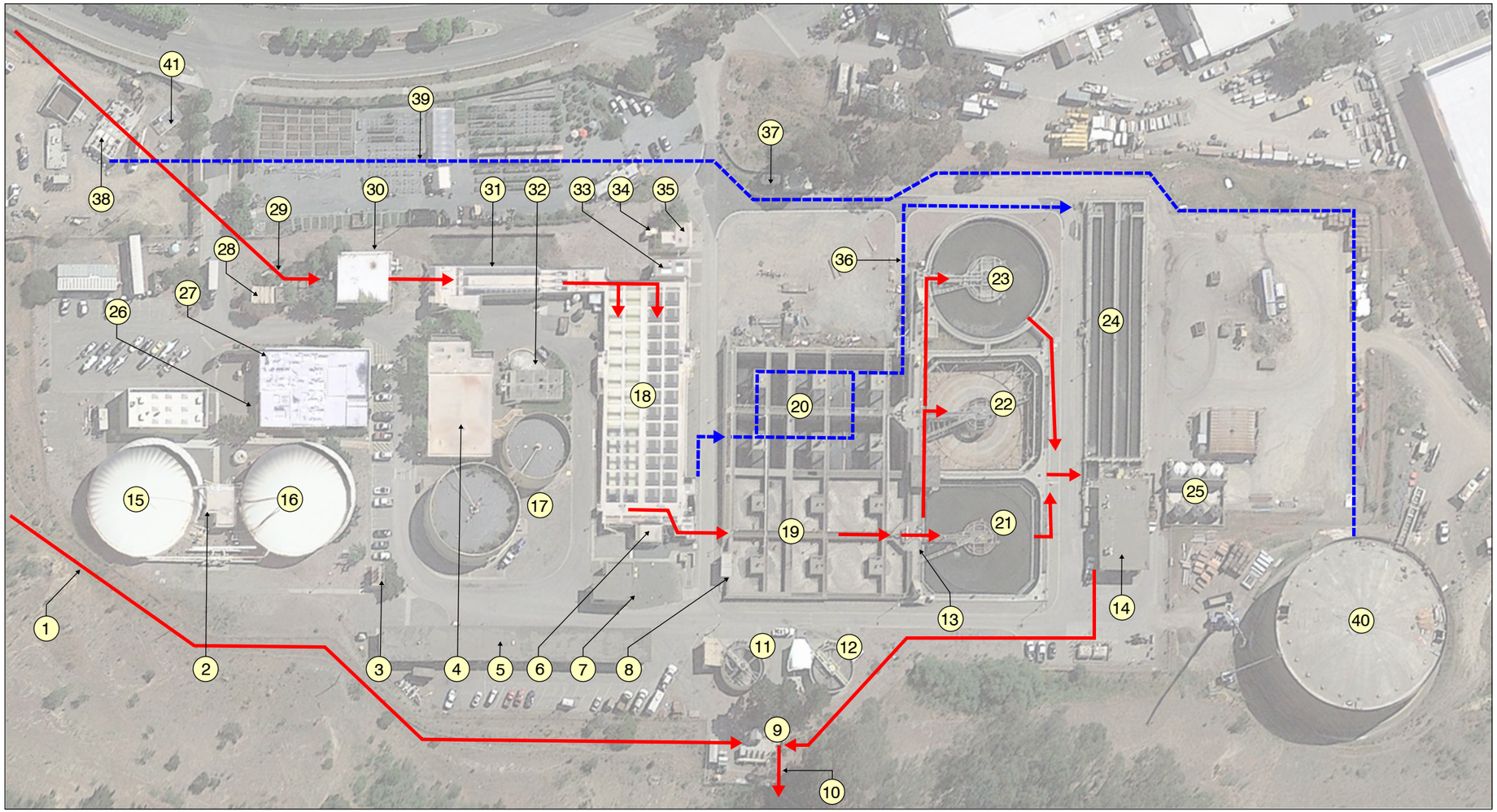
During major wet weather events, the influent flow can exceed the capacity of the secondary treatment process. Under these conditions, primary effluent flows above 20 mgd are bypassed to two equalization basins that have a total volume of approximately 2 million gallons (MG). If primary effluent flows remain greater than 20 mgd after the two equalization basins become full, the excess primary effluent flow above 20 mgd flows over a fixed weir in the equalization basins and flows to the chlorine contact basins. At the chlorine contact basins, it is combined with secondary effluent and disinfected prior to being discharged to the San Francisco Bay. After the wet weather event, the equalization basins are drained back to the headworks.

During severe storm events, the influent flow can exceed 40 MGD, the design capacity of the Influent Pump Station. When influent flows are greater than 40 MGD, the excess flow is diverted to the Wet Weather Pump Station, which conveys flow to the 5 MG Wet Weather Storage Tank. Water is held in the tank until the storm passes and influent flows subside. The Storage Tank is then drained back to the Wet Weather Pump Station and conveyed through the 66-inch trunk sewer to the plant for treatment.

3.2.2 Solids Treatment Processes

Primary sludge generated by the primary treatment process is thickened in the primary clarifiers and pumped from the primary clarifiers to the anaerobic digesters. Waste activated sludge (WAS) generated by the secondary treatment process is pumped from the secondary treatment process to the DAFTs for thickening. The thickened WAS (TWAS) is then pumped to the anaerobic digesters.

Primary sludge and TWAS is digested in one of the anaerobic digesters (Digester No. 1). The digested sludge is then pumped by the primary sludge transport pumps to Digester No. 2, where it is stored prior to being pumped to the WCWD WPCP by the sludge transport pumps on a daily basis through the 6" sludge/leachate pipeline (between the hours of 4 PM and 4 AM).



1. Flow from WCWD
2. Digester Control Bldg
3. Digester Gas Flare
4. Sludge Heating Buiding
5. Maintenance Shop
6. Primary Sludge Pump Station
7. Abandoned Bioassay Bldg
8. 3W Pump Station
9. Confluence Structure
10. Outfall Tunnel
11. DAF Thickener No. 1
12. DAF Thickener No. 2
13. RAS/WAS Gallery
14. Disinfection Bldg
15. Digester No. 2
16. Digester No. 1
17. Abandoned Digesters
18. Primary Clarifiers
19. Aeration Basins
20. Equalization (EQ) Basin
21. Secondary Clarifier No. 1
22. Secondary Clarifier No. 2
23. Secondary Clarifier No. 3
24. Chlorine Contact Basins
25. Bulk Chemical Storage
26. Sludge Transport Pump Station
27. Administration Building
28. Old Electrical Building
29. Influent Discharge from Sewer System
30. Headworks/Influent Pump Station
31. Grit Basins
32. Abandoned Elutriation Tanks
33. Standby Generator
34. PG&E Transformer
35. Switchgear
36. Wet Weather Bypass - Primary Effluent
37. IW Facility
38. Wet Weather Pump Station
39. Wet Weather Bypass - Raw Sewage
40. Wet Weather Storage Tank
41. Influent Flow Meter

N

100 50 0 100

Feet

Legend

Normal Flow

Bypass Flow

WWTP SITE LAYOUT AND FLOW SCHEMATIC

FIGURE 3.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f3-11034.ai

Wet Weather Storage Tank

Sampling Location Inf-002

Wet Weather Pump Station

From Sewer

Wet Weather Flow Diversion Box

Bar Screen

Screening Disposal to Landfill

Wet Well No. 1

Wet Well No. 2

Grit Chambers

Parshall Flumes

Grit Disposal to Landfill

Leachate from West Contra Costa Sanitary Landfill

Scum Disposal to Landfill

Scum Pumps

Primary Clarifiers

Parshall Flume

Equalization Basin No. 2

Equalization Basin No. 1

Aeration Basin No. 2

Aeration Basin No. 1

Secondary Clarifier No. 3

Secondary Clarifier No. 2

Secondary Clarifier No. 1

Chlorine Contact Basins

Sampling Location Eff-002

Parshall Flumes

Disinfection Building

Secondary Digester (Anaerobic Digester No. 2)

Primary Digester (Anaerobic Digester No. 1)

Sludge Transport Pumps

To West County Wastewater District Sludge Drying Beds

Primary Sludge Transport Pumps

Primary Sludge Pumps

Dissolved Air Floatation Thickeners

No. 1 (not in service)

No. 2

RAS Pumps

WAS Pumps

Thickened WAS Pumps

West County Wastewater District Effluent

Richmond Effluent

Sampling Location Eff-001

Outfall to Bay

LEGEND

- Liquid Stream Flow
- Solids Stream Flow
- Bypass Flow
- M — Flow Meter
- S — Compliance Sampling Location
- Gate
- Pump
- Fan

EXISTING PROCESS FLOW DIAGRAM

FIGURE 3.2

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f4-10034.ai

3.3 EXISTING TREATMENT PLANT PERFORMANCE

This section summarizes the historical performance of the treatment processes. Daily operating data from January 2011 through October 2015 was reviewed for the assessment.

The performance assessment is comprised of two main sections:

- Overall treatment performance of the WWTP with respect to meeting discharge limits and other effluent requirements.
- Historical load and performance of each of the unit processes.

This process performance assessment was used to establish design criteria for planning future treatment facility needs.

An understanding of the WWTP's current treatment performance is critical to determining the treatment capacity of the WWTP. Based on historical load and performance, recommended criteria were developed for each major treatment process. The recommended criteria serve as a basis for the process capacity assessment and are used for planning future treatment facilities.

3.3.1 Overall Treatment Plant Performance

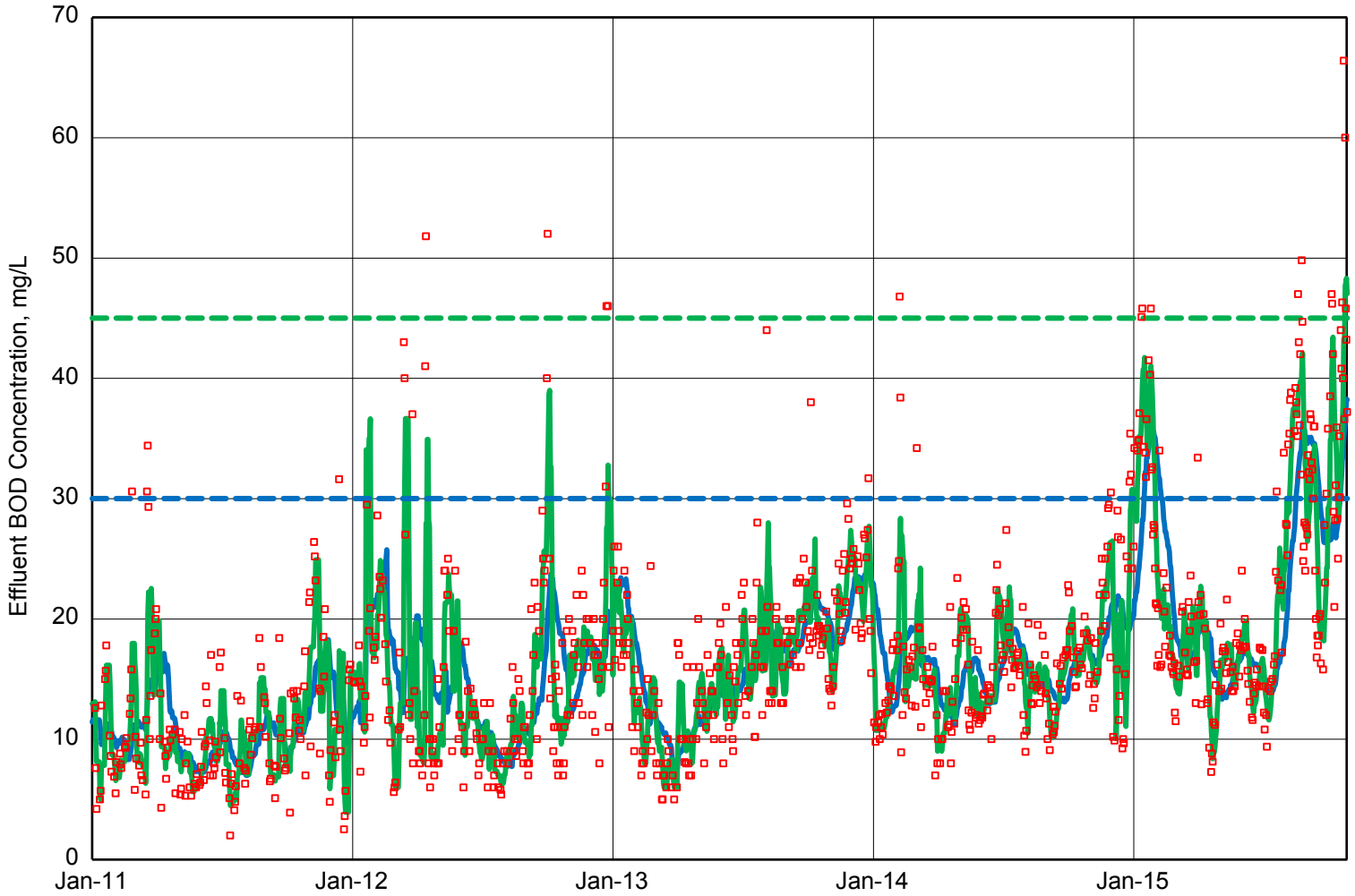
This section summarizes the overall treatment performance of the WWTP. The overall treatment performance of the WWTP is based on historical compliance with conventional pollutant requirements in the WWTP's NPDES permit. The discharge requirements included in the NPDES permit are described in detail in Chapter 4. Pollutants regulated in the NPDES permit include the 5-day biochemical oxygen demand, total suspended solids, ammonia, pH, total residual chlorine, enterococcus bacteria, total coliform bacteria, oil and grease, and toxic substances.

Overall, the WWTP has performed adequately from 2011 to 2015. Permit excursions that have occurred during this time period are discussed briefly below.

3.3.1.1 BOD

Figures 3.3 shows the daily effluent BOD concentrations and the running 30-day and 7-day average compilations of the daily data. The 30-day and 7-day running averages represent the monthly and weekly average of the data respectively and correspond to the effluent monthly and weekly NPDES permit limits.

The average BOD removal was 93.3 percent. The monthly and weekly average effluent BOD concentrations were both 16 mg/L, which are significantly below the NPDES permit limits of 30 mg/L and 45 mg/L, respectively. As shown in Figure 3.3, the maximum weekly BOD limit was exceeded once, and the maximum monthly limit was exceeded three times.



FINAL EFFLUENT BOD CONCENTRATION

FIGURE 3.3

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f8-11034.ai

3.3.1.2 TSS

Figures 3.4 shows the daily effluent TSS concentrations and the running 30-day and 7-day average compilations of the daily data. The 30-day and 7-day running averages represent the monthly and weekly average of the data respectively and correspond to the effluent monthly and weekly NPDES permit limits.

The average TSS removal was 93.9 percent. The monthly and weekly average effluent TSS concentrations were both 18 mg/L, which are also significantly below the NPDES permit limits of 30 mg/L and 45 mg/L, respectively. As shown in Figure 3.4, the maximum weekly TSS limit was exceeded four times, and the maximum monthly limit was exceeded two times.

3.3.1.3 Ammonia

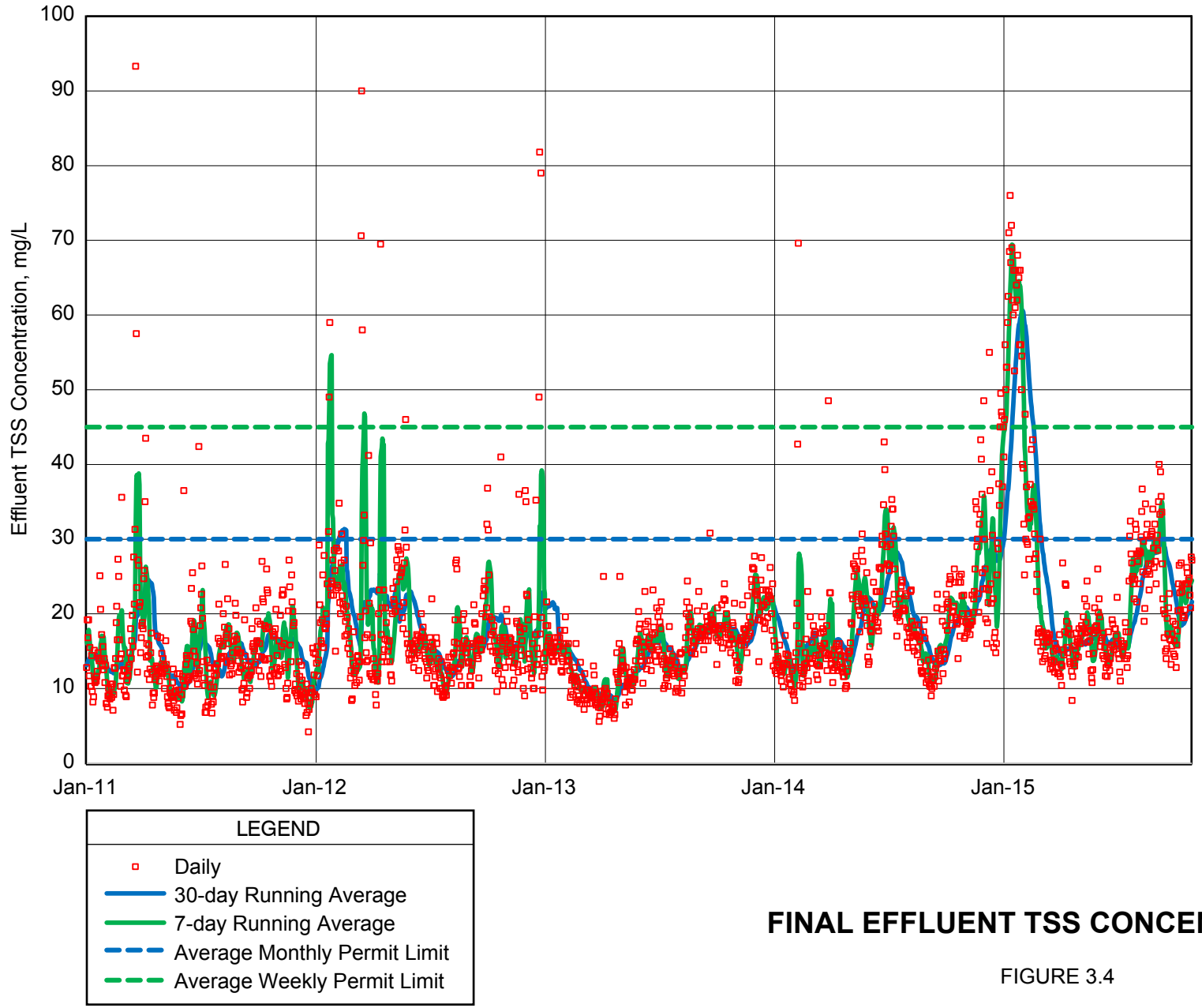
Since 2010, WWTP effluent data has not been sampled for ammonia; the ammonia effluent samples are taken at the compliance point (where the WWTP and WCWD effluents are combined). Figure 3.5 shows the daily influent and combined effluent ammonia concentrations and the running 30-day averages of the influent and combined effluent. Limited ammonia data was available for this analysis. Based on the available data, the monthly ammonia limit of 32 mg/L for the combined effluent was exceeded three times during the analysis period.

Although the activated sludge process is not designed for removal of ammonia, the process removed 26 percent of the influent ammonia on average from 2011 to 2015. However, considering more historical data from the Master Plan, the process removed 13 percent of the influent ammonia on average from 2003 to 2010.

It should be noted, given the City is planning on implementing onsite dewatering in the near future, the onsite dewatering process will generate a recycle flow that has a high ammonia concentration. This flow will be recycled to the headworks of the plant and contribute to the overall ammonia loading to the plant. Treatment of this increased load is discussed in the Chapter 6 Section 6.6.7 Centrate/Filtrate Management.

3.3.1.4 pH

The NPDES requirement for effluent pH is a daily average pH between 6.0 and 9.0. Over the analysis period, the average pH was 7.1. The pH was outside the NPDES required range twice. The pH was 5.6 on 6/2/2012 and 11.7 on 6/27/2013.



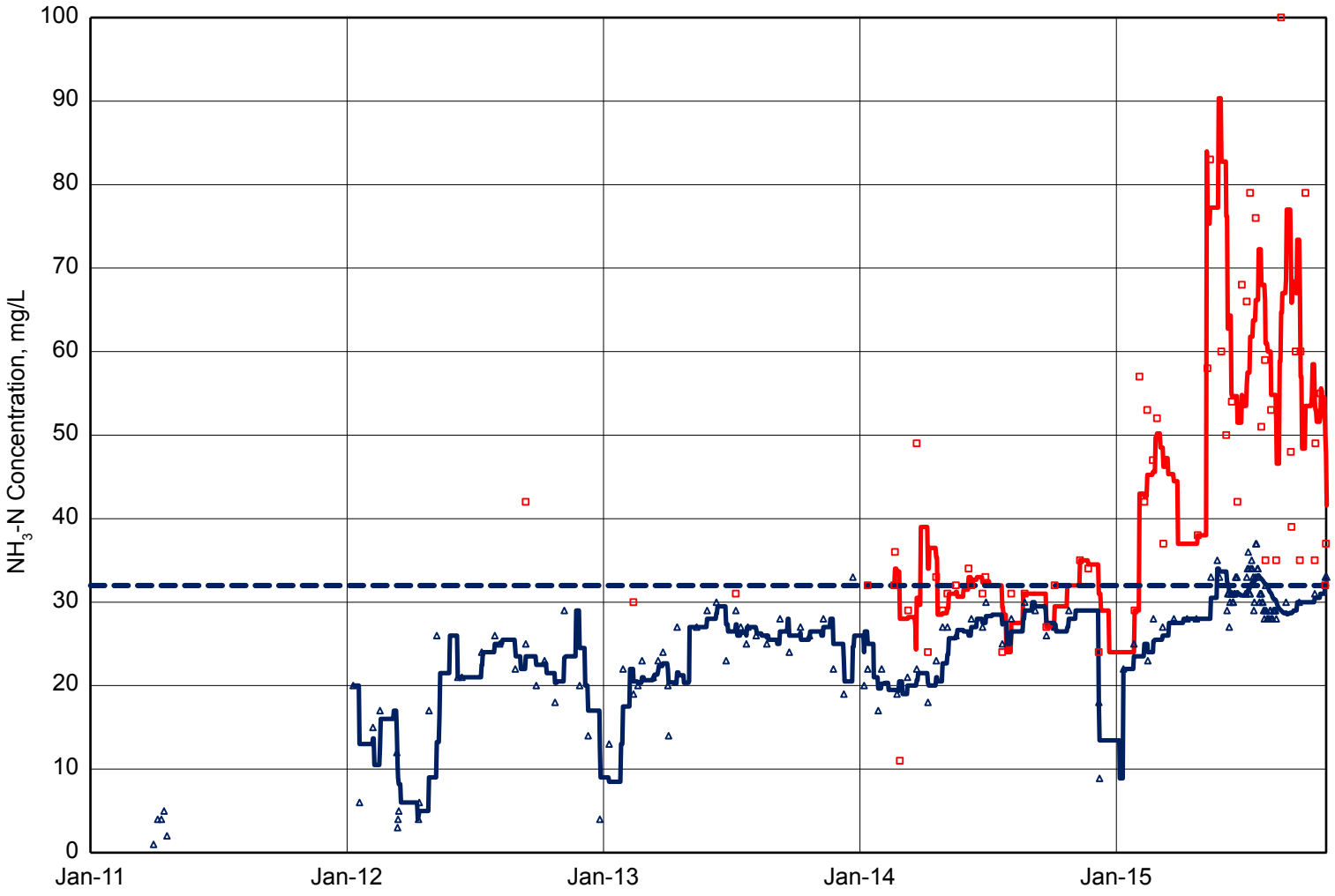
FINAL EFFLUENT TSS CONCENTRATION

FIGURE 3.4

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f9-11034.ai



INFLUENT AND FINAL EFFLUENT AMMONIA CONCENTRATION

FIGURE 3.5

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f10-11034.ai

3.3.1.5 Chlorine

The NPDES permit includes an instantaneous maximum chlorine residual concentration limit of 0.0 mg/L for the combined effluent from the WWTP and the WCWD WPCP. Both the WWTP and the WCWD WPCP include sodium hypochlorite facilities for disinfection. The effluents are dechlorinated with sodium bisulfite. The WWTP effluent is dechlorinated at the effluent end of the chlorine contact basins. The WCWD WPCP effluent is dechlorinated at the confluence structure. Over the analysis period, the daily average combined effluent chlorine residual limit was exceeded three times (10/15/2013, 12/9/2013, and 3/8/2014).

3.3.1.6 Coliform

The existing total coliform bacteria discharge limits are 240 most probable number (MPN)/100 milliliters (mL) for a five-day moving median and 10,000 MPN/100 mL for a maximum daily concentration. Figure 3.6 shows the effluent coliform daily and five-day moving median. As shown in Figure 3.6, the five-day moving median coliform limit was exceeded 17 times, and the maximum daily coliform value was exceeded once (1/20/2012).

3.3.1.7 Enterococcus

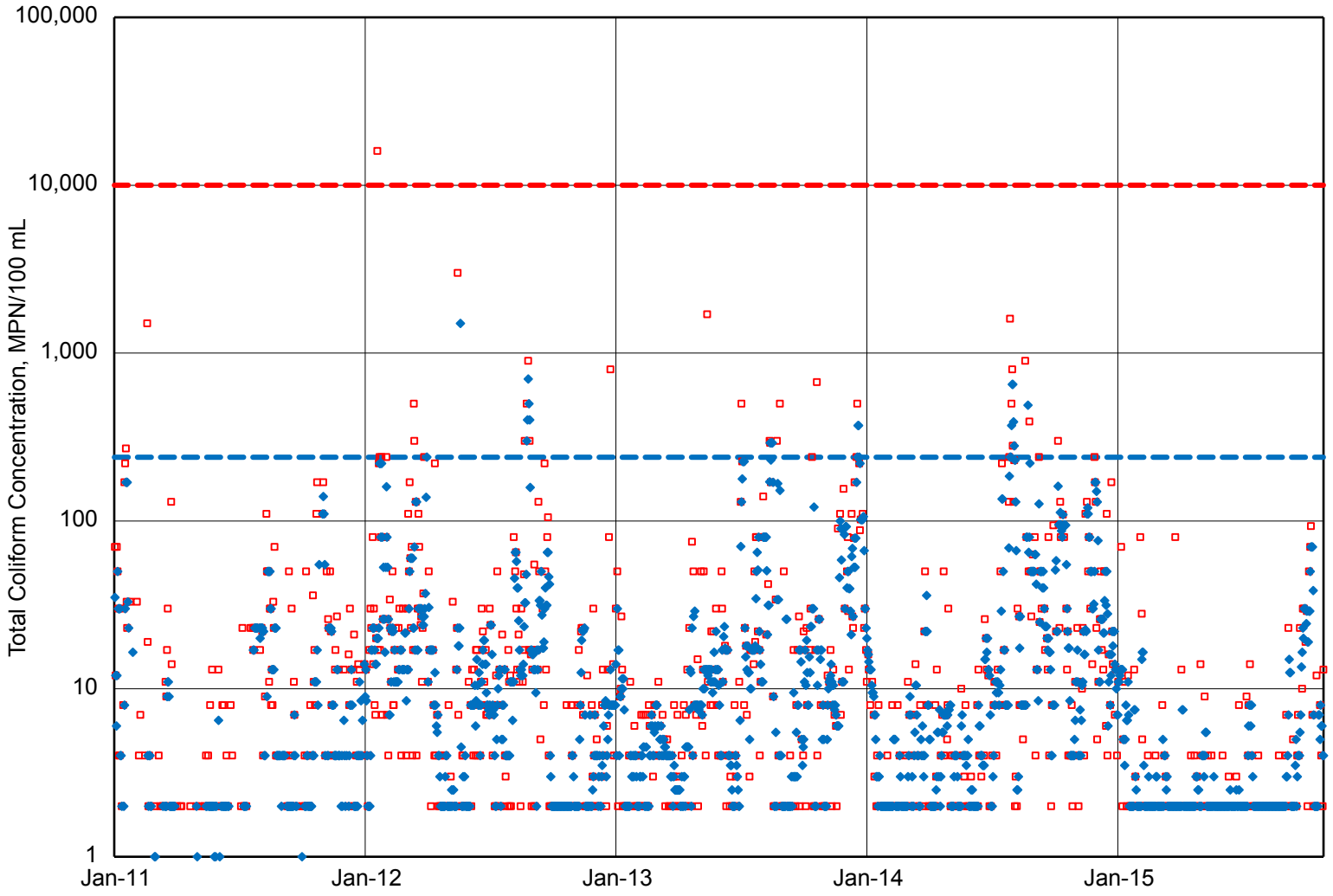
The most recent NPDES permit established a monthly average effluent Enterococcus limit of 35 MPN/100 mL. This monthly average limit was exceeded once (410 mg/L in August 2013). Excluding this month, the monthly average Enterococcus concentration was 7.5 MPN/100 mL.

3.3.1.8 Oil and Grease

The average effluent oil and grease concentration was 1.5 mg/L, which is well below the average monthly limit of 10 mg/L. The monthly maximum and daily maximum limits were not exceeded during the analysis period.

3.3.1.9 Toxic Substances

The mean and maximum concentrations of the toxic substances observed in the WWTP effluent and in the combined effluent are summarized in Table 3.1. Based on available data, the WWTP was in compliance with all permit limits over the analysis period. The WWTP effluent exceeded the maximum daily limit for mercury once; however, this did not result in a permit excursion because the combined WWTP and WCWD WPCP effluent was in compliance with the permit limit.



FINAL EFFLUENT TOTAL COLIFORM CONCENTRATION

FIGURE 3.6

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f11-11034.ai

Table 3.1 Effluent Concentrations of Toxic Substances WWTP Facility Plan City of Richmond and Veolia Water				
	Water Quality-Based Effluent Limits (WQBELs)			
	Richmond Effluent Concentration (µg/L)		Combined Effluent Concentrations (µg/L)	
Constituent	Mean	Maximum	Mean	Maximum
Bis(2-ethylhexyl)phthalate	Non-Detect	Non-Detect	2.1(2)	16
Copper	4.9	13	8.0	39
Cyanide	2.4(2)	4.7	3.0(2)	11
Heptachlor	Non-Detect	Non-Detect	Non-Detect	Non-Detect
Mercury	0.012	**0.081**	0.012	0.069
Nickel	3.6	5.5	4.9	20
Dioxin-TEQ	--	--	Non-Detect	Non-Detect
Endrin	Non-Detect	Non-Detect	Non-Detect	Non-Detect
PCBs	Non-Detect	Non-Detect	Non-Detect	Non-Detect

Note:
(1) Most values were non-detect. For the reported average, non-detect values were recorded as the detection limit.

3.3.2 Individual Unit Process Performance

This section summarizes the historical treatment performance of the major processes at the WWTP. The historical load and performance of each unit process was compared to industry accepted operating and performance criteria. The performance of each unit process provides a benchmark for the planning of new facilities and assessing capacity.

Each unit process is described in the following sections. Included in the process evaluation is a discussion of the original design loading rates and operational parameters. Theoretical maximum capacities for each unit process are suggested based on standard practice design criteria and historical performance under various loading conditions.

3.3.2.1 Mechanical Bar Screens

The WWTP has one mechanically cleaned bar screen that is located upstream of the Influent Pump Station. This screen has a bar spacing of 1 inch and is designed for the removal of rags, sticks, leaves, rocks, etc., that may otherwise cause damage to downstream equipment.

Bar screens are typically designed to have an approach velocity of 1.0 to 1.5 feet per second (fps). Table 3.2 shows the approach velocities for current flow scenarios. According

to the manufacturer's recommendations, the design capacity of the existing screen is 33 mgd based on the above criteria. Thus, the bar screen has sufficient capacity for ADWF and ADMMF, but not for PHWWF. In addition, there is no redundant bar screen. If the bar screen is out of service or the flow exceeds the screen capacity, unscreened wastewater overflows over/around the bar screen into the wet well. This may lead to clogging and ragging of downstream equipment.

While daily screenings volume is not recorded at the WWTP, the average daily screenings fill up three-quarters of a two yard hopper, and the hopper is emptied daily.

Table 3.2 Bar Screen Performance Data
WWTP Facility Plan
City of Richmond and Veolia Water

Design Parameter	Design Flow	Typical Design Criteria	2011 to 2015 Performance
Bar Screen Approach Velocity (fps)	ADWF(1)	1.0 to 1.5	0.27(1)
	ADMMF(2)	1.0 to 1.5	0.54(2)
	PHWWF(3)	1.0 to 1.5	1.82(3)

Notes:
(1) ADWF velocity based on screening capacity of 6.0 mgd.
(2) ADMMF velocity based on screening capacity of 11.8 mgd.
(3) PHWWF velocity based on screening capacity of 40 mgd.

Since the bar screen has a bar spacing of 1 inch, some trash and debris can pass through the screen and cause fouling of downstream equipment and processes (e.g., sludge draft tubes in the secondary clarifiers). When the existing bar screen nears the end of its useful life, a screen with a smaller bar spacing should be considered.

3.3.2.2 Grit Removal

The grit removal process is designed to remove heavier particles such as sand, grit, gravel, and other heavy materials. There are three grit chambers at the WWTP. In the past, a grit collector and grit washing screw were used to remove grit from the grit chambers. The grit chambers do not effectively remove grit. As a result, the grit collector and grit washing screw have been decommissioned. Grit that accumulates in the grit chambers is removed manually 1 to 2 times per year by plant staff.

The grit chambers do not effectively remove grit during average annual flows, because they are sized for wet weather flows. Typical design parameters for grit removal include a hydraulic retention time (HRT) of 45 to 90 seconds at peak instantaneous flow rates and an approach velocities less than 1 fps.

At average annual flows, the HRT is lower than typical design parameters and the water levels are low. The low water levels result in localized areas of high velocity flow around the grit collectors, resulting in poor grit removal performance.

3.3.2.3 Primary Treatment

The primary treatment facilities consist of two rectangular, primary clarifiers, primary sludge pumps, and scum pumps. Suspended solids gradually settle to the bottom of the clarifiers. The liquid portion of the flow, known as primary effluent, flows by gravity over weirs at the end of the clarifiers to the secondary treatment process. Flights driven by chains scrape the settled primary sludge to one end of the tank and skim floatable scum at the surface to the other end of the tank.

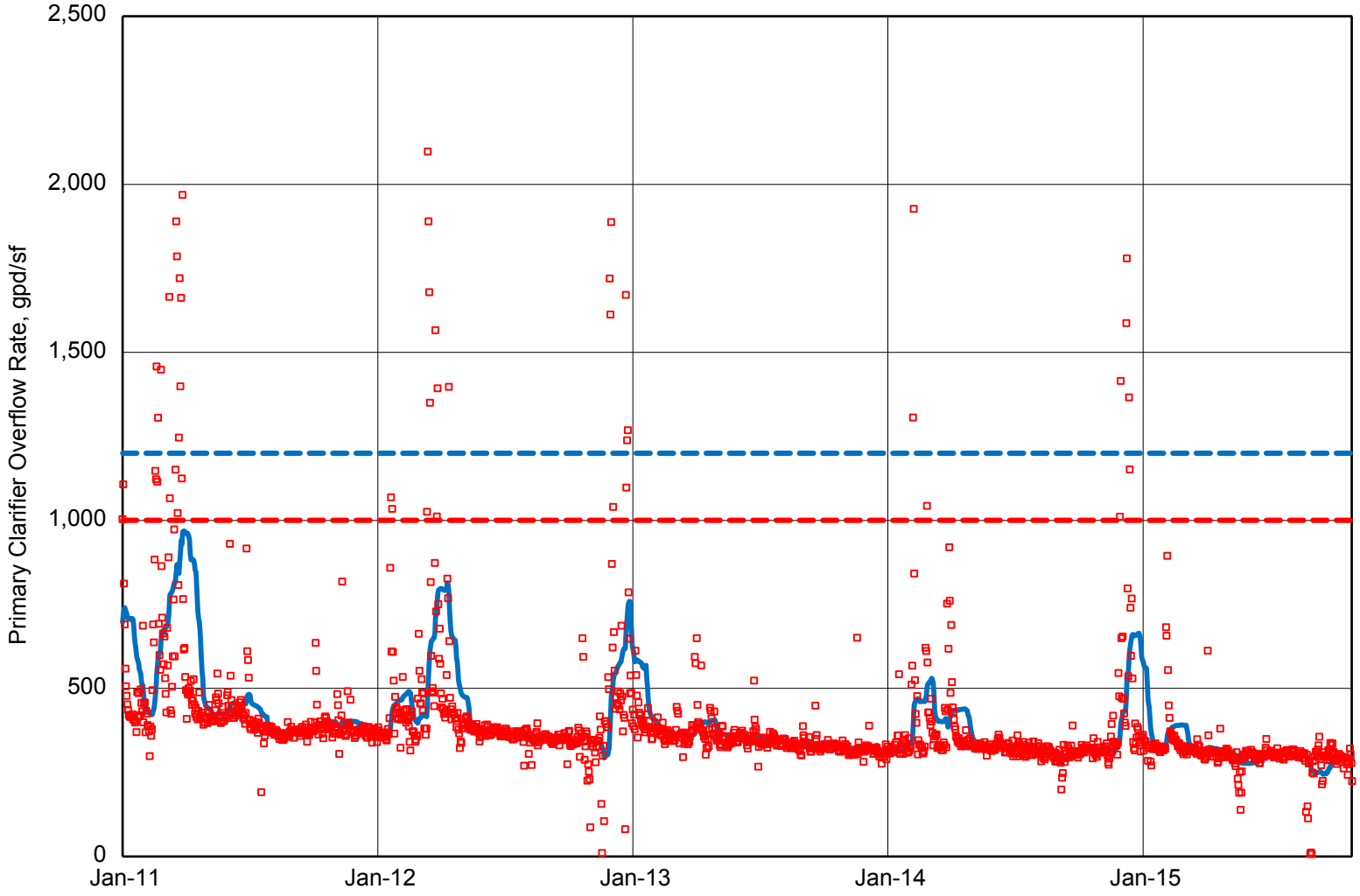
The surface overflow rate is a key parameter used to design and assess the capacity of primary clarifiers. Table 3.5 compares the overflow rate for the current conditions with typical design values. Figure 3.7 presents the daily and 30-day running average surface overflow rates for the review period.

Table 3.3 compares typical design criteria for surface overflow rate, BOD removal, and TSS removal with the actual performance data over the analysis period. The overflow rates at ADWF, ADMMF, and PHWWF were found to be well within the design criteria. BOD removal has been greater than typical design removal rates. TSS removal was somewhat below the typical design removal rate at ADWF; however, TSS removal in general is considered adequate.

Table 3.3 Primary Clarification Performance Data
WWTP Facility Plan
City of Richmond and Veolia Water

Design Parameter	Design Flow	Typical Design Criteria	2011 to 2015 Performance
Overflow Rate (gpd/sf)	ADWF(1)	800-1,200	380
	ADMMF(2)	800-1,200	740
	PHWWF(3)	2,000-3,000	2,510
BOD Removal (%)	ADWF	35%	Historical Average: 46%
	ADMMF	30%	
	PHWWF	<20%	
TSS Removal (%)	ADWF	70%	Historical Average: 60%
	ADMMF	60%	
	PHWWF	<35%	

Notes:
(1) ADWF velocity based on screening capacity of 6.0 mgd.
(2) ADMMF velocity based on screening capacity of 11.8 mgd.
(3) PHWWF velocity based on screening capacity of 40 mgd.



LEGEND
Daily
30-Day Running Average
Design ADWF Overflow Rate
Design ADMMF Overflow Rate

PRIMARY CLARIFIER OVERFLOW RATE

FIGURE 3.7

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f12-11034.ai

3.3.2.4 Aeration Basins

There are four equally sized, mechanically aerated basins, of which two are operational. The remaining two are currently used as equalization basins (the mechanical aerators are not functional in these basins). Each aeration basin has three aeration cells. The first cell is separated from the latter cells by a baffle wall.

Key parameters used to design and operate an activated sludge process include:

- Mixed liquor suspended solids (MLSS) concentration.
- Solids retention time (SRT).
- Sludge volume index (SVI).

Table 3.4 compares typical design criteria for the key parameters with the actual performance data over the analysis period.

The primary function of the aeration basins is to remove BOD via converting soluble organics into settleable biomass and floc. The basins were originally designed for BOD removal only. They were not designed for ammonia removal or nutrient removal (such as total nitrogen and phosphorus). In general, the aeration basins have performed adequately; however, there have been challenges in providing enough BOD and ammonia removal to meet the NPDES permit limits at all times. It is likely BOD exceedances are related to poor aeration (e.g., surface aerators failing). The potential causes for ammonia exceedances are less understood and could include that the SRT is too short/variable or the MLSS concentration is comprised of a high amount of inert suspended solids (which do not provide treatment).

3.3.2.4.1 *MLSS*

Table 3.4 and Figure 3.8 show the MLSS concentration was within the range of the typical design criteria, but lower than the design maximum concentration of 3,000 mg/L. The average MLSS was 2,220 and has ranged from 1,580 mg/L to 2,860 mg/L. The MLSS is important as it directly affects the mass of solids in the aeration tanks, which affects the operating SRT and treatment capacity. The recommended MLSS concentration to use for assessing capacity depends on the peak flow through the activated sludge process. Peak flow to the activated sludge process is critical because it is desirable to use the maximum MLSS concentration that does not cause failure of the downstream secondary sedimentation basins from solids overload during peak flows. Assuming the WWTP continues to limit flow to the activated sludge process to 20 mgd, a MLSS concentration of 3,000 mg/L should be used for assessing aeration basin capacity.

3.3.2.4.2 *SRT*

The SRT is the most important operating parameter for an aeration basin and is defined as the total mass of the solids in the aeration tanks divided by the total mass of the solids leaving the system in the WAS and secondary effluent. The SRT needed to achieve good performance depends on the treatment objectives (i.e. BOD removal, ammonia removal, nutrient removal, etc.) and the wastewater temperature. With the temperatures experienced in the Bay Area, the following SRTs are recommended for assessing the capacity of the aeration basins:

- 3 days for BOD removal only.
- 6 to 10 days for ammonia removal (nitrification).
- 6 to 10 days for total nitrogen removal (denitrification).

Figure 3.9 shows the SRT was about 7.5 days on average, with a range from 4.0 days to 10 days. Operating at this SRT and the MLSS concentrations summarized above, it is expected the process would removal nearly all influent ammonia. Other plants in the Bay Area are removing nearly all influent ammonia operating at similar MLSS concentrations and an SRT of 2 to 3 days. As stated above, the process is only removing about 26% of the influent ammonia. Ammonia removal rates may be lower than expected because the SRT is variable and slightly lower than what may be required for complete ammonia removal. The ammonia removal rate may also be low because the MLSS may be comprised of more inert material (material that does not provide treatment) than is currently being measured. The current ratio of mixed liquor volatile suspended solids (MLVSS) to MLSS is about 80%. This is a typical ratio for conventional activated sludge processes, but should be investigated further.

It is recommended that the City conduct a study to determine what is causing the lower ammonia removal rate and what operating parameters (MLSS and SRT) would provide complete ammonia removal. These operating parameters are critical to determining design criteria for treatment facility improvements that may be required in the future to comply with anticipated nutrient removal requirements.

3.3.2.4.3 *SVI*

In addition to removing BOD and other desired constituents, the aeration basin should generate well-settling sludge, which is measured by the sludge volume index (SVI). The SVI represents the volume the solids in a mixed liquor sample will compress to after 30 minutes. In general, the lower the SVI, the faster the solids settle. The SVI is important as it directly affects the capacity of the downstream secondary clarifiers and overall secondary process.

Figure 3.10 shows how the sludge volume index has varied. Over the analysis period, the average SVI was 180 milliliters per gram (mL/g), while the 90th percentile value was about

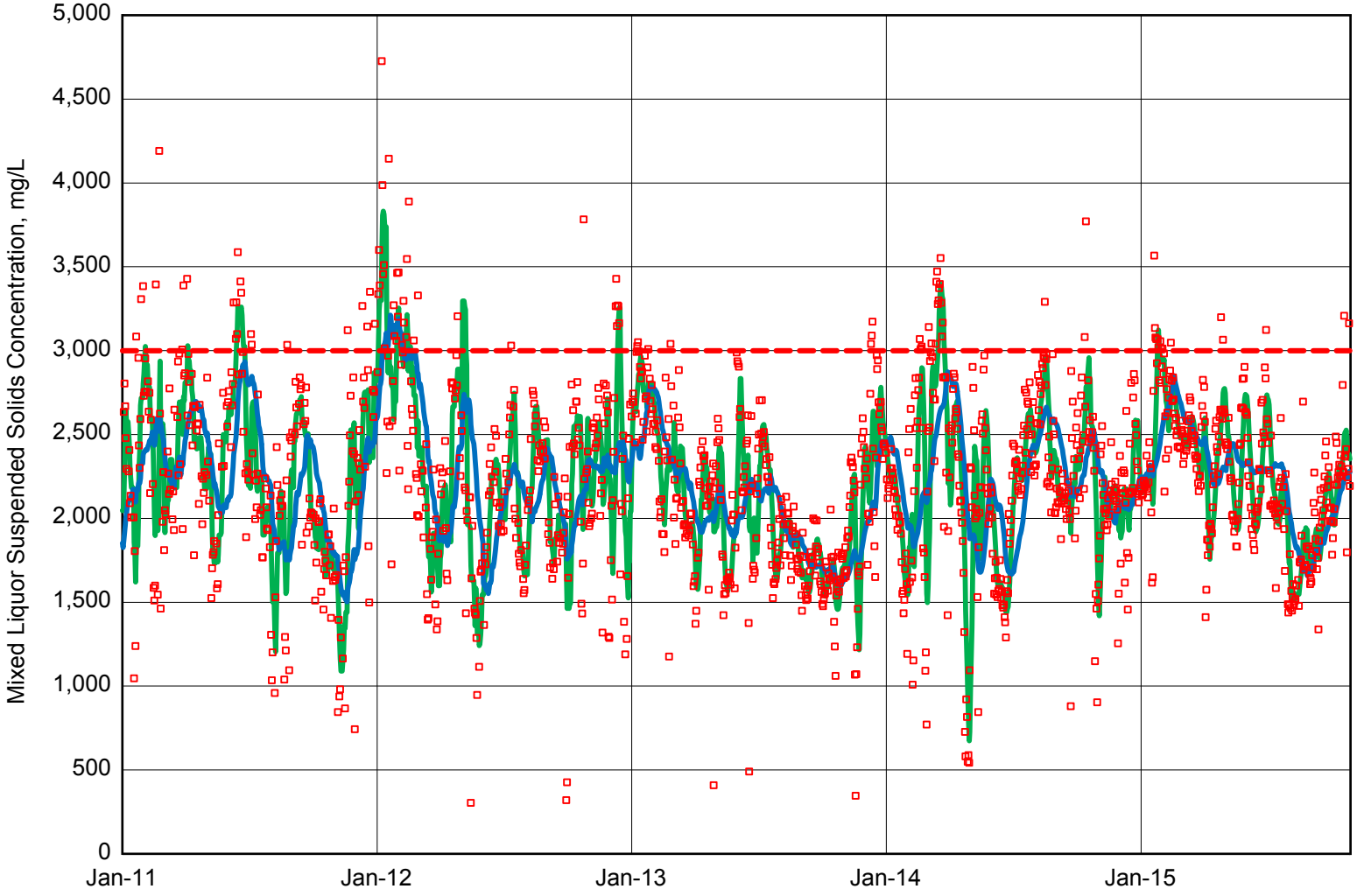
270 mL/g. This is very high considering most activated sludge plants typically have an SVI around 150 mL/g. As a result, the solids do not settle as easily in the secondary clarifiers.

The cause for the high SVI was investigated as part of the 2010 Master Plan. It was determined the mixed liquor contains abundant amounts of filamentous organisms. The two major filaments present were *Microthrix parvicella* and nocardioform organism. It was concluded settling issues were likely due to the presence of *Microthirix parvicella*. The presence of this filament is characteristic of mechanically aerated basins. In mechanically aerated aeration basins, there are zones where dissolved oxygen (DO) is present (close to the aerators) and zones that are devoid of DO (between the aerators). It is the cycling of the mixed liquor between these two zones (aerobic and anoxic) that encourages the growth of *Microthrix parvicella*. DO data collected at the aeration basins indicates the aeration basins do not have a uniform DO concentration. Large portions of the basins, especially the lower third of the first cells of the aeration basins, have very limited DO.

Table 3.4 Aeration Basin Performance Data
WWTP Facility Plan
City of Richmond and Veolia Water

Design Parameter	Typical Design Criteria	2011 to 2015 Performance Average	2011 to 2015 Performance Range(1)
MLSS (mg/L)	1,000-3,000	2,220	1,580 to 2,860
SRT (days)	4-8	7.5	4.0 to 10
SVI (mL/gram)	150	180	110 to 270
BOD Removal (%)(2)	85% at ADWL	88	80 to 95

Notes:
(1) The range corresponds to the 10th and 90th percentile.
(2) Includes total BOD removal across aeration basins and secondary clarifiers.



LEGEND
Daily
7-Day Running Average
30-day Running Average
Design Maximum Daily Concentration

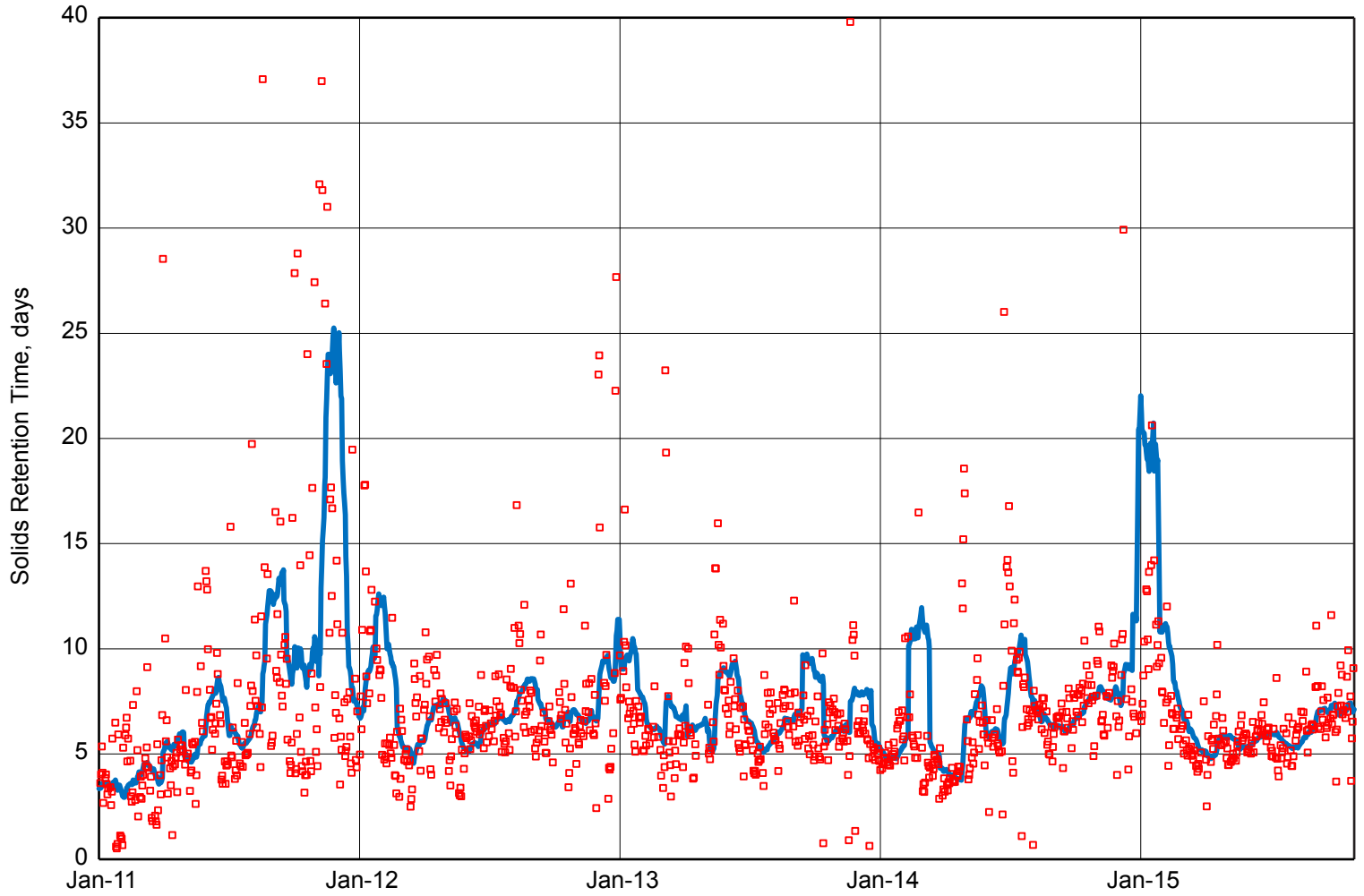
AERATION BASIN MIXED LIQUOR SUSPENDED SOLIDS (MLSS) CONCENTRATION

FIGURE 3.8

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f13-11034.ai



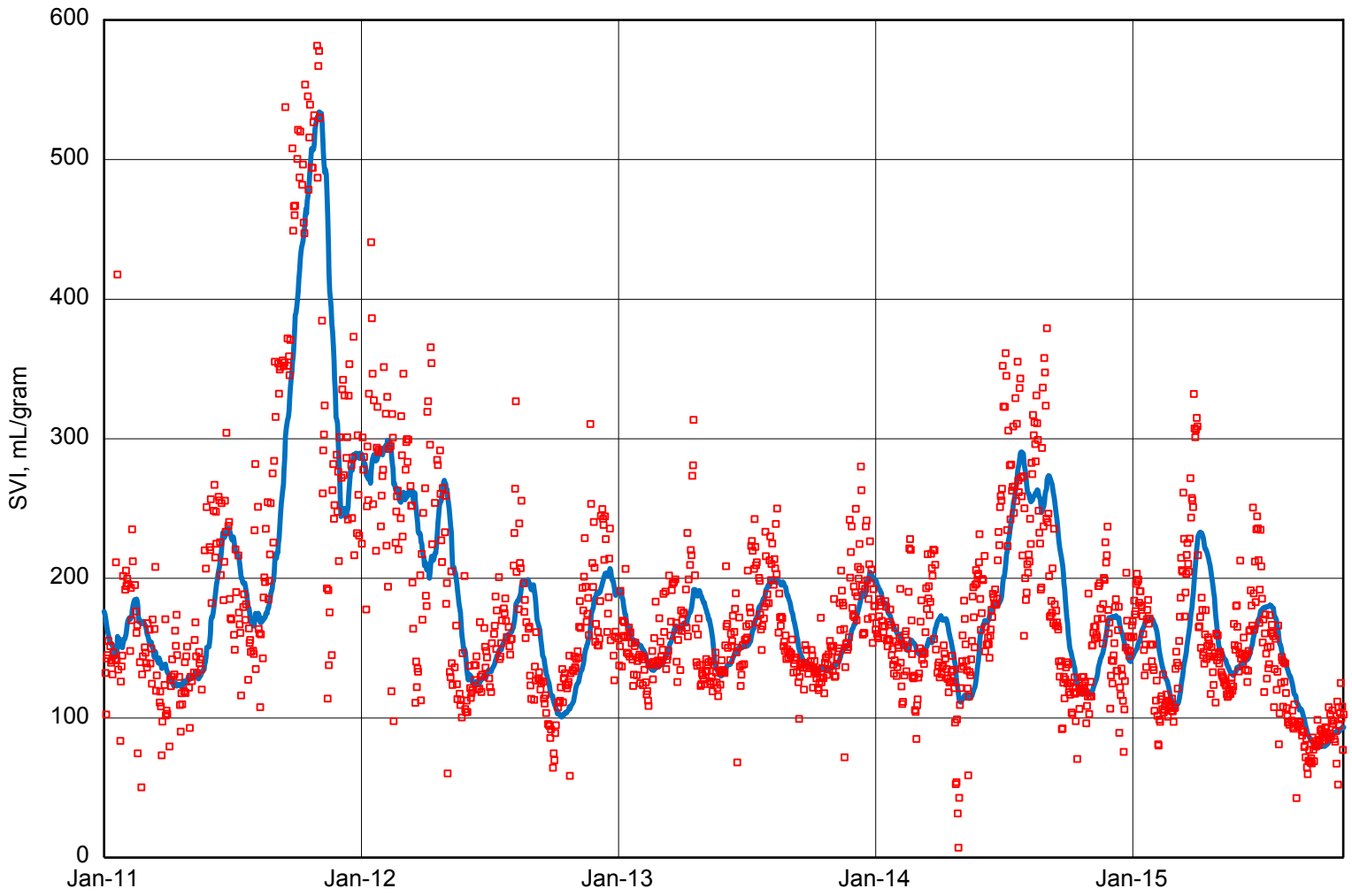
SECONDARY TREATMENT PROCESS
SOLIDS RETENTION TIME (SRT)

FIGURE 3.9

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f14-11034.ai



AERATION BASIN SLUDGE VOLUME INDEX (SVI)

FIGURE 3.10

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f15-11034.ai

3.3.2.5 Secondary Clarifiers

The WWTP has three secondary clarifiers: two square clarifiers (No. 1 and 2) and one circular clarifier (No. 3). The clarifiers are fed aeration basin effluent from the top through channels located beneath the clarifier mechanism bridges. The channels feed a flocculating well where the effluent is distributed to the clarifiers. The clarifier mechanisms have draft tubes that are designed to vacuum the sludge from the bottom of the clarifiers and convey return activated sludge (RAS) and WAS to wet wells at the center of the clarifiers. Clarifier No. 1 and 2 are shallower than Clarifier No. 3. Clarifiers No. 1 and 2 have in-board launders, with weirs on both sides. Clarifier No. 3 has a single effluent weir mounted on a launder around the perimeter of the clarifier.

The primary function of the secondary sedimentation basins is to separate the settleable biomass and floc (activated sludge) generated in the aeration basins from the effluent. In general, the sedimentation basins have performed adequately; however, there have been challenges in providing enough BOD and TSS removal in the secondary clarifiers to meet the NPDES permit at all times. As described in the sections below, although the loading on the clarifiers is within typical design standards, the clarifiers are not performing well due to some operational issues.

Key parameters used to design and operate secondary clarifiers include surface overflow rate and solids flux rate. Table 3.5 compares typical design criteria for the key parameters with the actual performance data over the analysis period.

3.3.2.5.1 *Surface Overflow Rate*

Plant staff indicated the square clarifiers tend to perform better (remove more TSS) than the circular clarifier. As a result, plant staff manually adjust the influent gates to the clarifiers to maintain a flow split of 80 percent to Clarifiers No. 1 and 2 and 20 percent to Clarifier No. 3. As indicated in Table 3.5 and shown in Figure 3.11, based on this flow split, the surface overflow rates for the clarifiers are within typical design criteria.

The solids loading rates for all three clarifiers are within design parameters. At peak flows, the solids loading for the square clarifier was 5.6 lb/sf/day, which is below the maximum solids loading rate of 40 lb/sf/day.

The allowable secondary sedimentation surface overflow rate depends on the settleability of the mixed liquor and the operating mixed liquor concentration. Correlations are available within technical literature to relate the settling rate of mixed liquor to the MLSS concentration and to the SVI. As stated above, the average SVI is 180 mg/L, which is higher than the typical SVI of 150 mL/g characteristic of activated sludge plants. As a result, although the overflow rate and solids loading rate are within typical design criteria, there have been incidences of TSS exceeding effluent limits. This indicates there are issues with

the settleability of the sludge. Reasons for poor sludge settleability are discussed in the aeration basin section above.

3.3.2.5.2 *Operational Issues*

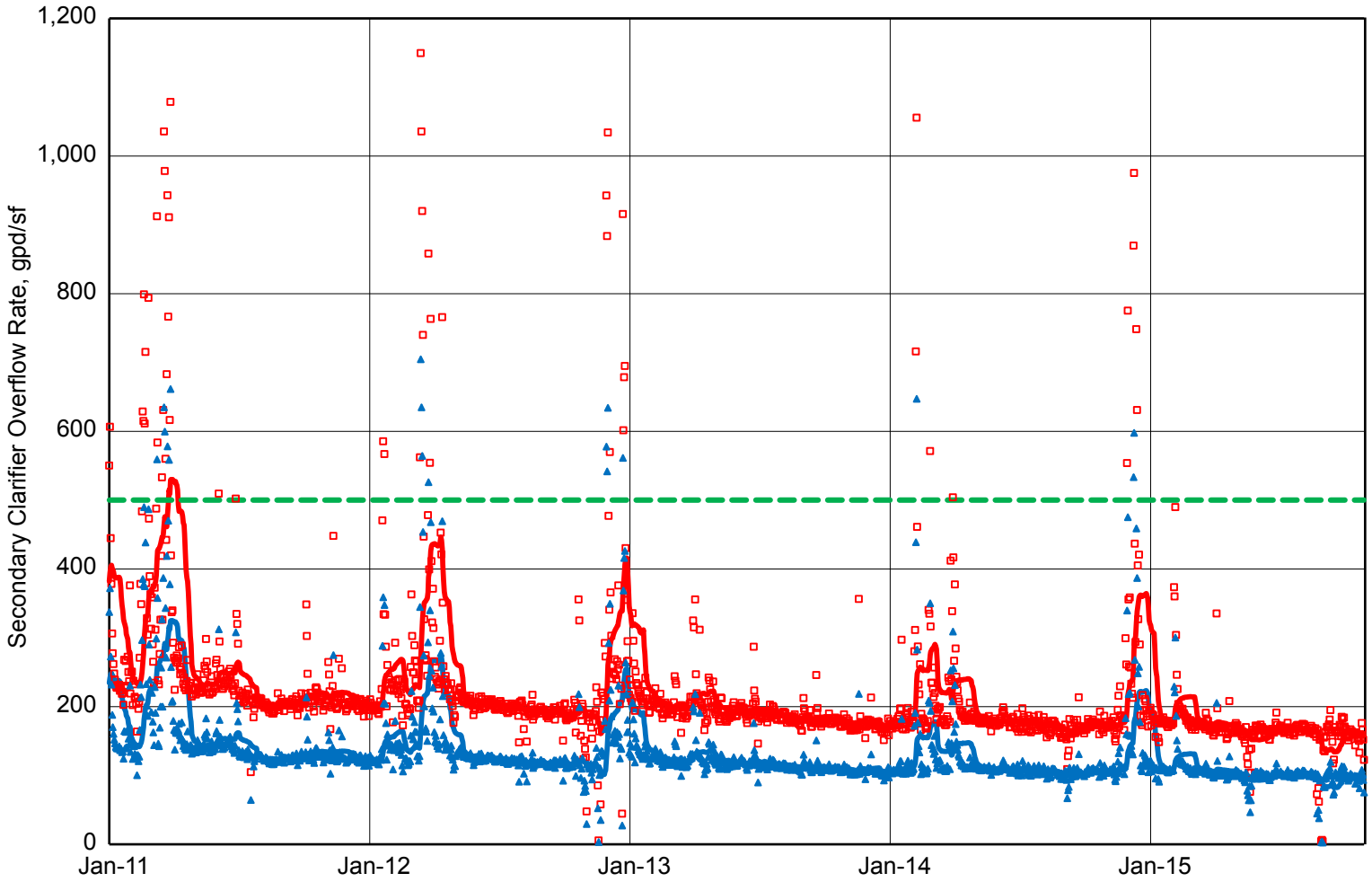
Overall, the loadings on the clarifiers are within typical design standards; however, the clarifiers are not performing well due to the following operational issues.

- Solids carryover has occurred in Clarifier No. 3 during peak flow events. Possible reasons for this include clogged draft tubes and short-circuiting due to high weir overflow rates. The draft tubes in all three clarifiers clog frequently, causing the sludge blankets to rise in portions of the clarifiers that are serviced by the clogged draft tubes. The draft tubes clog frequently because a large amount of debris passes through the influent bar screen.

- Clarifier Nos. 1 and 2 do not have corner sweeps. This results in solids collecting in the corners of the clarifiers. The solids then turn septic and begin to rise to the surface, resulting in solids carryover.

- Flow control to the clarifiers is limited. The WWTP has three upward opening slide gates that control flow to each clarifier. These gates can be manually controlled but due to varying flow rates, this is an ineffective way of regulating flow. Additionally, there are no flow measurement devices to indicate the flow to each clarifier.

- The secondary clarifiers will only operate optimally when the mixed liquor is composed of solids that settle properly. The SVI is a good indicator of settleability and, as discussed above, the SVI in recent years has been high. Switching from mechanical aeration to diffused aeration should help reduce the SVIs.



LEGEND
Daily - Clarifiers No. 1 and 2
Daily - Clarifier No. 3
30-day Running Average - Clarifiers No.1 and 2
30-day Running Average - Clarifier No. 3
Design ADWF Overflow Rate

SECONDARY CLARIFIER OVERFLOW RATE

FIGURE 3.11

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f16-11034.ai

Table 3.5 Secondary Clarification Performance Data WWTP Facility Plan City of Richmond and Veolia Water			
Design Parameter	**Design Flow**	**Typical Design Criteria**	**2011 - 2015 Performance**
Solids Flux (ppd/sf)			
Square Clarifiers(1)	Average	<24	3.8
	Range(2)	Max<40	2.4 to 5.6
Circular Clarifier(1)	Average	<24	2.4
	Range(2)	Max<40	1.5 to 3.4
Overflow Rate (gpd/sf)			
Square Clarifiers(1)	ADWF(3)	400 - 600	210
	ADMMF(4)	400 - 600	410
	PHWWF(5)	800 - 1,000	1,370
Circular Clarifier(1)	ADWF(3)	400 - 600	130
	ADMMF(4)	400 - 600	250
	PHWWF(5)	800 - 1,000	840

Notes:
(1) Based on a flow split of 80 percent to the two square clarifiers and 20 percent to the circular clarifier.
(2) The range corresponds to the 10th and 90th percentile.
(3) ADWF velocity based on screening capacity of 6.0 mgd.
(4) ADMMF velocity based on screening capacity of 11.8 mgd.
(5) PHWWF velocity based on screening capacity of 40 mgd.

3.3.2.6 Disinfection

The purpose of disinfection of wastewater is to protect public health by inactivating pathogenic organisms. The disinfection of wastewater at the WWTP is accomplished through sodium hypochlorite addition. The disinfected effluent is dechlorinated with sodium bisulfite (SBS) to protect the aquatic life in the San Francisco Bay.

Key parameters used to design and operate chlorine disinfection processes include chlorine dose and contact time. The average chlorine dosage concentration during the study period was 11 mg/L (as indicated in Table 3.6), which is within the typical chlorine dosage range. However, the required amount of chlorine is dependent upon a variety of factors (i.e., contact time, disinfection kinetics, reactor dynamics, mixing gradients, etc.) and the appropriate dosage should be determined based on operational experience. As such, performance should be based on resulting coliform concentrations and residual chlorine concentrations.

The average SBS dosage concentration during the study period was 27 mg/L (also shown in Table 3.6). This dosage is well above the typical SBS dosage range. Similar to the required chlorine dosage, the required amount of SBS is dependent upon a variety of factors and the appropriate dosage should be determined based on operational experience.

The City could perform a study on the effect of reducing the SBS dose, which would reduce the operational cost of effluent dechlorination, on the effluent chlorine residual.

The contact time is also shown in Table 3.6. The contact time at PHWWF is 35 min, which is within typical design criteria.

Table 3.6 Disinfection Performance Data
WWTP Facility Plan
City of Richmond and Veolia Water

Design Parameter	Design Flow	Typical Design Criteria	2011 - 2015 Performance
Chlorine Dose (mg/L)	ADAF	6 - 12	11
Sodium Bisulfite Dose (mg/L)	ADAF	8 - 18	27
Contact Time (min)	ADWF	30 - 60	230
	ADMMF	30 - 60	120
	PHWWF	15 - 30	35

An operational issue with the chlorine contact basins is that solids carryover from the secondary clarifiers and settle out in the chlorine contact basins. These solids need to be frequently cleaned out to maintain the available volume of the chlorine contact basins.

3.3.2.7 Waste Activated Sludge Thickening

The WWTP has two DAFTs designed for WAS thickening. As discuss above, only DAFT No. 2 is functional and operated. It is typically operated continuously. Thickening is accomplished at the WWTP without the use of a coagulant aid.

The operation of the DAFT falls within the industry standards for loading rates at ADAF. The average loading rate during the evaluation period was 7.0 lb/sf/d, compared with an industry standard of 10.0 to 20.0 lb/sf/d. The average percent capture was 89 percent, which is slightly above a typical performance of 85 percent. The addition of polymer to the DAFT can greatly enhance the capacity and performance of the system. This is especially important during peak loading periods when the DAFT loadings are higher than 10.0 lb/sf/d (which occurs about 10 percent of the time).

The primary function of the DAFT is to reduce the volume of the WAS to be digested by removing water from the WAS and increasing the solids concentration. Typically, the WAS feed to the DAFTs has a solids concentration of less than 1 percent. After thickening, the TWAS has an average solids concentration of 4.1 percent.

3.3.2.7.1 *Anaerobic Digestion*

The WWTP has two anaerobic digesters designed to stabilize combined primary sludge and TWAS. As discussed above, only Digester No. 1 is used for digestion, while Digester No. 2 is used to store digested sludge prior to it being pumped to the WCWD WPCP. Each digester has a maximum operating volume of 1.7 MG.

The key design criteria for anaerobic digestion are the hydraulic residence time (HRT) and volatile solids loading rate (VSLR). Based on the digester data available and operation of Digester No. 1 only, the average HRT was 51 days and the average VSLR was approximately 0.04 lb VSS per cf per day. The digester is operating well above the minimum HRT design criterion of 15 days, and the VSLR is well below a typical design criterion of 0.12 lb VSS per cf per day.

The primary function of the anaerobic digesters is to reduce the amount of volatile solids in the sludge. The average volatile solids reduction was 58 percent, which well above the 38 percent reduction required to meet Class B criteria. This indicates that the digesters are performing well. This result is expected since the digesters operate above minimum HRT and below maximum VSLR design criteria.

Overall, Digester No. 1 is performing well. However, screenings and grit not captured at the screening and grit facilities are accumulating in Digester No. 1, which is ultimately reducing the digester treatment capacity and will require taking Digester No. 1 offline for cleaning to restore the treatment capacity. When Digester No. 1 is offline for cleaning, Digester No. 2 will need to be put into service and therefore, it is important to note, there will be no digested sludge storage available during the period when Digester No. 1 is offline.

3.4 CAPACITY ANALYSIS

The treatment capacity of the WWTP is subject to a variety of conditions. Parameters affecting a plant's capacity include wastewater characteristics and loadings, peak flow and loading conditions, treatment objectives (i.e., ammonia removal, nitrate removal, etc.), plant hydraulic limitations, existing unit processes, process configuration and limitations, and required reliability and redundancy. The capacity assessment involved a two-stage approach. The first stage was to determine the hydraulic limitations of the plant by performing a hydraulic analysis, and second, determination of the treatment limitations of the existing facilities through use of design parameters and a process model.

3.4.1 Hydraulic Capacity

3.4.1.1 Recent Changes Impacting Hydraulic Capacity

A hydraulic capacity analysis of the WWTP was performed as part of the 2010 Master Plan. Since the 2010 Master Plan, the primary change that has occurred at the WWTP that had an impact on the plant hydraulic capacity is the construction of the Wet Weather Facilities (a 26-mgd pump station and 5 MG storage tank). The Wet Weather Facilities are designed to store flows above 40 mgd under the 10-year, 24-hour design storm. As a result, the maximum influent flow currently pumped to the treatment process is 40 mgd. It is assumed this will be the case in the future as well, given the 10-year, 24-hour design storm is anticipated to be the same at buildout conditions. As discussed in the Chapter 2, depending on the storm flows occurring before and after large storm events, the daily average flow to

the plant could be higher than 40 mgd because the wet weather storage tank may be fully utilized. For planning purposes, it is assumed the peak daily flow to the plant and pumped to the treatment process would be about 40 mgd (currently and at buildout).

3.4.1.2 Hydraulic Capacity Findings

The key finding of the hydraulic capacity analysis performed as part of the 2010 Master Plan is that the outfall has a capacity of approximately 62 mgd under maximum tide conditions. Considering the changes described above, this finding is still valid. Under this scenario, WCWD could discharge 21 mgd, which is the permitted wet weather capacity of the WCWD WPCP included in the NPDES permit. Richmond could discharge 41 mgd, which is greater than the estimated maximum daily flow at the plant.

At this flow, the water surface elevation in the confluence structure would be 23 feet ±, which significantly impacts the hydraulics of the WWTP. This water level submerges the effluent Parshall flumes (which have a base elevation of 20.0 feet) in the chlorine contact basins. This causes the water level in the chlorine contact basins to reach the top of the structure and submerge the effluent launders in the secondary clarifiers. Under these conditions, the WWTP is subject to basin overflows and poor secondary clarification, which could result in NPDES permit violations.

Appendices B and C includes the hydraulic profiles that were developed as part of the 2010 Master Plan. One profile was developed for an ADWF of 7 mgd, which is similar to the current and projected ADWF. The other profile was developed for a PWWF of 55 mgd. Max water surface elevations through the treatment process are anticipated to be less than what is shown in this hydraulic profile, given the peak flow through the treatment process is anticipated to be 40 mgd.

3.4.1.3 Recommended Hydraulic Improvements and Impacts of Sea-Level Rise

To avoid adverse impacts on the treatment process, the maximum water level in the confluence structure should remain at or below +20.0 feet. At this elevation and at maximum high tide, the capacity of the outfall is approximately 56 mgd (35 mgd for the Richmond WWTP and 21 mgd for WCWD).

Given flows regularly exceed 35 mgd during wet weather events, a solution to this hydraulic condition is required. In addition, due to projected rises in the base sea level in the future from climate change, the outfall hydraulic capacity will decrease with time. For the San Francisco Bay, the sea level is projected to rise by 2 to 13 inches by 2050 and 7 to 24 inches by 2100 (per the 2007 report by the Intergovernmental Panel for Climate Change). In addition, research by the Scripps Institute has shown that the mean high water level is increasing at a rate 19 percent faster than mean sea level due to climate change. If the sea level rises 18-inches, the outfall capacity will decrease from 62 mgd to 51.5 mgd at maximum high tide. If the sea level rises 36-inches, the outfall capacity will decrease to 47 mgd at maximum high tide.

To address this hydraulic limitation, a low-lift pump station could be installed at the confluence structure. The low lift pump station would only operate when the water level in the confluence structure is high.

3.4.2 Treatment Capacity

3.4.2.1 Recent Changes Impacting Treatment Capacity

A treatment capacity analysis of the WWTP was performed as part of the 2010 Master Plan. Operating data and existing and future influent flows and loadings were considered to determine the treatment capacity of the WWTP. Since the Master Plan, there have not been any significant upgrades or changes to the treatment process that have made a significant impact on the overall treatment capacity of the facilities. In general, the performance of each process is about the same. As summarized in Chapter 2, however, the current and future influent flows and loads developed as part of this Facility Plan are lower than those included in the 2010 Master Plan.

The findings of the 2010 Master Plan treatment capacity assessment are largely still valid, with the exception of the treatment capacity of the aeration basins and secondary clarifiers. The influent load has an impact on the treatment capacity of these facilities. As a result, these capacities were updated based on the current and future loads for this Facility Plan.

3.4.2.2 Treatment Capacity Findings

Table 3.7 presents the treatment capacity results for four scenarios in which the WWTP provides BOD and TSS removal of the entire flow stream, as required by the NPDES permit. The scenarios that were evaluated are as follows:

- All major process units in-service at ADW flows and loads.
- One major process unit is assumed out of service at ADW flows and loads; however, no two processes have a unit out of service at the same time (e.g., primary clarifier and aeration basin).
- All major process units in-service at ADMM flows and loads.
- All major process units are in service. Peak wet weather flow loadings of 40 mgd (primary) and 20 mgd (secondary) were used.

Table 3.7 Treatment Capacity Rating
WWTP Facility Plan
City of Richmond and Veolia Water

Unit Process	All Units In Service (mgd ADWF)	One Unit Out of Service (mgd ADWF)	All Units In Service (mgd ADMMF)	All Units In Service (mgd PWWF)	Design Criteria
Bar Screen	--	--	--	33	Approach velocity of 1.5 ft/sec
Influent Pump Station	--	--	--	30	With largest pump out of service
Grit Basin	--	--	--	40	
Primary Clarifiers	16	8.0	19	40	SOR of 1000 gal/sf-d at ADWF, 1,200 at ADMMF, and 2,500 at PWWF
Aeration Basins	8.2	4.1	15	--	SRT of 3 days and MLSS of 2,500 mg/L at ADWF and 3,000 mg/L at PWWF
Secondary Clarifiers	13	8.5	20	33	SVI of 150 mL/g and SOR of 400 gal/sf-d at ADWF, 600 at ADMMF, and 1,000 at PWWF
Chlorine Contact Basin	--	--	23	70	HRT of 1 hr at ADMMF and 20 min at PWWF
Outfall	--	--	--	35	At a water level of +20.0 ft in the confluence structure
Dissolved Air Flotation Thickeners	13	0	19	--	Loading of 18 lb/sf-d
Digesters	49	24	28	--	Loading of 0.12 lb VSS/cf-d and HRT of 15 d

The key findings of the treatment capacity analysis are as follows:

- The ADMMF capacity of the liquid treatment process is 15 mgd and is limited by the capacity of the aeration basins. It is recommended improvements be made to the aeration system to increase the treatment capacity of the aeration basins in order to treat projected flows and loads.
- The ADWF capacity of the liquid treatment process with all units in service is 8.2 mgd and is limited by the capacity of the aeration basins. It should be noted that there is not enough aeration basin capacity to take one of the two basins out of service during dry weather flows. It is recommended that capacity improvements be made to the aeration basins to more reliably treat current and projected flows and loads. These improvements would also allow for one aeration basin to be taken out of service during dry weather flow for routine maintenance.
- The ADMMF and ADWF capacity of the solids treatment process is 19 mgd and 13 mgd, respectively. The solids process capacity is limited by the capacity of the DAFT. It should be noted that there is only one functional DAFT, so there is no redundant capacity for thickening. It is recommended the thickening facilities be upgraded to include one redundant unit. This would increase the reliability of sludge thickening and allow for routine maintenance.

At PWWF, all processes are capable of meeting the 40 mgd primary and 20 mgd secondary capacity requirements with the exception of the influent pump station, bar screen, and outfall.

REGULATORY REQUIREMENTS AND CONSIDERATIONS

4.1 INTRODUCTION

This chapter summarizes regulatory requirements that affect the operation of the existing WWTP facilities. This includes a comprehensive review of the regulations governing final effluent, solids treatment and use/disposal, and air emissions. In addition, potential impacts of future regulations are considered. The Facility Plan provides a strategic plan for critical plant projects that will be implemented over the next 20 years. Recommendations for these projects were developed to meet existing regulatory requirements with the flexibility to meet potential future regulatory requirements. Assessment of current and future regulatory requirements is critical to the development of appropriate alternatives.

This chapter provides a summary of:

- The City's current operating permits.
- Existing federal, state, and regional regulatory requirements governing: the discharge of treated wastewater to San Francisco Bay, solids treatment and use/disposal, and applicable air quality (odor and air emissions, greenhouse gas emissions, etc.).
- Applicable new and emerging regulatory issues.
- Potential future regulatory or industry shifts to decentralized treatment.

4.2 SUMMARY OF FINDINGS AND CONCLUSIONS

The key findings and recommendations, as they relate to the City's current and future ability to comply with regulations, are:

- For the purposes of the Facility Plan, it is assumed the City would be required to meet an ammonia limit of 2 mg/L and a total nitrogen limit of 6-15 mg/L within the next 20 years (see Figure 4.1). These assumptions are based on the Bay Area Clean Water Agencies' (BACWA) Scoping and Evaluation Plan for potential nutrient reduction and discussions with regulators. If more stringent limits are implemented within the planning period, additional improvements beyond what is recommended in the Facility Plan will be required. It is recommended the City re-evaluate anticipated nutrient limits every five years at a minimum, to allow adequate time to implement improvements that may be required.
- The current trend of increasing regulation on microconstituents and other constituents of emerging concern (CECs) may result in new effluent limits for some constituents in the next 10 to 25 years. Given the uncertainty of the timing and scope of these regulations, the Facility Plan does not include improvements to address these constituents. Meeting limits for these constituents will likely require:

  - Increased source control and pollution prevention programs to minimize their discharge to the influent sewer. For ubiquitous compounds, it is recommended that the City work with other non-profit organizations and the legislature to restrict their use and improper disposal.
  - Advanced oxidation. Some microconstituents and other emerging contaminants have been shown to be effectively removed with advanced oxidation processes such as ozonation and/or ultraviolet disinfection. For some CECs, treatment with reverse osmosis in combination with an advanced oxidation process results in non-detect levels.
- The City currently pumps digested sludge (biosolids) to the West County Wastewater District (WCWD) Water Pollution Control Plant (WPCP) for dewatering and disposal. Given WCWD has indicated that they will not accept biosolids from the WWTP in the near future, the City will need to implement biosolids dewatering facilities at the WWTP site. With the implementation of these facilities, the City will be responsible for the use and/or disposal of the biosolids and for compliance tasks relating to biosolids treatment and disposal.
- The WCWD's current practice of landfilling (as well as land application) of biosolids is becoming increasingly restricted as fewer landfills are accepting biosolids. This ongoing trend places importance on the diversification of biosolids disposal options. To comply with future restrictions, the City should develop a plan for alternative biosolids use and/or disposal scenarios that are cost effective and feasible over the long-term.
- With California legislation requiring the reduction of waste being sent to a landfill by 75 percent by 2020, the elimination of diversion credit for green waste used as alternative daily cover by 2020, and the push to eliminate 100 percent of organic waste from landfills by 2025, use of biosolids as landfill alternative daily cover will likely be significantly reduced or eliminated.
- The majority of federal, state, and local air quality requirements are currently enforced through the Bay Area Air Quality Management District (BAAQMD) operating permit. Air regulations are fairly dynamic and need to be monitored with the renewal of each permit (i.e., every two years for the BAAQMD operating permit).
- Within the last five years, amended air emissions regulations for new internal combustion engines required emission control equipment. The City should plan for increasingly stringent emissions requirements and for emissions control equipment for stationary combustion facilities and engines. It is anticipated that more stringent regulations will take effect in the next five years.
- Due to the relatively low level of emissions, the WWTP is not currently required to report greenhouse gas emissions. General stationary combustion emissions may need to be reported within the next 10 years. Emissions and regulations should continue to be monitored.

Figure 4.1 illustrates the projected time frame for possible changes in National Pollutant Discharge Elimination System (NPDES) requirements for nutrients (specifically, nitrogen and phosphorous) over the next 30± years. While uncertain at this time, the timing and scope of those changes will affect the City's planning and alternatives development. A range of years during which future permit requirements are projected to be implemented are shown for each potential treatment level. Actual implementation dates for future regulations are unknown.

4.3 OVERVIEW OF CURRENT WATER QUALITY REQUIREMENTS

The WWTP is permitted for an ADWF capacity of 16 mgd and a wet weather flow capacity of 20 mgd, which is based on the capacity of the secondary treatment system. When influent flows are greater than 20 mgd, the permit allows a portion of the primary effluent to bypass the secondary treatment system and be blended with secondary effluent prior to disinfection before being discharged. The treated effluent from the plant is combined with effluent from the WCWD WPCP. The combined effluent is discharged to San Francisco Bay via a deep-water outfall. The City of Richmond and WCWD operate their WWTPs under the authority of the West County Agency (WCA), which was formed by a Joint Powers Agreement in February 1977.

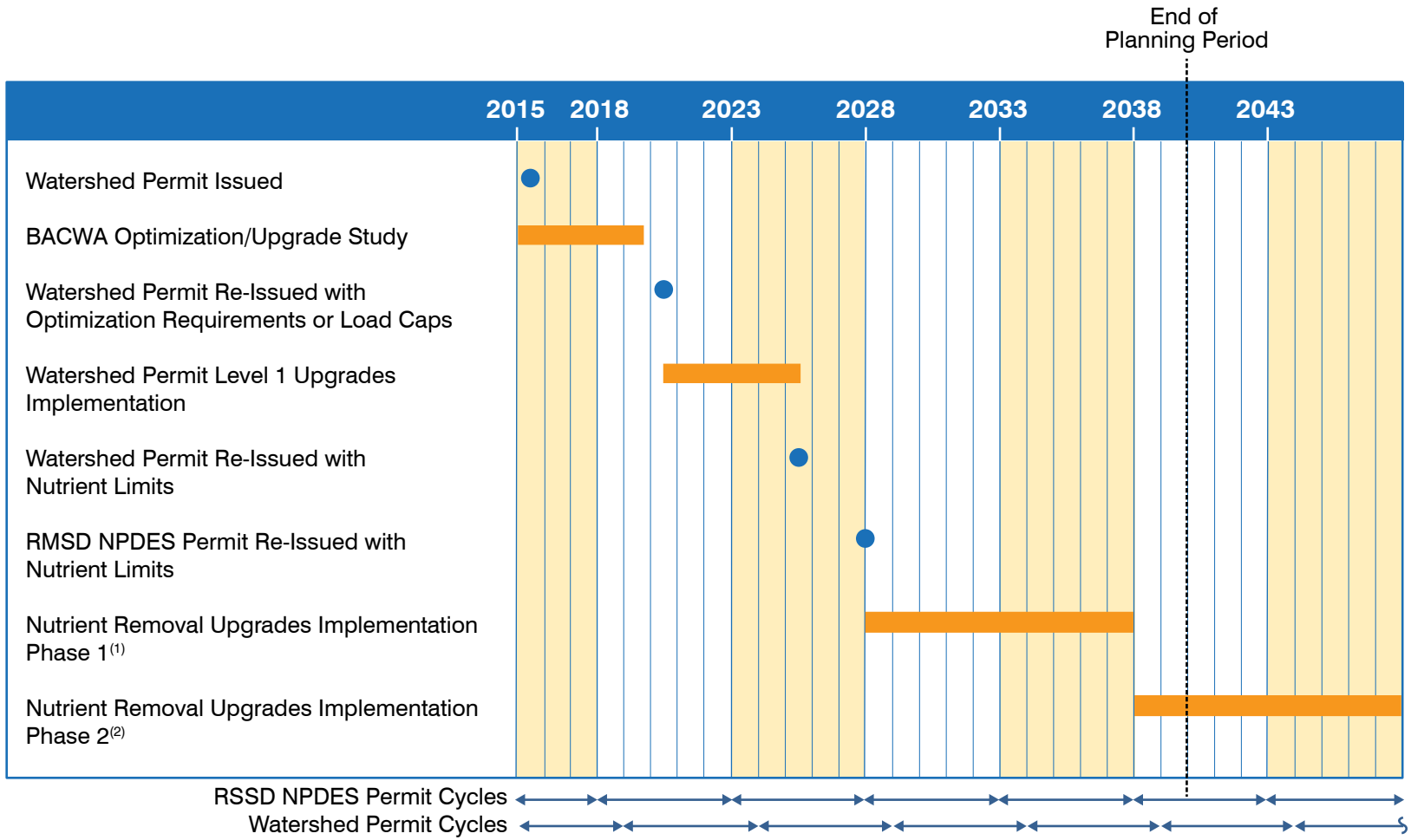
The WWTP has wet weather facilities for temporary storage of wet weather flows, with a combined volume of 5 million gallons. These facilities are used to store excess raw wastewater upstream of the headworks, when influent flows exceed the plant's treatment capacity of 40 mgd. When influent flows subside, the stored wastewater is routed back to the headworks for full treatment.

The section provides summaries of the WCA's current water quality requirements.

4.3.1 Permit Effluent Limits

Under the Clean Water Act (CWA), the Environmental Protection Agency (EPA) is responsible for the regulation of the WCA’s effluent discharges through the issuance of NPDES permits. Municipal and industrial discharges to waters of the U.S. are controlled through effluent limits contained in waste discharge permits issued under the authority of the federal NPDES programs. The NPDES permitting program for California has been delegated to the state of California. In the San Francisco Bay basin, permitting has been delegated to the San Francisco Bay Regional Water Quality Control Board (Regional Water Board).

The WCA's current permit, Order No. R2-2013-0016, NPDES Permit No. CA0038539, was adopted on May 8, 2013 and expires on June 30, 2018. The WCA is also required to meet mercury and PCB limits for San Francisco Bay dischargers under a watershed permit issued by the Regional Water Board Waste Discharge Requirements Order No. R2-2012-0096, NPDES Permit No. CA0038849, which became effective on



Notes:

(1) At this time, the Watershed Permit limits and timing have not been established. The assumed Phase 1 would include upgrades to meet Level 2 or Level 3 nutrient removal targets based on 2015 BACWA Nutrient Optimization/Upgrade Scoping and Evaluation Plan. The provisional nutrient limits are as follows:

Level 2: (NH_3 < 2 mg/L, TN < 15 mg/L, TP < 1 mg/L)

Level 3: (NH_3 < 2 mg/L, TN < 6 mg/L, TP < 0.3 mg/L)

(2) Phase 2 would be required if the nutrient limits are issued in two phases. Under this scenario, Phase 1 would be to meet Level 1 limits; Phase 2 would be to meet Level 2 limits.

POTENTIAL SCENARIO – IMPLEMENTATION SCHEDULE FOR NUTRIENT REMOVAL

FIGURE 4.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616s1-10034.ai

December 12, 2012 and expires on December 31, 2017. The WCA is also required to participate in the watershed permit issued by the Regional Water Board Order No. R2-2014-0014, NPDES Permit No. CA0038873, requiring the evaluation of potential nutrient discharge reduction and development of waste discharge requirements for nutrients (nitrogen and phosphorous) from municipal wastewater dischargers to the San Francisco Bay, which became effective on July 1, 2014 and expires on June 30, 2019. A copy of the current permits can be found in Appendices D, E, and F, respectively.

Table 4.1 summarizes the effluent limitations contained in the WCA's current 2012 NPDES permit. In addition to the limits in the table, the average monthly removal for BOD and TSS must be at least 85 percent. The permit also contains limits for acute and chronic toxicity.

Table 4.1 Effluent Limits in 2012 NPDES Permit(1)
WWTP Facility Plan
City of Richmond and Veolia Water

Constituent	Units	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Min	Instantaneous Max
BOD 5-day @ 20°C	mg/L	30	45	---	---	---
TSS	mg/L	30	45	---	---	---
Oil and Grease	mg/L	10	---	20	---	---
pH	s.u.	---	---	---	6.0	9.0
Enterococcus Bacteria(2)	MPN/ 100 mL	35	---	---	---	---
Copper, Total Recoverable	µg/L	44	---	76	---	---
Nickel	µg/L	34	---	59	---	---
Cyanide, Total Recoverable	µg/L	19	---	41	---	---
Bis(2-ethylhexyl)phthalate	µg/L	55	---	170	---	---
Dioxin-TEQ	µg/L	1.4×10^{-8}	---	2.8×10^{-8}	---	---
Endrin	µg/L	0.019	---	0.037	---	---
Heptachlor	µg/L	0.0019	---	0.0039	---	---
Ammonia, Total (as N)	mg/L	32	---	59	---	---
Dissolved Oxygen(3)	mg/L	---	---	---	---	---
Dissolved Sulfide(4)	mg/L	---	---	---	---	---
Turbidity(4)	NTU	---	---	---	---	---

Notes:
(1) Limits included in Waste Discharge Requirements Order No. R2-2013-0016, NPDES Permit No. CA0038539.
(2) The 30-day geometric mean value for all samples analyzed for enterococcus bacteria shall not exceed 35 colonies per 100 mL.
(3) The effluent shall not cause the dissolved oxygen concentration of the receiving waters to fall below a minimum of 5.0 mg/L within one foot of the water surface.
(4) Shall not exceed present natural background levels.

4.3.1.1 Dioxin-TEQ Effluent Limits

In February 2010, a blanket permit amendment for dioxin and furan compounds was issued for dischargers in the San Francisco Bay area (Order No. R2-2010-0054). The purpose of the amendment was to establish consistent standard requirements for all NPDES wastewater permits and to revise the method for calculating dioxin-TEQ for permits that require monitoring and reporting of dioxin-TEQ. Under the new method, all San Francisco Bay dischargers, including the WCA, are in compliance with their dioxin-TEQ permit limits.

4.3.1.2 Mercury Effluent Limits

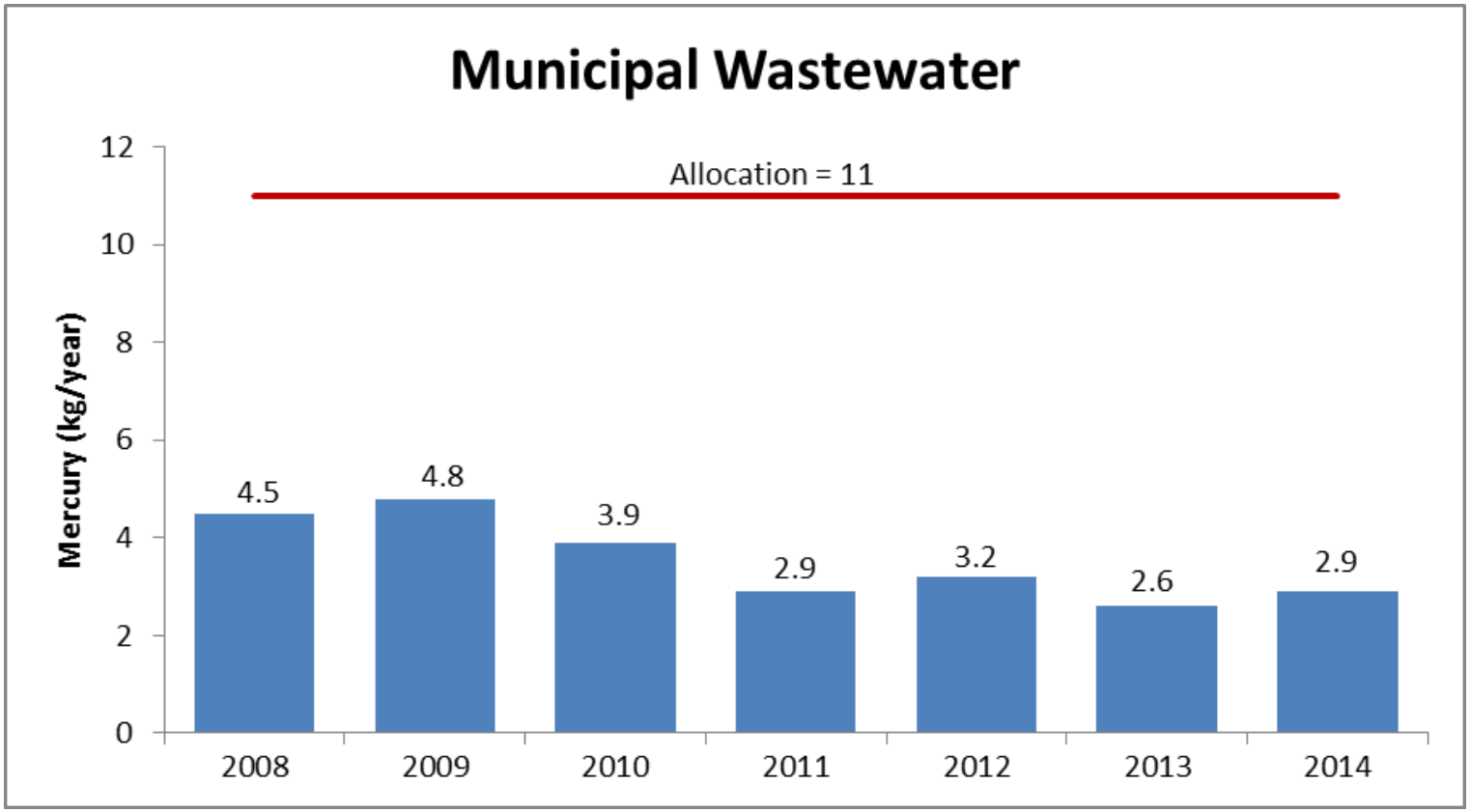
The WCA must also comply with mercury effluents limits set in the San Francisco Bay Mercury Watershed Permit (NPDES Permit No. CA0038849, Order No. R2-2012-0096). This permit sets mercury effluent limits for all discharges to the San Francisco Bay and its tributaries. The current and future mercury limits for the WCA are included in Table 4.2.

Table 4.2 Mercury Effluent Limits in San Francisco Bay Mercury Watershed Permit[(1)]
WWTP Facility Plan
City of Richmond and Veolia Water

Discharger	Running Annual Average Effluent Limit (kg/yr)	Average Monthly Effluent Limit (µg/yr)	Average Weekly Effluent Limit (µg/yr)
West County Agency (RSSD and WCWD)	0.23	0.066	0.072

Note:
(1) Limits included in Waste Discharge Requirements Order No. R2-2012-0096, NPDES Permit No. CA0038849. Effective January 1, 2013.

The permit requires the permitted dischargers to report mercury mass loads and source control activities on an annual basis. In 2015, the WCA reported an estimated running annual average mercury mass emission that is well under the average annual effluent limit of 0.23 kg/yr. The watershed permit also requires reporting the aggregate municipal discharge mass load of total mercury to the Bay. Individual mass limits are only considered if the aggregate loading exceeds a limit prescribed in the mercury total maximum daily load (TMDL). Figure 4.2 shows the aggregate loading of mercury from municipal wastewater dischargers to the Bay since 2008 (Source: Regional Water Board), and each year they have been in compliance.



TOTAL MERCURY FROM MUNICIPAL WASTEWATER DISCHARGERS TO THE SAN FRANCISCO BAY

FIGURE 4.2

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f30-11034.ai

The WCA has also reported that the following mercury source control projects were completed or underway (2011 Mercury Watershed Permit Group Report, RMC Water and Environment):

- Dental Amalgam Program.
- Fluorescent Light Recycling.
- Household Hazardous Waste Collection.
- Public Outreach/Education.
- Thermometer and/or Thermostat Exchange.
- Vehicle Service Facilities.

4.3.1.3 PCB Effluent Limits

The WCA must also comply with PCB waste discharge effluent limits set in the amendment to the San Francisco Bay Mercury Watershed Permit (Order No. R2-2012-0096). This permit sets PCB effluent limits for a subset of discharges to the San Francisco Bay and its tributaries. The current PCB limits for the WCA are included in Table 4.3.

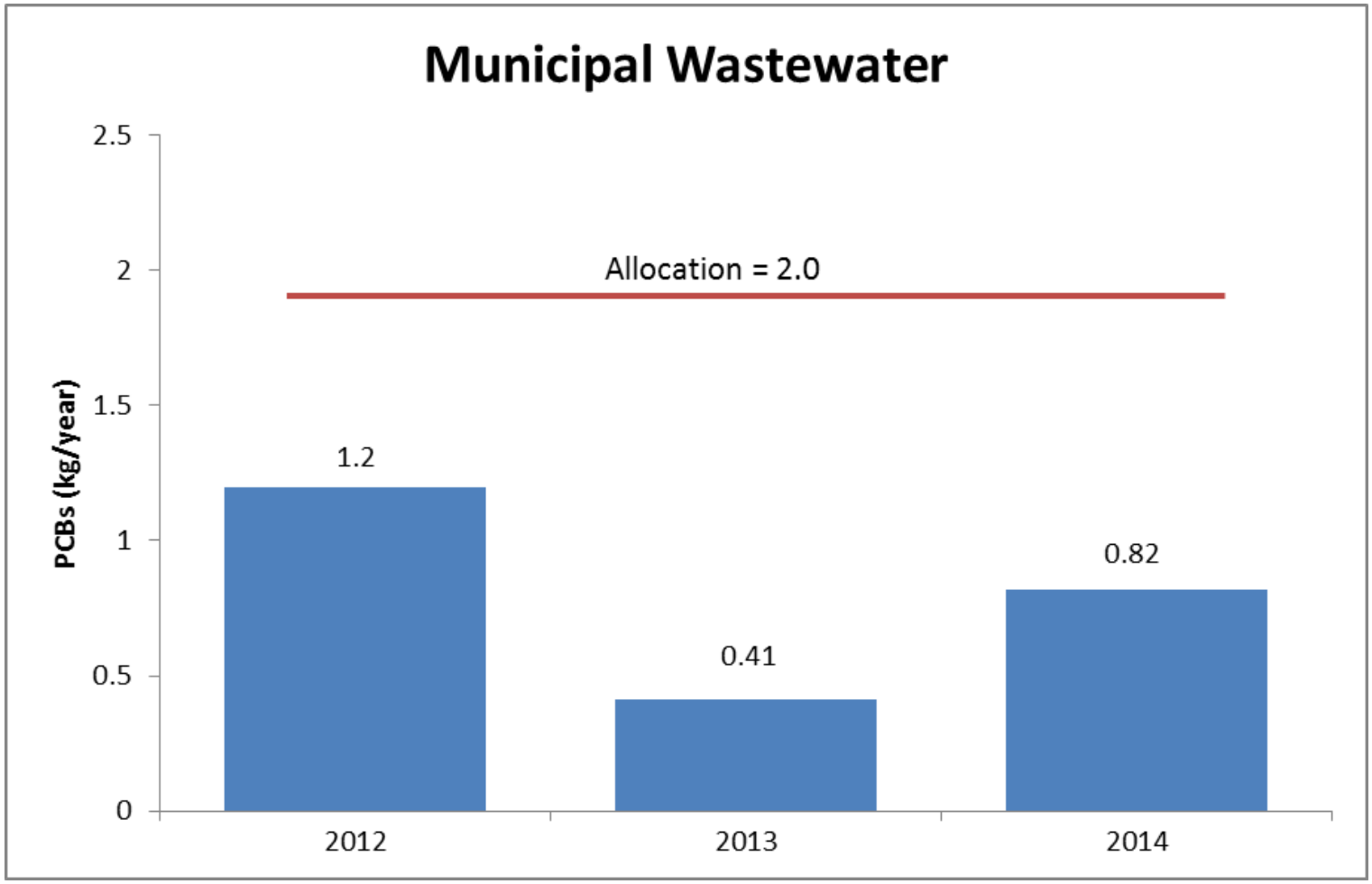
Table 4.3 PCB Effluent Limits in San Francisco Bay Mercury and PCB Watershed Permit
WWTP Facility Plan
City of Richmond and Veolia Water

Discharger	Average Monthly Effluent Limit (ug/L)	Maximum Daily Effluent Limit (ug/L)
West County Agency (RSSD and WCWD)	0.012	0.017

Note:
(1) Limits included in Waste Discharge Requirements Order No. R2-2012-0096, NPDES Permit No. CA0038849. Effective January 1, 2013.

The permit requires the City to identify controllable sources of PCBs to its treatment system. The controllable sources consist of PCB contributions to wastewater from industrial equipment and PCB contributions to wastewater from buildings with PCB-containing sealants that are scheduled for remodeling or demolition and identified as pilot projects required by Provision C.12.b of the Municipal Regional Stormwater Permit (Order No. R2-2009-0074, proposed revisions to this section are under review). The WCA submits the results of this evaluation, including any proposed control actions with an implementation schedule, in its annual pollution prevention reports.

The watershed permit also requires reporting the aggregate municipal discharge mass load of total PCBs to the San Francisco Bay. Figure 4.3 shows the aggregate loading of PCBs from municipal wastewater dischargers to the bay since 2012 (Source: Regional Water Board), and each year they have been in compliance.



TOTAL PCBs FROM MUNICIPAL WASTEWATER DISCHARGERS TO THE SAN FRANCISCO BAY

FIGURE 4.3

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f30-11034.ai

4.3.1.4 Wet Weather Discharges and Blending

During wet weather conditions that exceed the secondary capacity of 20 mgd, the WWTP discharges blended primary and secondary effluent to the outfall and subsequently to the Bay. In general, bypasses are prohibited under the Federal Clean Water Act; however, the WWTP's bypass is allowed by the NPDES permit when wet weather inflows exceed 20 mgd and when the discharges meet the effluent and receiving water limits. The NPDES permit also required the City to complete specific tasks to reduce blending, including capacity evaluations/improvements and collection system improvements by specific dates.

The NPDES permit also requires the City to report incidents of blended effluent discharges in routine monitoring reports and to conduct monitoring of the blended effluent in accordance with the monitoring and reporting requirements.

The City has numerous sewer relief line projects planned or in progress to reduce sanitary sewer overflows (SSOs) and has been working on minimizing its wet weather discharges that require blending at the WWTP. In 2015, the City implemented wet weather facilities that provide wet weather storage of 5 million gallons at the WWTP. The facilities are designed to contain influent from a 10-year, 24-hour storm. While these investments are anticipated to result in a reduction to the wet weather flows, it is anticipated that additional measures would be required at the WWTP to sufficiently minimize blending events. Additional measures could include onsite equalization or increasing the capacity of the secondary treatment facilities. Therefore, the Facility Plan reserves site space for future facilities required to minimize blending events at the WWTP.

4.3.2 Other Permit Effluent Provisions

Other provisions in the permit include the following:

- Monitoring and reporting of selected constituents.
- Pollution prevention/minimization program and reporting.
- Evaluation and status reports for the wastewater facilities, the operations and maintenance manual, the reliability of the wastewater facilities, and the facility contingency plan.
- Implementation and enforcement of a pretreatment program.
- Appropriate management of all biosolids.
- Implementation of a sewer system management plan for operation and maintenance of the collection system and mitigation of sanitary sewer overflows.
- Specific tasks to reduce blending.
- Implementation of action plans to control copper and cyanide discharges.

4.3.3 San Francisco Bay Nutrients Watershed Permit

On April 9, 2014, the Regional Water Board issued Order No. R2-2014-0014 *Waste Discharge Requirements for Nutrients from Municipal Wastewater Discharges to San Francisco Bay* (Watershed Permit). The Watershed Permit sets forth a regional framework to facilitate collaboration on studies that will inform future management decisions and regulatory strategies. A component of the permit was to conduct treatment plant optimization and upgrade studies for nutrient removal. These studies are being conducted by Bay Area Clean Water Agencies (BACWA) and should be completed in 2016. Nutrients of interest are ammonia, total nitrogen, and total phosphorus. These studies will increase the understanding of external nutrient loads, improve the accuracy of the inputs used in load response models, and identify the benefits of potential load reductions and associated costs for different dischargers to the Bay. Table 4.4 provides the anticipated timing of these studies and possible regulatory targets for nutrient removal.

Table 4.4 Anticipated Regulatory Targets for Nutrient Removal[(1)]
WWTP Facility Plan
City of Richmond and Veolia Water

Upgrade Level	Evaluation Required	Ammonia (mg-N/L)	Total Nitrogen (mg-N/L)	Total Phosphorous (mg-P/L)	Critical Dates	
					Issuance	Compliance Date
1	Optimization	--	--	--	2019	2024
2	Upgrades	<2	<15	<1	2027	2037
3	Upgrades	<2	<6	<0.3	2037	Future[(2)]

Notes:
(1) Projected effluent limits for seasonal averaging periods are presented for ammonia and total nitrogen for each treatment level.
(2) Implementation of Level 3 upgrades is expected to follow Level 2 upgrades, but the Regional Water Board could decide to skip Level 2 and require Level 3 upgrades.

Level 1 consists of optimization efforts where nutrient loads are reduced as much as possible with minimal capital investment. The achievable levels of reduction will be plant specific and will largely depend on available infrastructure and whether there is excess treatment capacity or tanks that can be modified or operated for nutrient reduction. While Level 1 alternatives may be effective in the near term, they may not be in the long term if new facilities or excess capacity is needed to accommodate planned growth.

Level 2 and 3 consist of making necessary plant upgrades to achieve the targeted levels of nutrient reduction. In most cases, Level 2 upgrades can be achieved with conventional nutrient removal technologies, while Level 3 upgrades will require the addition of supplemental carbon, metal salts (such as ferric chloride), and effluent filtration. The effluent targets being proposed will be based on seasonal averages (i.e., dry season from May through September and wet season from October through April) as opposed to a daily, weekly, or monthly target. This is based on the premise that shorter averaging periods will result in overly-conservative designs that are costly, but offer little or no additional water quality benefit.

The SWRCB and BACWA are currently discussing requirements for the next renewal of the Watershed Permit in 2019. The SWRCB is in favor of including a “no net loading increase” provision that could result in annual mass limits for total nitrogen and total phosphorus (kg/year) based on discharge volume and concentrations measured during the last 5 to 10 years. BACWA is considering other requirements to offer to the SWRCB in lieu of the “no net loading increase” requirement. Under consideration is the continued or expanded nutrient removal pilot studies at publicly owned treatment works (POTWs), documented impacts to beneficial uses, continued monitoring and trend reporting, increased funding for the science plan, recognition for early implementation of nutrient removal processes, and nutrient trading between wastewater treatment facilities.

The compilation of monitoring, modeling, studies, and management options specified by the Watershed Permit will not be completed until the 2024 or 2029 renewal is issued. If impacts from discharges are demonstrated, wastewater treatment facilities will receive requirements for nutrient mass reductions. The level of reductions required is not known and may depend on the location of the discharger.

For the purposes of this Facility Plan, the same terminology used by BACWA will be used to describe the different levels of nutrient removal. It is assumed that Level 1 optimization would occur in the next 5-10 years, Level 2 would be required in 10-15 years, and that Level 3 would be required in 15-30 years.

4.4 ASSESSMENT OF FUTURE WATER QUALITY REGULATIONS

This section provides insight into the future regulatory considerations that may impact the City’s effluent discharges over the next 30± years. Because continued regulatory compliance is a major goal of the Facility Plan, identifying future regulatory trends is critical for:

- Developing treatment scenarios and alternatives.
- Planning space requirements for future regulatory compliance.
- Making budget considerations for major design/construction projects.

In identifying future pollutants of concern (POCs), such as metals, nutrients, CECs, and/or pathogens, the Facility Plan will include alternatives that are flexible and can be more easily expanded or upgraded to treat future POCs.

4.4.1 Nutrient Removal

4.4.1.1 State of California

The State Water Resources Control Board (SWRCB) is in the process of developing statewide policies for nutrients, intending to develop separate policies for inland surface waters, bays and estuaries, and near-shore coastal waters. The SWRCB held a scoping

meeting in October 2011 to seek input on content for a proposed Nutrient Numeric Endpoint (NNE) framework and policy for inland surface waters. The SWRCB and Regional Water Board are working on similar projects to develop the nutrient policies for enclosed bays and estuaries, including the San Francisco Bay and the Sacramento-San Joaquin Delta.

4.4.1.2 San Francisco Bay

Nutrients play a key role in the ecology of the San Francisco Bay; however, the effects of nutrient loads to the Bay, including loads from wastewater treatment plants, are not fully characterized nor understood. Currently, there are information gaps about how the productivity rates of phytoplankton affect the higher organisms in the Bay food webs, and how nitrogen and phosphorus loads affect the Bay's beneficial uses. Additionally, there is some evidence that the Bay, which has been historically resilient to nutrient effects due to light limitation, tidal exchange, and benthic grazing, is becoming more susceptible to nuisance algal blooms, low dissolved oxygen, and other eutrophication impacts. If future research shows that reduction in nutrient loads would be effective in addressing eutrophication effects, then new, more stringent water quality standards and effluent limitations may be developed.

In its current NPDES permit, the WCA is given an effluent limit for ammonia, but not for total nitrogen or total phosphorus. Based on work being done under the Watershed Permit, initial issuance of nutrient criteria in the San Francisco Bay region is expected by year 2023. See Section 4.3.3 for more details on the Watershed Permit.

4.4.2 Microconstituents

In addition to the increasingly stringent regulation of nutrients, there is a trend towards increasing monitoring and potential regulation of microconstituents and other CECs in San Francisco Bay and other waters of California.

Microconstituents, also referred to as CECs by the EPA Office of Water, are substances that have been detected at low levels in surface waters and the environment and may potentially cause deleterious effects on aquatic life and the environment at relevant concentrations. CECs include:

- Persistent organic pollutants (POPs) such as polybrominated diphenyl ethers (PBDEs; used in flame retardants, furniture foam, plastics, etc.) and other organic contaminants.
- Pharmaceuticals and personal care products (PPCPs), including a wide suite of human prescribed drugs, over-the-counter medications, bactericides, sunscreens, and synthetic musks.
- Veterinary medicines such as antimicrobials, antibiotics, anti-fungals, growth promoters, and hormones.

- Endocrine-disrupting chemicals (EDCs), including synthetic estrogens and androgens, naturally occurring estrogens, as well as many other compounds capable of modulating normal hormonal functions and steroidal synthesis in aquatic organisms.
- Nanomaterials such as carbon nanotubes or nano-scale particulate titanium dioxide.

Monitoring requirements for these trace pollutants are increasing, including requirements to analyze constituents at lower detection limits. It is likely that, at some point in the future for selected constituents, water quality criteria followed by new effluent limits will be added to permits. Implementation of CEC standards is not expected to be imminent as the EPA is currently focused on assessing the potential impact CECs have on the environment, aquatic organisms, and human health.

The City should consider options and alternatives that minimize sources of these pollutants and remove them from the influent wastewater through increased source control and pollution prevention programs, where practicable. However, many of these CECs are ubiquitous, such as those found in PPCPs, and will be difficult to control at the source. The City should work with legislative and industry representatives to reduce or restrict the use of certain products where feasible, and continue public outreach efforts to discourage improper disposal of consumer products.

4.4.3 Toxicity

The SWRCB is developing an updated approach to assess toxicity in wastewater and stormwater. Toxicity testing is used, in addition to chemical analysis, to determine the toxic effects of pollutants in a water sample. A draft policy issued by the SWRCB in 2011 is entitled “Policy for Toxicity Assessment and Control” and was intended to improve testing of water samples, as well as monitoring and reporting requirements, in a consistent manner. The draft policy, which is still under development by the SWRCB, contained the following elements:

- Numeric limits for chronic and acute toxicity for wastewater dischargers.
- Use of the Test of Significant Toxicity (TST) as the statistical method to determine toxicity, replacing hypothesis testing and point estimate approaches.
- Single test failures triggering violation and accelerated monitoring.
- Regional Water Board discretion on inclusion of acute toxicity in permits and evaluation of toxicity tests using Instream Waste Concentration (IWC).

The SWRCB conducted an external peer review of the draft policy. The expert’s comments are posted on the SWRCB’s website. The SWRCB anticipates release of a revised draft policy in 2016.

4.5 ASSESSMENT OF WASTEWATER SOLIDS REGULATIONS

Solids generated at a wastewater treatment facility are comprised of screenings, grit, primary or raw sludge (PS) and secondary or waste activated sludge (WAS). The screenings and grit are typically dewatered and disposed in a landfill. The PS and WAS are described as sewage sludge or wastewater solids prior to stabilization.

Sludge generated by a wastewater treatment facility is defined as biosolids once beneficial use criteria, as determined by compliance with the EPA's Title 40 Code 503 regulations, have been achieved through stabilization processes. Stabilization processes are described as those that help reduce pathogens and reduce vector attraction. Biosolids are defined as treated organic solid residuals resulting from the treatment of domestic sewage at a wastewater treatment facility. Biosolids are a product with a high carbon content and other beneficial use properties.

Several federal, state, and local regulations are in place that influence whether biosolids from municipal wastewater treatment plants can be beneficially used or disposed of. Increased concerns and debate over biosolids use/disposal and its associated environmental impacts have led to more stringent amendments to regulations. Changes in regulations affecting biosolids management are expected and make a flexible management program essential.

As discussed previously, the City currently pumps digested sludge (biosolids) to the WCWD WPCP for dewatering and disposal. Given this, WCWD has historically been responsible for compliance tasks relating to biosolids dewatering and disposal.

As discussed in the Executive Summary, the City's current practice of pumping biosolids to the WCWD WPCP will need to be discontinued. This will require that the City provide biosolids dewatering at the WWTP and dewatered biosolids disposal. With the implementation of these facilities, the City will be responsible for the use and/or disposal of the biosolids and for compliance tasks relating to biosolids treatment and use/disposal.

This section summarizes the status of biosolids regulations and the trends that are anticipated for the future. In addition, the impacts of each of these regulations on beneficial use/disposal are discussed.

4.5.1 Federal Regulations

Federal, state, and local agencies are responsible for regulating beneficial use/disposal of biosolids. The authority of each agency varies based on the beneficial use/disposal methods employed. However, key guidelines are established by the EPA. These guidelines are in turn implemented by state and local governments. Many state and local agencies in California have developed additional rules, guidelines, and criteria for biosolids management.

4.5.1.1 40 CFR 503 Regulations

In order to implement the long-term biosolids permitting program, required by the Water Quality Act of 1987, the EPA initiated two rule makings. The first rule-making established requirements and procedures for including biosolids management in NPDES permits, procedures for granting state biosolids management programs primacy over federal programs, or for federal programs to implement biosolids permits if a state so chooses.

The second rule-making proposed to regulate and control biosolids permitting was 40 CFR Part 503 Standards for the Use and Disposal of Sewage Sludge ("40 CFR 503"). This rule addresses three general categories of beneficial use/disposal of biosolids including:

- Land application of sewage sludge for beneficial use of organic content.
- Surface disposal of biosolids in a monofill, surface impoundment, or other dedicated site.
- Incineration of sewage sludge with, or without, auxiliary fuel.

Biosolids are classified by the EPA's 40 CFR 503 regulations as Class B or Class A, according to the level of treatment to reduce pathogens. Biosolids must also meet vector attraction and metal concentration limits. All biosolids must meet the Ceiling Concentration Limits for pollutants. Table 4.5 summarizes the pollutant concentration limits and the ceiling concentration limits required by 40 CFR 503 for land applied biosolids. Pathogen reduction requirements of 40 CFR 503 for land applied biosolids are summarized in Table 4.6.

Table 4.5 Pollutant Limits for Land Applied Biosolids
WWTP Facility Plan
City of Richmond and Veolia Water

Pollutant	Ceiling Concentration Limits, mg/kg dry weight basis	Pollutant Concentration Limits, mg/kg dry weight basis
Arsenic	75	41
Cadmium	85	39
Chromium	3,000	1,200
Copper	4,300	1,500
Lead	840	300
Mercury	57	17
Molybdenum	75	-
Nickel	420	420
Selenium	100	36
Zinc	7,500	2,800

Table 4.6 40 CFR 503 Biosolids Regulations – Pathogen Reduction Requirements
WWTP Facility Plan
City of Richmond and Veolia Water

Class A Biosolids Requirements	Class B Biosolids Requirements
• Either fecal coliform density is less than 1,000 MPN/gram of total dry solids, or the density of Salmonella species bacteria in the sludge is less than 3 MPN/4 grams of total dry solids. • Biosolids must be treated and/or meet one of the following alternatives before disposal. For more details on each treatment alternative, refer to 40 CFR 503.32(a): – Thermally treated. – High pH-high temperature treatment. – Treatment to reduce enteric virus to less than 1 PFU/4 grams of total dry solids) and viable helminth to less than 1/4 grams of total dry solids). – Treatment by composting, heat drying, heat treatment, thermophilic aerobic digestion, beta ray irradiation, gamma ray irradiation, or pasteurization process. Specific operating conditions for each process has been specified in 40 CFR 503.32(a). – Use of processes equivalent to the above (subject to authority approval).	• Comply with site restrictions of land application of Class B biosolids as specified in 40 CFR 503.32(b)(2), (b)(3), or (b)(4). In summary, these restrictions include harvesting of certain food crops, grazing of animals, turf harvesting, and public access to lands where Class B biosolids were applied. • Biosolids must be treated and/or meet one of the following alternatives before disposal. For more details on each treatment alternative, refer to 40 CFR 503.32(b): – Geometric mean of seven samples of treated biosolids collected at the time of disposal shall meet a fecal coliform density of 2 million CFU or MPN/gram of total dry solids. – Processes that significantly reduce pathogens which include aerobic digestion, air drying, anaerobic digestion, composting, or lime stabilization. Specific operating conditions for each process has been specified in 40 CFR 503.32(b). – Use of processes equivalent to the above (subject to authority approval).

Note:
(1) Abbreviations: CFU = Colony Forming Unit and PFU = Plaque Forming Unit.

In addition to reducing pollutant and pathogen levels, 40 CFR 503 requirements mandate that biosolids undergo treatment to reduce the risk of vectors such as flies, mosquitoes, fleas, rodents, and birds that can get into the biosolids. In order to prevent the spread of disease-laden pathogens, biosolids must be treated to reduce their attractiveness to these types of vectors. The alternatives considered for this study are expected to reduce the volatile solids by a minimum of 38 percent, which would meet the vector attraction reduction requirements. Alternatively, drying the biosolids to reduce the moisture content to 10 percent or lower also meets the requirement. Vector attraction reduction requirements are summarized in Table 4.7.

4.5.1.1.1 Class B Biosolids

Class B biosolids can be produced through any of the defined Processes to Significantly Reduce Pathogens (PSRP). The quantity and quality of the processed sludge and biosolids produced must be monitored and recorded by each biosolids producer. Quality parameters include pathogen reduction, vector attraction reduction, and inorganic content (i.e., heavy metals).

Table 4.7	40 CFR 503 Biosolids Regulations – Vector Attraction Reduction Requirements WWTP Facility Plan City of Richmond and Veolia Water
Alternative Number in 40 CFR 503.33(b)	**Description**
1	Mass of volatile solids shall be reduced by a minimum of 38 percent during biosolids treatment.
2	If the above requirement cannot be met, vector attraction reduction can be demonstrated by reducing volatile solids by a minimum of 17 percent by digesting a portion of previously digested biosolids anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37 degrees C.
3	If the above requirement cannot be met, vector attraction reduction can be demonstrated by reducing volatile solids by a minimum of 15 percent by digesting a portion of previously digested biosolids aerobically in the laboratory in a bench-scale unit for 30 additional days at a temperature of 20 degrees C.
4	Specific oxygen uptake rate for biosolids treated in an aerobic process is less than or equal to 1.5 mg of oxygen per hour per gram of total dry solids at a temperature of 20 degrees C.
5	Biosolids shall be treated in an aerobic process for 14 days or longer. During that time the temperature of biosolids shall be higher than 40 degrees C, with an average of 45 degrees C or higher.
6	The pH of biosolids shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for 2 hours, and then at 11.5 or higher for an additional 22 hours at 25 degrees C.
7	The percent solids of material that does not contain unstabilized solids shall be equal to or greater than 75 percent based on moisture content and total solids prior to mixing with other materials.
8	The percent solids of material that contains unstabilized solids shall be equal to or greater than 90 percent based on moisture content and total solids prior to mixing with other materials.
9	Sewage sludge shall be injected below the surface of the land. No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected. When the sewage sludge that is injected below the surface of the land is Class A with respect to pathogens, the sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen reduction process.
10	Sewage sludge applied to the land surface or placed on a surface disposal site shall be incorporated into the soil within six hours after application to or placement on the land. When sewage sludge that is incorporated into the soil is Class A with respect to pathogens, the sewage sludge shall be applied to or placed on the land within eight hours after being discharged from the pathogen treatment process.

Land appliers must follow application restrictions and pollutant load restrictions for Class B biosolids at the time of application with regard to public contact, animal forage, and production of crops for human consumption. For example, Class B biosolids may only be applied at sites where there is no possibility of contact with the general public. These sites include certain types of agriculture, landfills, etc. Additional restrictions associated with Class B prevent crop harvesting, animal grazing, and public access for a defined period of time until environmental conditions have further reduced pathogens.

The PSRPs include mesophilic anaerobic digestion and static aerated pile composting. To meet Class B standards, the mesophilic anaerobic digestion process must be operated between 15 days at 35 to 55 degrees Celsius and 60 days at 20 degrees Celsius. Composting operations are required to raise the temperature of biosolids to 40 degrees Celsius or higher for five days. The temperature in the compost pile must also exceed 55 degrees Celsius for four hours during the five-day period.

4.5.1.1.2 Class A Biosolids

Class A biosolids can be produced through any of the defined Processes to Further Reduce Pathogens (PFRP). Class A biosolids have more stringent treatment requirements than Class B biosolids for pathogen reduction and may be land applied where contact with the general public is possible (i.e., nurseries, gardens, golf courses, etc.).

The PFRPs include thermophilic anaerobic digestion, static aerated pile composting, heat drying, and pasteurization. To meet Class A standards, the thermophilic anaerobic digestion process must be operated at 50 degrees Celsius or higher for 30 minutes or longer. Composting operations are required to operate at 55 degrees Celsius or higher three days. Heat drying must reduce the moisture content of the biosolids to 10 percent or lower. Pasteurization processes must maintain the temperature of the biosolids at 70 degrees Celsius for 30 minutes or longer.

4.5.1.1.3 Exceptional Quality Biosolids

Biosolids that meet the high quality pollutant concentrations limits of Table 4.5, one of the Class A pathogen reduction requirements of Table 4.6 and one of options 1 through 8 of the vector attraction reduction alternatives in Table 4.7, may be identified as exceptional quality (EQ) biosolids. Exceptional quality biosolids may be used and distributed in bulk or bag form and are not subject to general requirements and management practices other than monitoring, recordkeeping, and reporting to substantiate that the quality criteria have been met.

4.5.1.2 40 CFR 258 Regulations

In addition to the regulations set forth to govern biosolids permitting, 40 CFR 258 Solid Waste Disposal Facility Criteria was promulgated October 1991 to control the disposal of biosolids classified as solid wastes. Wastewater sludge is exempted from the definition of solid waste unless the sludge is co-disposed with household solid wastes. The regulations

set forth criteria for landfills with respect to: location, design, operation, groundwater monitoring, and closure with the intent of protection of ground and surface water from contamination. The main requirement of co-disposed sludge is that it must meet the Paint Filter Liquids Test (EPA Method 9095A). This method determines the presence of free liquids in a sample. Well-dewatered sludge, such as in the case of WWTP's sludge, typically passes this test as it does not contain any free liquid.

4.5.1.3 Treatment of Landfill Leachate

Two types of leachate are collected at the West Contra Costa Sanitary Landfill and sent to the WWTP and WCWD WPCP for treatment and disposal. One type is sent to the WWTP and the other is sent to the WCWD WPCP. Leachate collected from the Class II landfill is collected at the WCWD WPCP and pumped to the RSSD WWTP for treatment. This leachate is not treated at the WCWD WPCP, in order to minimize the chloride load to the WCWD WPCP. As a result, WCWD is able to manage the chloride concentration of recycled water supplied from the WCWD WPCP to EBMUD. The leachate collected from the landfill's Class I hazardous waste management facility is treated at the landfill. After the leachate is sufficiently treated (i.e., has reached an acceptable contaminant level and will not upset the secondary treatment process at the WCWD WPCP) it is pumped to the WCWD WPCP for further treatment.

Leachate from the landfill was previously determined to be "non-hazardous"; however, the landfill used to accept hazardous materials. The Resource Conservation and Recovery Act (RCRA) requirements can be interpreted to mean that leachate coming from a landfill that accepted hazardous materials in the past, can be categorically defined as "hazardous," even though leachate tests indicate it is non-hazardous. Under the federal Domestic Sewage Exemption (DSE), however, a treatment facility is exempt from having to meet Treatment, Storage, and Disposal (TSD) requirements under RCRA, as long as the leachate is commingled with domestic wastewater prior to the headworks, a treatment facility.

4.5.2 State Regulations

State biosolids beneficial use/disposal is primarily regulated by California's SWRCB, the CDPH, and the nine Regional Water Boards. The WWTP is regulated under the San Francisco Regional Water Board. As required under the Porter-Cologne Act, the SWRCB, along with its nine Regional Water Boards, is principally concerned with protecting existing and future beneficial uses of water.

The California Department of Resources Recycling and Recovery (CalRecycle) oversees and regulates California's solid waste disposal including co-disposal issues and biosolids use as a daily covering material. The main regulation dealing with land discharge of biosolids (and incineration ash) is the California Code of Regulations (CCR) Title 23, Division 3, Chapter 15. Other regulations and guidelines include Title 22, Division 4.5,

Chapter 11; California Water Environment Association's (CWEA) Manual of Good Practice for Agricultural Land Application of Biosolids; and CEQA.

The SWRCB's General Waste Discharge Requirements (GWDRs) for the Discharge of Biosolids to Land for use as a Soil Amendment in Agriculture, Silviculture, Horticulture, and Land Reclamation Activities covers the discharge of sewage sludge as a soil amendment. In order for such a discharge to be allowed, the sludge must have been treated, tested, and shown to be capable of being used beneficially and legally as a soil amendment, as specified under 40 CFR 503. This order is intended to help streamline the regulatory process for such discharges, but may not be appropriate for all sites using biosolids due to particular site-specific conditions or locations. Such sites are not precluded from being issued individual WDRs.

4.5.3 Local Agency Regulations

Many counties in California have developed, or are developing, ordinances for biosolids land application. The stringency of these county regulations ranges from requirements for relatively high minimum insurance to the banning of sludge land application.

For the WWTP, several local agencies have regulatory input concerning sludge management. These agencies are listed in the following:

- Contra Costa County. Land use at the WCWD site is controlled through the County General Plan and the county's land use ordinances. If the site is to be extended or modified, a special use permit may be required.
- Association of Bay Area Governments (ABAG). ABAG is a nine-county agency that acts as the metropolitan clearinghouse for review of projects receiving federal assistance. ABAG's major role in any proposed project would be to ensure that land use is consistent with regional long-range goals and policies.
- Bay Area Air Quality Management District (BAAQMD). BAAQMD enforces local, state, and federal air quality standards and issues and enforces pollution control facility permits. The BAAQMD also monitors local air quality, which includes any nuisance odor conditions.
- Contra Costa County Department of Community Health. This agency administers the state health-related regulations pertaining to sludge and solid waste disposal and utilization. The department also monitors sludge hauling and transportation although such activity does not require registration.
- West Contra Costa Sanitary Landfill, Inc. West Contra Costa Sanitary Landfill, Inc. is a Class II landfill. Leachate from the landfill is sent to the RSSD WWTP and the WCWD WPCP for treatment. In return, the owners of the landfill regularly transport the dried sludge generated at the WCWD WPCP, from the WCWD WPCP to one of their active landfills. As discussed in Chapter 3, the dried sludge is generated from both the RSSD's and WCWD's wastewater flows.

- City of Richmond. The City manages the Richmond WWTP and is therefore responsible for regulation and supervision of all activities including sampling, reporting, and maintenance of the Pretreatment Program.

4.5.4 Future Regulatory Considerations for Biosolids Disposal

The State of California does not directly regulate beneficial use of biosolids. The Regional Water Boards have the option of adopting the State's General Order for biosolids providing additional management requirements with no additional biosolids quality requirements. Also, CalRecycle and the California Department of Food and Agriculture (CDFA) have jurisdiction over certain aspects of organics management that could affect the future management of biosolids in the State.

Traditionally, the role of CalRecycle in biosolids beneficial use has been to define biosolids management practices that are considered landfill diversion for the purpose of municipalities attempting to meet the 50 percent landfill diversion target set by Assembly Bill (AB) 939. Landfill alternative daily cover (ADC) and land application are the more common Northern California biosolids markets since they have been considered landfill diversion. However, the following adopted and developing legislation is threatening the future viability of solids used as ADC:

- In 2012, AB 341 was adopted, which established a 75 percent landfill diversion goal. CalRecycle is in the process of defining and implementing the manner in which this goal will be achieved. This will include an examination of whether the use of biosolids as ADC will continue to be considered landfill diversion or if it will be classified as disposal.

- In 2014, AB 1594 was adopted and requires that green waste no longer qualify for diversion credit when used as ADC at a landfill. This bill may indirectly affect an agency's biosolids use/disposal program when it is fully implemented January 1, 2020. Agencies that mix green waste with biosolids for use as ADC at landfills currently receive diversion credit under AB 939, but will no longer be able to due to AB 1594.

- CalRecycle has also demonstrated an interest in regulating imported organics, such as food waste, being co-digested with sewage sludge at wastewater treatment plants. As of January 2016, the final rule excluded co-digestion at the WWTPs that practice anaerobic digestion. In fact, in an effort to divert 100 percent of organics from landfills by 2025, the California Air Resources Board (CARB) sees co-digestion of food waste and fats, oils, and grease with sewage sludge at WWTPs as a key strategy for achieving reductions in methane emissions across the state. The regulation requiring 100 percent diversion of organics from landfills is scheduled to be developed by 2018. There is concern that this or future legislation targeted at reducing statewide greenhouse gases, may eliminate the use of biosolids as ADC,

result in stricter permit requirements for biosolids, and/or eliminate the ability to dispose of biosolids at landfills altogether.

Should ADC be classified as disposal, this would end the practice of using biosolids and green waste as ADC, which would severely impact biosolids managers in the Bay Area, where over 50 percent of biosolids are recycled as ADC. However, CalRecycle may create rules specific to biosolids or help develop alternative routes (such as more extensive land application) for biosolids end-uses. Termination of landfill ADC would place capacity and price pressure on existing biosolids markets, such as compost and land application, increasing competition among utilities for available biosolids outlets.

Use or disposal of biosolids is becoming progressively more difficult in California. Land application of biosolids is being restricted by many California counties, and fewer landfills are accepting biosolids. Biosolids generated at the WWTP are conveyed to the WCWD where they are dewatered in sludge drying lagoons. Once dewatered, the sludge is transported by truck by the owners of WCCSL to one of their active landfills, where it is used as land cover.

Numerous counties in California have developed or are currently developing ordinances for biosolids land application. Figure 4.4 illustrates the current status of County ordinances that affect land application of biosolids.

To comply with possible future restrictions, the planning process will need to consider alternative biosolids use and/or disposal scenarios that are cost effective and will operate within the existing WWTP facilities. The City should explore biosolids disposal options, such as the regional biosolids to energy pilot project.



BIOSOLID APPLICATION MAP

FIGURE 4.4

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f25-11034.ai

4.6 ASSESSMENT OF AIR QUALITY REGULATIONS

At the WWTP, sources of air contaminants are predominantly derived from diesel and natural gas engines, a digester gas flare, and boilers. Other sources of air contaminants are derived from wastewater processes and associated fugitive emissions.

The federal Clean Air Act (CAA) requires the EPA to set national air quality standards to protect human health and welfare. The CARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the CAA.

The agencies relevant to the WWTP air requirements include:

- **Federal –** EPA.
- **State –** CARB.
- **Local –** Bay Area Air Quality Management District (BAAQMD).

These agencies issue air quality permits for the modification of existing facilities or the construction and/or operation of new facilities, and to establish new source pollutant levels and treatment requirements.

CARB has developed State air quality standards that are generally more stringent than federal standards. Other CARB duties include monitoring air quality in conjunction with local air districts, setting emissions standards for new motor vehicles, and reviewing district input on the State Implementation Plan (SIP). The SIP consists of emission standards for vehicles and consumer related sources set by ARB, and attainment plans and rules adopted by local air districts.

The following sections provide summaries of the relevant state and local air quality standards that need to be considered in the Master Plan.

4.6.1 State Regulations

The WWTP currently operates standby diesel engines that range in size from 755 hp to 1,586 horsepower. Any new or replacement engines would need to comply with the Airborne Toxic Control Measure (ATCM) for Stationary Compression-Ignition (CI) Engines. The ARB originally approved the ATCM in 2004. Subsequent to the adoption of the original ATCM in 2004, the U.S. EPA promulgated new federal “Standards of Performance for Stationary Compression-Ignition Internal Combustion Engines” (NSPS). In October 2010, ARB approved amendments to the ATCM to closely align California’s requirements with those in the federal NSPS. The amended ATCM became effective May 19, 2011.

The ATCM requires a 0.15 gram per brake horsepower-hour (g/bhp-hr) particulate matter (PM) emission limit for all new emergency standby stationary compression ignition engines

greater than or equal to 50 hp. Annual maintenance and testing hours are limited to no more than 50 hours per calendar year. Local air districts may impose more limited hours. New emergency standby engines are required to meet the applicable non-methane hydrocarbon plus nitrogen oxides (NMHC+NOx), hydrocarbon (HC), and carbon monoxide (CO) tier 2 or tier 3 non-road CI engine emission standards, and tier 4 standards that do not require add-on controls. Table 4.8 shows emission limits for engine sizes comparable to those currently in use at the WWTP.

Table 4.8 ATCM Emission Standards for New Stationary Emergency Standby Diesel-Fueled CI Engines in g/bhp-hr (g/kW-hr)(1)
WWTP Facility Plan
City of Richmond and Veolia Water

Maximum Engine Power	Particulate Matter	Non-Methane Hydrocarbon plus Nitrogen Oxides	Carbon Monoxide
600<hp<750	0.15	3.0	2.6
(450<kW<560)	(0.20)	(4.0)	(3.5)
hp>750	0.15	4.8	2.6
(kW>560)	(0.20)	(6.4)	(3.5)

Note:
(1) May be subject to additional emission limitations as specified in current applicable district rules, regulations or policies. Applicable to model years 2008 and later.

4.6.2 Bay Area Air Quality Management District Regulations

4.6.2.1 Overview

The WWTP is also subject to the regulations of the BAAQMD. The BAAQMD activities include rule development and enforcement, monitoring of air quality, a permit system for stationary and mobile sources, air quality planning, protection of the public from adverse effects of toxic air contaminants, and responses to public requests for information regarding air quality issues.

The BAAQMD administers rules and regulations that apply to stationary and mobile sources that emit air contaminants in the Bay Area. Generally, new and existing stationary sources are governed by requirements in the following Regulation Sections: 2 (Permits), 8 (Organic Compounds), 9 (Inorganic Gaseous Pollutants), and 10 (Standards of Performance for New Stationary Sources).

4.6.2.2 Current BAAQMD Permit

The WWTP currently holds a permit to operate from the BAAQMD. The existing permit allows operation of numerous stationary sources, including a standby diesel engine generation, an emergency standby diesel engine generator, two hot water boilers, and a waste gas burner. The BAAQMD permit is included as Appendix G.

4.6.2.3 Requirements for New and Modified Sources

Regulation 2, Rule 2 implements Federal New Source Review (NSR) and Prevention of Significant Deterioration (PSD) requirements. This permitting process governs the construction, replacement, operation, or alteration of any source that emits or may emit contaminants. The process involves an Authority to Construct, followed by a Permit to Operate. Any new or modified source is required to comply with new source review requirements, including application of Best Available Control Technology (BACT), and emission offsets.

BACT is the level of emission control or reduction for new and modified sources of emissions that have the potential to emit 10 or more pounds of any criteria pollutant per day. BACT is intended to reduce emissions to the maximum extent possible considering technological and economic feasibility. The BAAQMD maintains a BACT/TBACT (Toxics-BACT) Workbook, and the California Air Pollution Control Officers Association (CAPCOA) also maintains a clearinghouse for statewide BACT determinations.

Emission Offsets, or Emission Reduction Credits (ERCs), are generated by reducing emissions beyond what is required by regulation, or by curtailing or shutting down a source. ERCs may be used to provide offsets for emission increases from a new or modified source, as required by NSR. The ERCs may be banked and the banking certificates may be traded or sold to another facility for use as offsets for that facility. These credits can be very valuable and consideration should be given to retaining them for future projects.

4.6.2.4 Requirements for Engine-Generators

Future operation of engine-generators will likely continue to be impacted by increasingly restrictive emission requirements. In the past, the BAAQMD has tightened emission regulations following the lead of the South Coast Air Quality Management District (SCAQMD) in southern California. Historically, regulations adopted in SCAQMD are adopted by BAAQMD in subsequent years.

In 2012, SCAQMD amended Rule 1110.2 - Emissions from Gaseous and Liquid-Fueled Engines. Rule 1110.2 was amended to ensure emission compliance and provide documentation for combustion engines, through use of continuous emission monitoring systems (CEMS) or inspection and monitoring programs. The amended rule also established new long-term emission requirements. The SCAQMD regulations which currently apply to engine generators, are shown in Table 4.9. These regulations require that all engine generators meet the state of California's CARB 2007 emission requirements for all units. Digester gas fueled equipment is no longer being granted higher emission limits.

Table 4.9 SCAQMD Rule 1110.2 Emission Standards for Internal Combustion Engines WWTP Facility Plan City of Richmond and Veolia Water			
Engine Size	**NO_x (ppm)(1)**	**VOC (ppm)(1)(2)**	**CO (ppm)(1)**
All sizes	11	30	250
Notes: (1) Corrected to 15% oxygen on a dry basis and averaged over 15 minutes. (2) Measured as methane.			

For comparison, current BAAQMD emission regulations for engines powered by fossil-fuels (such as diesel) and waste-derived fuels are as shown in Table 4.10. SCAQMD's limits are significantly below BAAQMD limits, and it would be reasonable to assume that BAAQMD limits will continue to decrease following the lead of the SCAQMD.

Table 4.10 BAAQMD Regulation 9, Rule 8 Emission Standards for Internal Combustion Engines WWTP Facility Plan City of Richmond and Veolia Water		
Engine	**NO_x (ppm)(1)**	**CO (ppm)(1)**
Spark-Ignitid Engines Powered by Fossil Fuels (rich burn)	25	2,000
Spark-Ignitid Engines Powered by Fossil Fuels (lean burn)	65	2,000
Spark-Ignited Engines Powered by Waste-Derived Fuels (rich and lean burn)	70	2,000
Note: (1) Corrected to 15% oxygen on a dry basis and averaged over 15 minutes.		

In addition to the limits in Table 4.10, new equipment must meet BACT. The existing diesel engine should be able to continue to operate under the current permit conditions. However, new BACT requirements for new cogeneration systems were issued in August 2013 and are significantly stricter than the current permit conditions.

Fuel cell emissions are currently significantly lower than CARB 2007 requirements and, as such, there are no limits on emissions in any air district; nor are any limits expected within the planning horizon for this project.

4.6.3 Greenhouse Gas Emissions

4.6.3.1 State and Federal Mandatory Reporting

CARB adopted the Global Warming Solutions Act (also referred to as AB 32) in September 2006. This Act requires public and private agencies statewide to reduce GHG emissions.

The GHGs regulated under AB 32 are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. The AB 32 does not directly affect wastewater treatment process emissions, but it does cover electricity generating units and general stationary combustion (GSC) sources.

CARB's Scoping Plan lists two thresholds against which wastewater treatment facilities are to check if they are required to report. The reporting thresholds shown in Table 4.11 include GSC emissions from both fossil fuel (i.e., natural gas and diesel) and non-fossil fuel (i.e., biogas) sources.

Table 4.11 Greenhouse Gas Emissions Thresholds for Reporting Years 2011 and Beyond
WWTP Facility Plan
City of Richmond and Veolia Water

Electricity Generating Unit	≥ 10,000 mt(1) CO_2e(2) per year
General Stationary Combustion	≥ 10,000 mt(1) CO_2e(2) per year

Notes:
(1) mt: metric tons.
(2) CO_2e: carbon dioxide equivalent emissions.

In addition, the U.S. EPA's Mandatory GHG Reporting Rule (Reporting Rule) was adopted October 30, 2009. The Reporting Rule explicitly states that centralized domestic wastewater treatment systems are not required to report emissions; however, any stationary combustion of fossil fuels taking place at a wastewater treatment facility may be considered a "large" source of GHGs if they emit a total of 25,000 metric tons or more of CO_2 equivalent (CO_2e) emissions per year.

Pursuant to AB 32, GHG estimates are based on CARB's Regulation for the Mandatory Reporting of GHG Emissions (title 17, California Code of Regulations (CCR), sections 95100-95157). To align itself with the U.S. EPA's GHG Reporting Rule, CARB's regulation incorporated by reference certain requirements in the U.S. EPA's Final Rule on Mandatory Reporting of GHGs (Title 40, Code of Federal Regulations (CFR), Part 98). Specifically, section 95100(c) of CARB's regulation incorporated those requirements promulgated by U.S. EPA as published in the Federal Register.

The WWTP GHG emissions have not exceeded the reporting thresholds for CARB and EPA, and the emissions are not expected to exceed the thresholds through the planning horizon of this Facility Plan.

4.6.3.2 State Cap-and-Trade Program

In addition to mandatory reporting of GHGs, CARB adopted a GHG cap-and-trade program that became effective in January 2012. This program states that agencies emitting 25,000 metric tons or more of fossil fuel-based (i.e., natural gas and diesel) CO_2e emissions per year beginning in 2011 or any subsequent year will be capped and required to reduce their emissions over time. As long as the WWTP maximizes its use of renewable fuels and stays

below this threshold, the current regulations may only require the WWTP to report GHG emissions and will not subject it to being a “capped” (or “covered”) entity. The WWTP GHG emissions are well below the cap-and-trade threshold and are not expected to exceed the threshold through the planning horizon of this Facility Plan.

4.7 CROSS-MEDIA IMPACTS

The interconnection of regulations to the various areas impacted by wastewater treatment is an important consideration. Recently representatives from various air districts, Regional Water Boards, Caltrans, and the EPA came to an agreement to develop a cross-media checklist for use during the development of regulations. California Association of Sanitation Agencies (CASA) is coordinating the efforts to develop the checklist. The components of the cross-media checklist include biosolids, compost processing, recycled water, AB 32 (regulating GHG emissions), CEQA, regulatory processes, development of Water Quality Control Plans (Basin Plans) and water quality standards/ regulations, and impact assessments to air, water, and land media. Figure 4.5 shows the key wastewater components and their corresponding regulatory issues.

4.8 FUTURE REGULATORY SCENARIOS

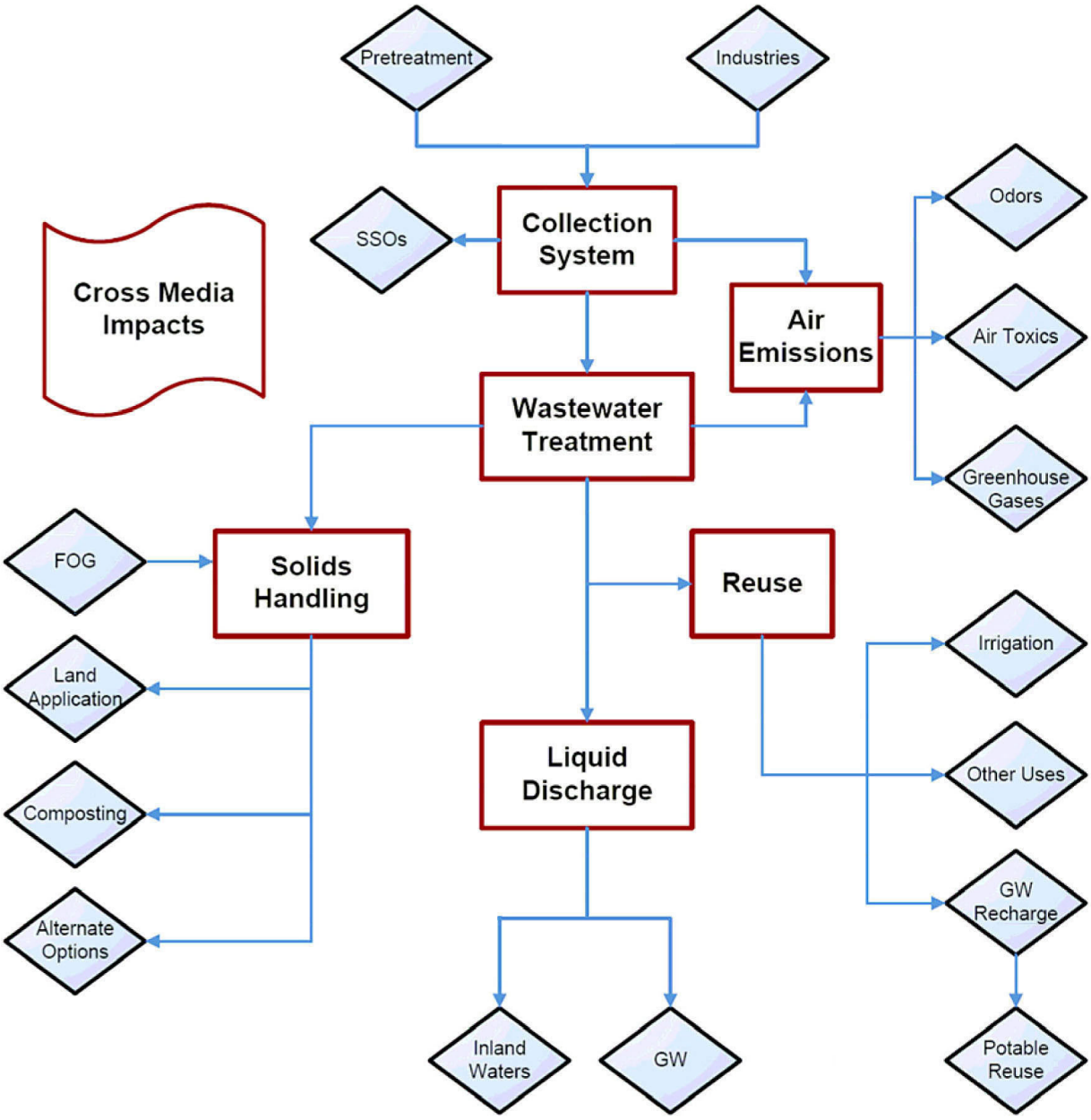
The development of regulatory scenarios for the Facility Plan is based on several factors, including:

- Other waste discharge requirements issued to dischargers in the San Francisco Bay Area and California.
- Pending policies and regulations.
- Discussions with regulators.
- Examination of growth and other non-regulatory developments that may affect areas where the City is currently in compliance.

These factors provide a basis for decision-making on regulatory issues to meet the needs of the Facility Plan through the 20-year planning horizon and over the next 30± years.

The City may also consider strategies for addressing emerging regulations. At this level of planning, it makes sense to review groups of similar contaminants, rather than individual constituents, to determine ways to control their discharge. In general, future regulations that have the greatest impact on the City's long range planning and facility layout are those requiring major process changes, namely increased nutrient removal standards.

Table 4.12 summarizes potential solutions that could be implemented at the WWTP to comply with current and future potential regulatory issues.



CROSS-MEDIA IMPACTS: KEY WASTEWATER REGULATORY ISSUES

FIGURE 4.5

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

rich0616f31-11034.ai

Table 4.12 Summary of Regulatory Issues and Potential Solutions
WWTP Facility Plan
City of Richmond and Veolia Water

Topic	Issue	Potential Solution
Minimize Blending	Blending continues to be scrutinized and will likely be discouraged by the RWQCB within the planning horizon.	Increase secondary treatment capacity.
Nutrient Removal	San Francisco Bay RWQCB consideration of nutrient removal regulations. Data collection and studies are evaluating eutrophication of the Bay that may result in more stringent future effluent limits.	Modify/add processes, chemical addition, and/or capacity to remove nutrients and maximize source control. Provide flexibility in implementation of secondary treatment facilities to provide just-in-time improvements.
Biosolids	Land application of biosolids is assumed to continue in the future and will become more competitive. Higher quality biosolids are becoming preferred.	Consider biosolids use/disposal alternatives.
Air Emissions	Air emissions regulations are becoming more stringent and are updated on regular basis.	Plan for modified emissions control equipment for stationary combustion facilities/engines.
Greenhouse Gases	POTWs are not directly required to report GHG emissions, but may need to report general stationary combustion emissions.	Monitor GHG emissions regulations and comply when necessary. Implement energy efficiency and green energy projects.
Microconstituents	Increasing regulation of these constituents is anticipated to result in new effluent limits to permits in the distant future.	Maximize removal through increased source control and pollution prevention programs. Consider advanced oxidation.

CONDITION ASSESSMENT AND CRITICALITY EVALUATION

5.1 INTRODUCTION

A comprehensive condition assessment of all WWTP facilities was conducted as part of the 2010 Master Plan. This effort also included an evaluation to determine the criticality of each unit process component. The condition assessment and criticality evaluation led to the development of a rehabilitation and replacement (R&R) schedule for the existing structures, process equipment, and support facilities.

As part of the Facility Plan, an additional condition assessment was performed on November 11, 2015. The focus of this condition assessment was to update the condition of the facilities that will be impacted by the critical and near-term projects described in Chapters 6 and 7. These projects are recommended for implementation within the next 5 to 10± years.

This chapter includes:

- A high-level summary of the condition assessment and criticality findings of the 2010 Master Plan.
- A summary of the condition assessment update performed for the Facility Plan.
- Updated R&R recommendations that reflect the findings of the updated condition assessment.

The updated R&R recommendations serve as the basis for the R&R costs included in the Facility Plan CIP in Chapter 10.

5.2 KEY FINDINGS AND RECOMMENDATIONS

The key findings and recommendations are:

- As a result of the 2010 Master Plan condition assessment, assets were identified and recommended for rehabilitation or replacement within the near-term planning horizon (2009 to 2013) and long-term planning horizon (2014 to 2045).
- As a result of the 2015 Facility Plan condition assessment, the findings of the 2010 Master Plan condition assessment were updated, specifically with respect to facilities that will be impacted by the critical and near-term projects identified in this Facility Plan.
- As part of the 2010 Master Plan, assets for the near-term planning horizon were grouped into three main categories (in order of high priority to low priority): Level 1 -

Mandatory Projects, Level 2 - Necessary Projects, and Level 3 - Discretionary Projects.

Since completion of the 2010 Master Plan, most of the Level 1 Projects have been implemented, while most of the Level 2 and Level 3 Projects were not. The Level 1, 2, and 3 R&R projects that have not been completed are still considered high priority projects. It is recommended they be implemented within the next 5 to 10± years to spread out capital costs.

- As part of the 2010 Master Plan, assets for the long-term planning horizon were grouped into two main categories: Anticipated R&R Projects from 2014 to 2030 and Anticipated R&R Projects from 2030 to 2040. These projects would be required to replace and rehabilitate infrastructure that will reach the end of its useful life within the planning horizon.

  For planning purposes, the long-term R&R costs recommended in the 2010 Master Plan are included in the Facility Plan CIP in Chapter 10. The scope, timing, and cost of the projects have not been changed. The costs have only been escalated to account for inflation that has occurred since the 2010 Master Plan. A plant-wide condition assessment should be conducted as part of the next Master Plan to develop updated recommendations for long-term R&R improvements.

5.3 2010 MASTER PLAN CONDITION AND CRITICALITY ASSESSMENT

5.3.1 Condition Assessment

In May 2008, a team of process/mechanical, structural, electrical and instrumentation/control Carollo engineers conducted a condition assessment of the WWTP facilities. The team was accompanied by Veolia Operations and Maintenance (O&M) personnel. The team ranked the condition of the WPCP equipment and structures on a scale of 1 to 5, with a ranking of 1 and 5 corresponding to excellent and inoperable conditions, respectively. Table 5.1 shows the condition ranking scale.

Table 5.1 Condition Ranking Scale
WWTP Facility Plan
City of Richmond and Veolia Water

Condition	Ranking
Excellent (Brand New)	1
Good	2
Fair	3
Poor	4
Inoperable	5

5.3.2 Criticality Assessment

Veolia and Carollo Engineers then conducted a workshop to rank the treatment processes by their relative criticality to develop a rationale for selecting the highest priority upgrades or replacement projects for the WWTP.

The relative criticality was determined by ranking each process area against each other, based on the following assessment criteria and weighting criteria:

- Health and Safety (effects on public and O&M personnel after a process failure); weight = 2.5.
- Permit Requirements (effects on permit requirements after a process failure); weight = 2.5.
- Operational Costs (effects on operational costs after a process failure); weight = 1.0.
- Condition (determination of which processes need to be replaced based on current condition); weight = 4.0.

5.3.3 Master Plan Rehabilitation and Replacement Recommendations

Equipment rehabilitation and replacement requirements were established based on the condition assessment, criticality ranking, and the useful life of each WWTP component. The R&R projects were prioritized into three main categories (in order of high priority to low priority).

- Level 1 - Mandatory Projects. These are the most critical R&R projects, required to meet discharge regulations or for protecting health and safety.
- Level 2 - Necessary Projects. These are R&R projects that need to be completed soon, but not immediately.
- Level 3 - Discretionary Projects. These are projects that are projected to be needed within the master planning period, but over which the City and Veolia have a significant level of control as to when they should be implemented. Level 3 R&R projects also include R&R projects for equipment or process components that are projected to reach the end of their useful life during the master planning period.

Table 2 of Appendix H summarizes the individual WWTP facilities that are included in the R&R projects. This table also indicates which R&R improvements have been implemented since the 2010 Master Plan.

5.4 CONDITION ASSESSMENT FOR CRITICAL AND NEAR-TERM PROJECTS

On November 11, 2015, a team of process/mechanical, structural, electrical and instrumentation/control engineers conducted a condition assessment of the WWTP facilities

that would be impacted by the critical and near-term projects. The team was accompanied by Veolia O&M personnel. The team ranked the condition of the WWTP equipment and structures using the same 1 to 5 scale used for the Master Plan and shown in Table 5.1.

The results of the condition assessment are summarized by major process component/area below. Table 1 of Appendix H includes a table that summarizes the WWTP facilities and their condition. The list includes the condition assessment findings of the Master Plan and the Facility Plan (The list is color coded to indicate which condition assessment findings were updated as part of the Facility Plan.).

5.4.1 Preliminary Treatment

5.4.1.1 Grit Removal

The grit removal facility is in a similar condition as was reported in the 2010 Master Plan. Overall, the grit removal system is in fair to poor condition.

The structure is in fair condition. The influent wet well is extensively corroded due to hydrogen sulfide exposure. The kick plates on the guardrails are wood planks and should be replaced with aluminum kick plates. The grating rebates are in fair condition; however, the grating is corroded and the corrosion is advancing rapidly. If not replaced, the grating will be nonfunctional in a few years.

The influent gates are not functional. To isolate one of the three grit chambers, a sheet of plywood must be used to block the flow. The mechanical grit screws appeared to be in good condition, although the screw motors are corroded. It should be noted, the grit screws are not operated because the grit basins do not provide significant grit removal. Portions of the grit collectors appear to be broken and out of alignment. The Parshall flumes are not equipped with level sensors. The grit basin effluent gates are heavily corroded.

As discussed in Chapter 3, the grit process is nonfunctional and all facilities should be replaced.

5.4.2 Secondary Treatment

5.4.2.1 Aeration Basins

The aeration basins are in a similar condition as was reported in the 2010 Master Plan. In general, the aeration basins are in fair condition.

The basin structures are in good condition; however, the concrete walls of all basins exhibit heavy corrosion and there is a major crack in the wall between Basin Nos. 1 and 2. The undersides of the aerator platforms are corroded and spalling, and the stability of these platforms during a seismic event is questionable. The guardrails have started to corrode. The grating is corroded and needs replacement. The mixed liquor channel between the aeration basins and the secondary clarifiers is in fair condition.

The mechanical aerators in Basin No. 1 and 2 have been replaced in the last 10 to 15 years. Aerator C in Aeration Basin No. 1 was rebuilt in November 2015. These mechanical surface aerators require significant maintenance and are susceptible to breaking down. They also generate aerosols around the aeration basins that cause corrosion and odors in the aeration basin area. The aerators in Basin Nos. 3 are not operable and would need to be replaced if the basin were placed back into service for secondary treatment and mechanical aeration is continued. The aerators in Basin No. 4 have been removed.

The gates throughout the basins are in poor condition due to corrosion and are not operated. The channel aeration system is not operable. The RAS piping and valves on the deck of the aeration basins are in poor condition.

5.4.2.2 Secondary Clarifiers

The secondary clarifiers are in a similar condition as was reported in the 2010 Master Plan. They are generally in fair condition; however, the condition of the collector mechanisms has deteriorated from fair to poor/inoperable condition.

The concrete structures of Clarifier Nos. 1 and 2 are nearing the end of their useful life, but they are in good condition. As a result, their replacement is not needed in the immediate future. There is no flexibility in the connections between Clarifier No. 3 and the aeration basin structure. Consequently, these connections may be more likely to fail during a seismic event.

The collector mechanism structures (e.g., steel bridges for Clarifiers No. 1 and 2) are heavily corroded and should be replaced. The mechanism in Clarifiers No. 1 and 3 are in poor condition. The mechanism in Clarifier No. 2 is inoperable; it is significantly corroded and a safety concern. Immediate temporary repairs should be made to this mechanism to restore it to an operable condition.

The effluent launders are out of alignment in spots and should be rehabilitated. The launder bars are corroded and in poor condition. Clarifier No. 3 is also missing several skimmers that should be replaced.

5.4.2.3 Secondary Treatment Control Building

The secondary treatment control building is in a similar condition as was reported in the 2010 Master Plan. It is generally in fair condition.

The secondary treatment control building houses the electrical equipment for the mechanical aerators and RAS pumps, as well as the programmable logic controller (PLC) for the secondary process. The building is a significant seismic risk because the heavy concrete roof and parapet are supported on concrete columns with minimal shear strength. The building should be evaluated by a structural engineer to determine if the building needs to be reinforced and/or if the parapet should be removed or modified.

5.4.2.4 Secondary Treatment Gallery

The secondary treatment gallery is in a similar condition as was reported in the 2010 Master Plan. The equipment is in poor to fair condition.

The secondary treatment gallery houses electrical equipment, waste activated sludge (WAS) pumps, RAS/WAS piping and valves, flow meters, and the channel aeration blowers. Due to the moist environment, the pumps, valves, and piping in the gallery are all severely corroded. The MCCs, VFDs, and transformers for the RAS/WAS pumps and the clarifier mechanisms are also corroded. The MCCs were installed in 1967 and are obsolete. These MCCs are currently being replaced as part of the Electrical Distribution System project. The RAS pumps are submersible pumps and were not inspected; however, these pumps were replaced in the last five years and are probably in good condition. The WAS flowmeters are heavily corroded and should be replaced.

5.4.3 Disinfection

5.4.3.1 Sodium Bisulfite Chemical Storage Area

The sodium bisulfite chemical storage area is in a similar condition as was reported in the 2010 Master Plan. It is generally in fair condition.

The interior surfaces of the concrete containment structure have been exposed to chemicals. It is recommended these surfaces be coated to keep the concrete dry to extend its useful life. The existing ladders should be replaced with stairs to allow for safer entry into the containment area.

The sodium bisulfite chemical storage tanks have reached the end of their useful life due to ultraviolet (UV) light exposure. The tanks should be replaced in the near future before a spill occurs. The level sensors on the chemical tanks were not inspected during the condition assessment. These level sensors should be inspected and replaced as needed when the tanks are replaced. The sodium bisulfite pumps are not reliable and require high maintenance, so they should be replaced.

5.4.4 Solids Handling

5.4.4.1 Dissolved Air Flotation Thickeners (DAFTs)

The DAFTs are in a similar condition as was reported in the 2010 Master Plan.

DAFT No. 1 is inoperable. All electric and mechanical equipment is obsolete. DAFT No. 2 is in fair condition. The concrete structure is in fair condition. Some concrete repair is required. The foundations for the pumps and mechanical equipment are cracked. Generally all metals at DAFT No. 2 are in poor condition. The steel deck and canopy are in poor condition. The grating and handrails should be replaced soon.

Given there is no standby capacity with the existing DAFT system, the DAFT system will be replaced with a new thickening facility as described in Chapter 7.

5.4.4.2 Solids Handling Building

The Solids Handling Building was not assessed as part of the 2010 Master Plan. In general, it is in fair condition.

The structure was originally designed for biosolids dewatering; however, those processes were decommissioned many years ago. Most of the original equipment has been removed from the building, but some equipment, piping, and support utilities are still in place. The building now houses one duty and one standby air compressor that supply plant air throughout the plant site to support plant operations and maintenance. The air compressors are in fair condition; however, they require a lot of maintenance. There are utility trenches below the building floor that are full of piping and utilities, some of which are still in service.

In general the structure is in fair condition. The columns and beams are in fair condition and do not show spalling. The columns have a horizontal cracking pattern that is consistent with concrete lift and segregation. The columns along the northern exterior are in better condition than the columns along the southern wall. The shear walls have some cracking. The metal door frames are heavily corroded and no longer functional (inoperable).

5.4.4.3 Abandoned Digester Tanks

Abandoned Digester Tanks No. 1 and No. 2 were not assessed as part of the 2010 Master Plan. In general, they are in inoperable condition.

Veolia has taken core samples of these tanks in the past and determined these tanks are some of the first pre-stressed concrete tanks ever built. The stability of these tanks during a seismic event is questionable. They do not have any covers. If the digesters were to be repurposed for digester sludge storage or digester capacity, new covers would need to be installed. However, it would be difficult to install covers because the digester walls are thin compared to current standards. The stairs are nonfunctional and no longer used. Given the general condition, the abandoned digester tanks are not considered suitable for repurposing.

5.4.4.4 Digester Gas Piping and Flare

The digester gas piping and flare were not assessed as part of the 2010 Master Plan. In general, the piping and flare are in fair condition. The digester gas piping and flare work well; however, the digester gas piping has areas of localized corrosion, and the flare is heavily corroded.

The majority of the above ground digester gas piping is ductile iron and suspected to be corroded from condensation inside of the pipes. As digester gas cools after leaving the digesters, water condenses from the gas. Currently, there are no condensate and sediment

traps to remove this water. Instead, water is removed by a 1-inch condensate drain connected to a drop leg off the main digester gas pipe in the Digester Control Building. The interior diameter of the piping is suspected to be reduced from mineral scaling and deposition of grease. The buried digester gas piping is polyethylene piping that was installed in 2009. This piping is assumed to be in good condition.

The pressure regulators were replaced within the past five years because they were not operating adequately. Since they were replaced, the digester gas and flare system has operated well.

5.4.5 WWTP SCADA System and PLCs

In general, the WWTP instrumentation and controls are in a similar condition as was reported in the 2010 Master Plan. The Supervisory Control and Data Acquisition (SCADA) system, that is used for remote monitoring and control of the WWTP, is in poor condition and obsolete. The Programmable Logic Controllers (PLCs), which are used to control equipment, are in generally in fair to poor condition. Approximately 25 percent are in good condition, 10 percent in fair condition, and 65 percent in poor condition. The network room in the administration building was remodeled around 2010.

The WWTP SCADA system was renovated by Veolia in 2003. The communication network was converted to wireless communication because of failures in the hardwired PLC network cables. According to WWTP staff, the PLC network cables were damaged by flooding in the pullboxes. Only the influent pump station PLC is hardwired to the main PLC in the Administration Building. There is also limited communication between the generator, the 1W system, and the remainder of the SCADA system. Improved communication between the standby generator and SCADA system is necessary.

The 2010 Master Plan recommended that a fiber optic cable be included in electrical ductbanks whenever electrical ductbanks are replaced. An electrical improvements project is underway and includes installation of fiber optic cable per the Master Plan recommendations. This will allow the SCADA system to be converted from a wireless system to a fiber optic system. While more expensive, implementing a fiber optic system will result in a faster and more reliable control system.

5.4.6 SCADA System for Collection System Lift Stations

The existing collection system lift station wireless communication system connects 19 sites, including lift stations, tower structures, and other intermediate radio sites, back to the WWTP. Since the 2010 Master Plan, plant staff have determined the existing wireless communication system suffers from low reliability and signal drops. The City would like to improve reliability of communications between the collection system lift stations and the WWTP. The existing system is based upon Proxim's 5.0 GHz Ethernet/IP 5054R antenna mounted radio. One of the issues with an antenna mounted radio is that when it locks-up and needs a hard reset or power cycle, a trained technician is required to climb up to the

antenna/radio unit to physically reset it. Further, these radios have been discontinued by the manufacturer and are not available for purchase anymore.

Improvements to the communication system are considered necessary because the system is critical to the routine operation of the collection system lift stations. If the lift stations are not operated properly, the risk of sanitary sewer overflows is increased.

5.4.7 Miscellaneous Facilities

5.4.7.1 3-Water System

Given recent improvements, the 3-Water (3W) system is in better condition than was reported in the 2010 Master Plan. In general, the 3W system is in fair condition.

The plant 3W system supplies disinfected secondary effluent throughout the plant site to meet various plant water demands, including pump seal water, sprays in treatment tanks, washdown, etc. The 3W system includes two vertical turbine pumps located near the north end of the aeration basins. The discharge from these pumps is filtered with automatic-cleaning strainers. These pumps and strainers were replaced in 2015. A backup vertical turbine pump is located in the chlorine contact basin. The discharge from this pump is filtered by an inline, dual body, hand operated strainer.

Per plant staff, the flow and pressure through the 3W system is inadequate for treatment plant operations. The condition of the 3W piping varies throughout the WWTP, but it is generally in fair condition. Although strainers have been implemented, the 3W piping still is subjective to plugging in some areas.

5.4.7.2 Fencing

The perimeter fence is in a similar condition as was reported in the 2010 Master Plan. The perimeter fence at the plant is in poor condition in certain areas. The City and Veolia should consider installing a rock-restraining fence on the west side of the plant to protect staff and equipment from falling rocks. A new 8-foot perimeter fence topped with 3 strands of barbed wire should be considered for the remaining portions of the plant site to improve plant security.

5.4.7.3 Paving

The plant paving was not assessed as part of the 2010 Master Plan. In general, the plant paving is in fair condition; however, there are portions of the pavement at the WWTP that are in poor condition or inoperable. Figure 5.1 illustrates the condition of the pavement and the main driving route through the plant that is heavily used.

A majority of the pavement that is in poor condition is located along the main route through the plant that is heavily used and used by large trucks. The large trucks include vehicles conveying chemical to the chemical storage tanks, as well as City vehicles and buses that are washed out and cleaned in the open space located at the south end of the plant. Areas

with deep potholes are considered inaccessible areas, as they generally need to be avoided to prevent damage to vehicles.

A project to replace the portions of the pavement at the WWTP that are in poor condition is considered a necessary near-term project to improve the overall condition and operability of the plant roadways. This will improve driver safety around the plant site and prevent the development of potholes which ultimately prevents damage or excessive wear of City vehicles.

5.4.7.4 Lighting

The plant lighting was not assessed as part of the 2010 Master Plan. In general, the plant light system is in poor condition. Figure 5.2 illustrates the effectiveness of the current lighting system.

There are several areas around the WWTP that are not well lit at night, which causes a safety hazard for plant staff. The lighting system includes lights along the major roadways and process areas; however, most lights do not work. In addition to this, there is no perimeter lighting at the WWTP. As a result, plant staff cannot easily spot intruders at night, and there have been instances of intruders entering the plant site in recent years.

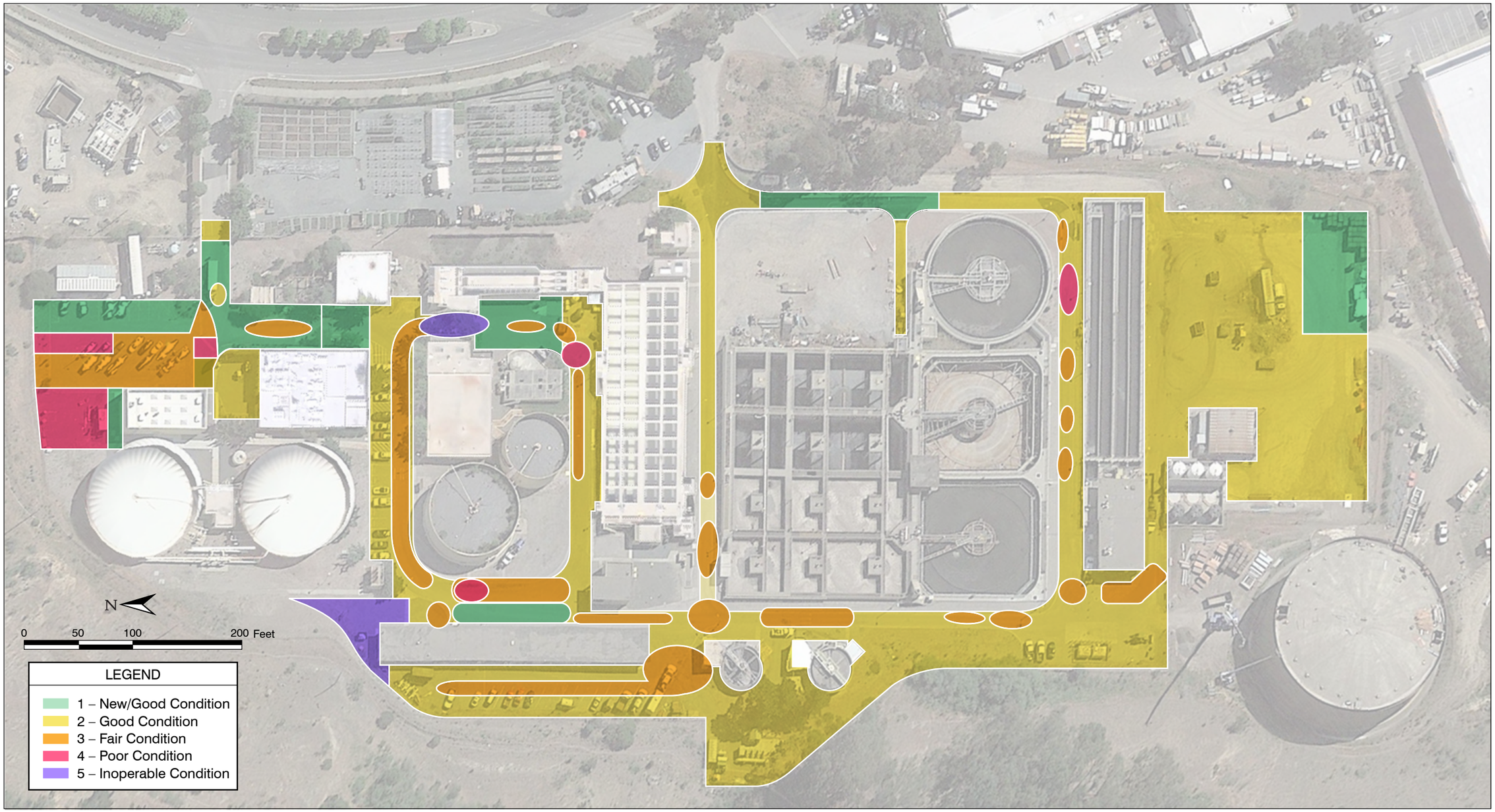
The plant lighting system should be upgraded in the near-term to improve the overall safety of plant staff.

5.5 UPDATE TO R&R RECOMMENDATIONS

5.5.1 Near-Term R&R Recommendations

As discussed above, as part of the 2010 Master Plan for the near-term planning horizon, assets were grouped into three main categories (in order of high priority to low priority). Those groups included Level 1 - Mandatory Projects, Level 2 - Necessary Projects, and Level 3 - Discretionary Projects.

Since the 2010 Master Plan, most of the Level 1 Projects have been completed; most of the Level 2 and Level 3 Projects have not been completed. The tables in Appendix H indicate which projects have been completed, as well as which projects will be completed or addressed by a capital improvement project that is required for reasons other than replacing aging infrastructure (e.g., the Secondary Clarifier Improvements Project discussed in Chapter 6, which is required to replace aging infrastructure as well as improve treatment performance).



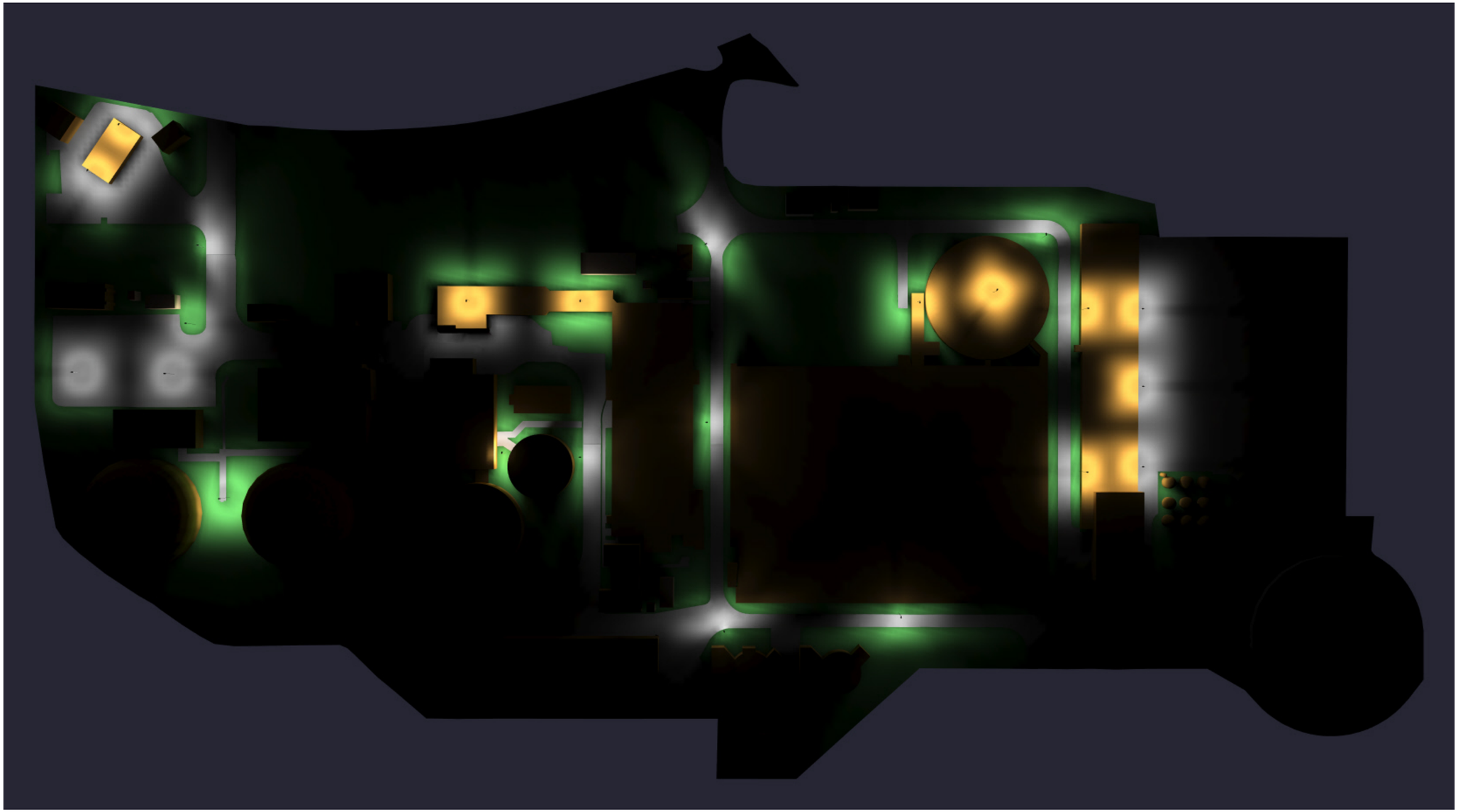
PAVEMENT CONDITION ASSESSMENT

FIGURE 5.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f26-11034.ai



EXISTING PLANT LIGHTING SYSTEM

FIGURE 5.2

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f27-11034.ai

The Level 1, 2, and 3 R&R projects that are yet to be completed are still considered high priority projects. It is recommended they be implemented in the next 5 to 10± years to spread out capital costs. The scope and prioritization of these projects is discussed further in Chapter 10.

5.5.2 Long-Term R&R Recommendations

As part of the 2010 Master Plan, for the long-term planning horizon, assets were grouped into two main categories: Anticipated R&R Projects from 2014 to 2030 and Anticipated R&R Projects from 2030 to 2040. These projects would be required to replace and rehabilitate infrastructure that will reach the end of its useful life within the planning horizon.

As discussed above, the 2010 Master Plan condition assessment was a more comprehensive assessment of the WWTP assets. The long term rehabilitation and replacement needs were not reevaluated as part of the Facility Plan condition assessment. For planning purposes, the long-term R&R costs recommended in the 2010 Master Plan are included in the Facility Plan CIP discussed in Chapter 10. The scope, timing, and cost of the projects have not been changed. The costs have only been escalated to account for inflation that has occurred since the 2010 Master Plan. A plant-wide condition assessment should be conducted as part of the next Master Plan to develop updated recommendations for long-term R&R improvements.

CRITICAL PROJECTS

6.1 INTRODUCTION

This chapter summarizes critical projects that are recommended for implementation within the next 5± years. These projects were identified as critical projects in the 2010 Master Plan and are still considered critical projects to implement based on the needs determined through the performance, capacity, and condition assessments and regulatory review, which are summarized in Chapters 3, 4, and 5.

The critical projects include:

- Screening and Grit Removal Improvements.
- Aeration System Upgrades.
- Secondary Clarifier Improvements.
- Nutrient Removal Study.
- Solids Dewatering/Disposal.

For each project, this chapter summarizes the project background and drivers, basis of design, recommendations, and site layouts. Project alternatives were developed and analyzed where pertinent to the future planning (i.e., where alternatives have a significant impact on the overall site layout or project cost). As needed, costs were developed to compare alternatives. Project costs for the recommended projects are summarized in Chapter 10.

6.2 SITE LAYOUT OF CRITICAL PROJECTS

See Chapter 10 for an overall site layout of the critical projects.

6.3 BASIS OF COSTS FOR ALTERNATIVES ANALYSIS

Equipment, annual operation and maintenance (O&M), and life cycle costs were prepared for the alternatives. Costs shown in this chapter do not include capital or O&M costs for improvements that are common to all alternatives. The costs presented in this chapter are used for comparing alternatives, but do not represent the complete project cost to implement each alternative. Chapter 10 includes the complete project costs for the recommended alternatives, including the cost of common improvements.

Annual O&M costs were estimated for each of the alternatives based on power usage (or production), chemical usage, and sludge disposal. These O&M costs do not include O&M

costs for components common to both alternatives. Labor was also not included in the O&M costs, since significant variation between alternatives is not expected. The unit costs used for developing O&M costs for the alternatives are summarized in Table 6.1.

To compare the overall cost effectiveness of the various alternatives, life cycle costs were developed. These costs, also known as the total present worth value, are the sum of the total equipment costs and the present worth value of the ongoing O&M costs. Ongoing O&M costs were converted to a present worth value based on a 3 percent inflation rate, 6 percent discount rate, and 20-year analysis period.

Table 6.1 O&M Unit Costs
WWTP Facility Plan
City of Richmond and Veolia Water

Item	Units	Value[(1)]
Power Used or Generated	$/kW-hour	0.15
Polymer	$/lb active polymer	2
Sludge Disposal	$/wet ton	30

Note:
(1) 2016 dollars.

6.4 SCREENING AND GRIT REMOVAL IMPROVEMENTS

6.4.1 Background and Project Driver

As previously stated in Chapter 3, the existing coarse bar screen lacks capacity to handle PHWWFs. There is also no redundant bar screen. Therefore, when the bar screen is out of service or the PHWWF exceeds its capacity, unscreened wastewater would overflow over/around the bar screen into the Influent Pump Station wet well. This may lead to clogging of downstream equipment. The 2010 Master Plan recommended installing a second bar screen to allow screening of all wet weather flows and to allow taking the existing bar screen out of service for rehabilitation.

The existing coarse bar screen allows smaller rags and debris to pass through to downstream processes, ultimately accumulating in the anaerobic digesters. These inert materials interfere with the treatment processes, increase maintenance costs, and create a risk of discharge violations from particles that pass all the way through the treatment process to the final effluent. The 2010 Master Plan also recommended that the new bar screen have a finer bar screen spacing of 1/4 inch to 1/2 inch to reduce the impacts of rags and debris that pass through the existing coarse bar screen.

In addition to the issues with the influent bar screen, it was noted in Chapter 3 that the grit removal system is currently not functioning. Since grit is not removed in the grit chambers, it carries through to the primary clarifiers and settles out with the primary sludge. The primary sludge, along with grit, is sent to the anaerobic digesters, where the grit accumulates in the

bottom of the digesters because it is relatively heavy. Over time, this grit accumulation reduces the capacity of the digesters because it displaces the volume needed for the biological process. The accumulated grit must be periodically removed manually from the digesters to maintain digestion capacity, which is a costly and disruptive operation. In addition, grit abrades downstream equipment, such as the primary sludge pumps. Thus, the lack of grit removal results in higher operation and maintenance costs and reduced equipment life.

The 2010 Master Plan recommended constructing a vortex grit basin with a capacity to accommodate peak hour dry weather flows. Final design and bidding for a vortex grit basin was completed in 2011 by Carollo Engineers. Due to cost constraints, the construction project was put on hold. The vortex grit system was designed to operate normally under dry weather flows, with the ability to treat wet weather flows up to 20 mgd. Under this configuration, flows higher than 20 mgd were to be treated by the existing gravity grit channels.

Based on the findings of the Facility Plan, the issues described above are representative of current conditions. The existing coarse bar screen and non-functioning grit removal system should be replaced with a fine screening system and new grit removal system.

6.4.2 Basis of Design

This screening and grit removal improvements project would include a new fine screening facility and grit removal system. Based on discussions with the City and Veolia, it was determined it is most appropriate for the new grit facility to be designed to accommodate the PHWWF that would be pumped to the treatment process, which is 40 mgd.

6.4.3 Recommended Improvements

6.4.3.1 Screening

It is recommended the screening facility consist of two mechanically cleaned bar screens with a bar spacing of approximately 3/8-inch. Given the existing screen has an opening of 1-inch, it is anticipated that implementing 3/8-inch screens would provide an improvement in process performance and reduction in downstream maintenance demands, while limiting the increase in maintenance at the headworks to a reasonable level. The screens should provide removal of most plastics and rags, which can cause equipment plugging and damage.

Screens with bar spacing less than 3/8-inch could be provided. Smaller spaced would provide removal of more inert material and finer materials, such as disposable wipes. Removing these materials would reduce the potential for ragging of downstream equipment and reduce maintenance efforts. However, these smaller spaced screens tend to capture a disproportionally high amount of organic material, which is not desirable. Excessive organics in screenings generate a high level of odors and require larger, more complex

screenings handling and odor control systems. Such systems are higher in capital costs, more mechanically intensive, require more operator attention, and require a higher level of maintenance than screenings handling systems for larger spaced screens.

6.4.3.2 Screenings Handling

Screenings removed by the bar screens must be washed and compacted prior to being discharged into storage bins for disposal offsite. In addition to rags and inert material, the screens would removal fecal and other organic matter that would generate odors if this material is not adequately washed from the inert screenings and returned to the process flow. In addition to reducing odors, lowering the organic content through washing would improve dewatering and reduce the weight and volume of the solids. Dewatering is required to reduce the weight and volume of the solids to reduce hauling and disposal costs.

One screenings washer/compactor is recommended for screenings washing and dewatering. Unwashed and un-compacted screenings would be disposed of if the washer/ compactor is ever out of service. Odors and hauling costs would be higher during these time periods. The project design should include provisions to add a standby washer/compactor in the future should the City determine it is beneficial to have a standby unit.

6.4.3.3 Grit Removal

Two grit separation technologies used in wastewater treatment are aerated grit basins and vortex grit basins. Vortex grit removal technologies include mechanically induced vortex grit removal as well as free vortex grit removal. Vortex grit basins were selected as part of the 2010 Master Plan because vortex grit basins are a simpler, less mechanically intensive method of grit removal in a smaller footprint than aerated grit removal.

It is recommended the grit facility include either mechanically induced vortex grit removal basins or free vortex grit removal basins. The 2011 design was based on mechanically induced vortex grit basins that were 360-degree, sloped-bottom grit vortex basins. Since then, there have been advancements in grit removal technology. Based on recent industry experience, the Smith and Loveless 360-degree, flat-bottom vortex grit basin (a mechanically-induced vortex grit basin) and the Eutek HeadCell (a free vortex grit removal basin) have been found to provide more grit removal than the 360-degree, sloped-bottom grit vortex basins. Therefore, the design should be developed to allow either flat-bottom vortex grit basin or HeadCell technology.

6.4.3.4 Grit Handling

The grit handling process is comprised of grit withdrawal and grit washing and dewatering. Grit washing separates grit from organic solids, and grit dewatering removes the free water from the material in preparation for disposal. A lower organic content in grit reduces odors and vector attraction, while dewatering reduces the weight, volume, and cost of materials hauled.

The 2011 design was based on implementing one cyclone and grit classifier. Based on discussions with plant staff, the grit system should include one duty and one standby cyclone and grit classifier.

Another grit handling technology that could be considered is the Huber COANDA Grit Washer. Cyclone and grit classifier technology is still recommended because there is extensive successful experience in similar applications, it provides a wide range of hydraulic capacity applicable to medium and large plants, it produces adequately clean grit, has a moderate capital cost, and multiple manufactures allow for competitive bidding.

6.4.3.5 Odor Control

It is recommended that odor control of the screening and grit basins be provided. Foul air from screening structure and grit structure should be contained and vented to a soil bed biofilter.

6.4.3.6 Summary of Major Project Elements

The screening and grit removal improvements project would include the following:

- A fine screening structure with two mechanically cleaned bar screens with bar openings of approximately 3/8-inch.
- A screenings conveyor and washer compactor.
- Two vortex grit basins rated for 20 mgd each. The grit basins would include three grit pumps and two grit cyclones and classifiers.
- A slab on grade and canopy structure to cover the classifiers and screenings washer compactor.
- Demolition of the existing grit basin structure.
- An influent distribution box and parshall flumes.
- New pipes to connect the existing influent pump station discharge pipes to the new distribution box.
- An effluent distribution box to connect to the existing primary clarifier structure.
- Foul air ducts, fans, and a soil bed biofilter.

6.5 SECONDARY TREATMENT IMPROVEMENTS

As discussed in Chapter 3, the secondary treatment process has performed adequately; however, there have been challenges in providing enough BOD and TSS removal to meet the NPDES permit limits at all times. This is likely due the fact that the surface aerators are beyond their useful life and need to be replaced. In addition to this, the secondary clarifiers have operational issues and the secondary clarifier mechanisms are beyond their useful life. These facilities also pose some safety concerns. The aerators generate aerosols around the aeration basins that pose a health hazard to plant staff; and the secondary clarifier mechanisms are severely corroded and in poor/inoperable condition.

To address these issues, the 2010 Master Plan recommended upgrading the aeration system and making improvements to the secondary clarifiers. These recommendations are carried forward in the Facility Plan. It should be noted, these improvements are an initial phase of work that would need to be completed prior to the long-term improvements required to meet anticipated nutrient removal requirements (specifically for total nitrogen and phosphorous).

It is recommended the Facility Plan CIP include the following secondary treatment improvement projects:

- Aeration System Upgrades.
- Secondary Clarifier Improvements.

These projects are discussed in further detail in the following sections.

6.5.1 Aeration System Upgrades

6.5.1.1 Background

As discussed in Chapter 3 and the 2010 Master Plan, the mechanical surface aerators in the aeration basins are not providing an even distribution of dissolved oxygen (DO) throughout the basins. This reduces the treatment performance of the basins and is also suspected to cause the growth of filamentous organisms, which reduce the overall settleability of the sludge. In addition, the current mechanical surface aeration system is not as efficient as other standard aeration systems. Another drawback of the mechanical surface aerators are they create aerosols that are a health hazard.

Upgrading the existing aeration system is critical to improving the performance of the secondary treatment process to more reliably remove BOD and TSS and eliminating the airborne health concern.

6.5.1.2 Basis of Design

The aeration system upgrades would include replacing the existing aeration system in Aeration Basins No. 1 and 2. The upgrades should be designed for current and future flows and loads projected through 2027, and current regulations with respect to BOD and TSS. Due to cost constraints, the improvements would not be designed to provide nitrification.

These improvements are an initial phase of work that would need to be completed prior to the long-term improvements required to meet anticipated nutrient removal requirements. As a result, these improvements would be designed to align well with the long-term improvements that would be required to: treat future flow and load conditions projected through 2040; treat the additional nutrient load from the dewatering centrate; and to meet the anticipated nutrient removal requirements.

6.5.1.3 Recommended Improvements

As recommended in the 2010 Master Plan, it is recommended the mechanical surface aerators be replaced with a diffused aeration system, comprised of membrane diffusers and blowers housed in a blower building. The diffused aeration system is a more energy efficient system and would provide more even distribution of DO throughout the basins. It is anticipated that fine bubble aeration would reduce the number of filamentous organisms in the mixed liquor, which would increase the settleability of the sludge and result in improved secondary process performance.

6.5.1.3.1 *Aeration Basin Improvements*

The aeration system upgrades would include the demolition of the existing mechanical surface aerators. The concrete platforms that support the aerators and the concrete walkways to the platforms would also be demolished.

The aeration system upgrades would include installing fine bubble membrane diffusers in the existing Aeration Basins No. 1 and 2. No structural modifications beyond what is required to install the new aeration equipment are included. During the design phase of this project, process modeling of the secondary process should be used to determine the optimal number of diffusers, oxygen requirements, and aeration air flow.

6.5.1.3.2 *Blower Building*

It is recommended the blowers be housed in a building located near the aeration basins. Blower sizing should be based on current and future flows and loads and regulatory conditions. The building should be sized for future conditions; however, this project should only include the installation of blowers required to meet current flows and loads and current regulatory conditions with respect to BOD and TSS. Blower technology should be evaluated and selected as part of preliminary design.

6.5.1.3.3 *Summary of Major Project Elements*

The aeration system upgrades would include the following:

- Aeration Basin Diffuser Improvements
    - Demolition of mechanical aerators, concrete support platforms, and associated electrical components.
    - Aeration piping to Aeration Basins No. 1 and 2 and aeration control valves.
    - Fine bubble diffusers in Aeration Basins No. 1 and 2.
    - Aeration control system.
- Blower Building
    - New blower building; it is assumed that the building would be a pre-engineered metal building with a slab on grade foundation.
    - Blowers and electrical system improvements to supply power to the blowers.

6.5.2 Secondary Clarifier Improvements

6.5.2.1 Background

The 2010 Master Plan identified the following four issues with the secondary clarifiers. Based on the findings of the Facility Plan, these issues are representative of current conditions.

- In the square clarifiers (Clarifiers No. 1 and 2), sludge accumulates in the corners and turns septic. As a result, the sludge rises to the surface and goes over the effluent weirs, which contributes to poor performance and increases the potential for TSS violations. The Master Plan recommended grouting the corners of the clarifiers to form a 45-degree angle that allows the sludge to settle towards the center of the clarifiers, instead of accumulating in the corners.
- The draft tubes in all three clarifiers clog frequently, causing the sludge blankets to rise in portions of the clarifiers that are serviced by the clogged draft tubes. The draft tubes clog because a large amount of debris passes through the coarse bar screen. The Master Plan recommended replacing the clarifier mechanism with a blade type collector that moves the sludge to the center of the clarifier for removal.
- When operated at high flows, Clarifier No. 3 has solids carryover into the effluent. Possible reasons for this include clogged draft tubes and short-circuiting due to high weir overflow rates. The Master Plan recommended installing density current baffles to the clarifier and replacing the feed well with an energy dissipater/flocculating feed well.

- The current configuration of the mixed liquor channels does not provide the ability to measure or control the flow of mixed liquor to each secondary clarifier. There are three upward opening slide gates that control flow to each clarifier. However, these gates can only be manually controlled, which is an ineffective way of regulating the flow due to varying flow rates. Due to the hydraulics of the existing configuration, Clarifier No. 1 receives more flow than the other two clarifiers, which negatively affects the performance and capacity of the overall secondary treatment process. The Master Plan recommended installing flow control weirs in the clarifier influent channel to provide a more even flow split to each clarifier.

Upgrading the secondary clarifiers to address the issues describe above is critical to improving the performance of the secondary treatment process and more reliably meeting the NPDES permit limits for TSS.

6.5.2.2 Basis of Design

All three secondary clarifiers would be upgraded to address the issues above. Upgrades would be designed to accommodate a peak flow of 20 mgd. This is the current peak flow through the secondary clarifiers and future peak flow (assuming wet weather bypassing of flows above 20 mgd, see Chapter 8 for recommendations for eliminating wet weather bypassing).

6.5.2.3 Recommended Improvements

Improvements to address the issues above are recommended. It is recommended the Clarifiers No. 1 and 2 would be grouted to prevent accumulation of sludge in the corners. The mechanisms in all three clarifiers would be replaced and improvements would be made to portions of the effluent launders that are out of alignment and corroded.

To provide flow measurement, the influent channel to each clarifier would be retrofitted with a cutthroat flume or other similar flow measurement device. To provide flow control, automated gates would be added upstream of each flow measurement point to allow the flow to each clarifier to be manually or automatically adjusted to optimize performance.

The secondary clarifier improvements would include the following:

- Secondary Clarifier Feed Channel Box Modifications
    - Installation of cutthroat flumes and instrumentation for flow measurement in the influent channels to each secondary clarifier.
    - Addition of automated flow control gates upstream of the new flow monitoring structures for each secondary clarifier.

- Secondary Clarifier Improvements
    - Demolition of existing secondary clarifier mechanisms and associated electrical components.
    - New secondary clarifier mechanisms and electrical system improvements.
    - Grouting to fill in the corners of Clarifiers No. 1 and 2.
    - Structural upgrades as needed to meet current seismic code requirements.

6.6 NUTRIENT REMOVAL STUDY

Although the plant is not designed to provide nitrification, as discussed in Chapter 4, anticipated nutrient removal requirements will likely require nitrification and denitrification. The initial nutrient removal requirements, the Level 1 Nutrient Removal Requirements, are anticipated to have a compliance date of 2024 and require optimizing existing treatment processes to reduce nutrient loads as much as possible with minimal capital investment. It is recommended the City conduct a study to determine what operating parameters (MLSS and SRT) would be required to provide nitrification and denitrification. These parameters are essential to determining minor upgrades that could be made to optimize the process for seasonal nutrient removal, as well as major infrastructure upgrades that would be required for long-term nutrient removal requirements.

It is recommended this study be conducted after the Screening and Grit Improvements, Aeration System Upgrades, and Secondary Clarifiers Improvements are implemented because these improvements are anticipated to improve the performance of the secondary treatment process.

6.7 SOLIDS DEWATERING/DISPOSAL

6.7.1 Background

Currently, digested sludge is pumped to WCWD for dewatering, drying, and eventual disposal. However, the City and WCWD entered into an agreement to end this practice by January 1, 2016. As part of the agreement, a penalty would take effect if digested sludge were sent to WCWD after this date. To meet the terms of the agreement and to avoid increasing biosolids disposal costs, it is critical that a dewatering facility be implemented at the WWTP site.

6.7.1.1 2010 Master Plan

The 2010 Master Plan included a dewatering project to address this need. The project included belt filter presses, a dewatered sludge loading facility, filtrate pumps, chemical facilities, and an odor control system. This project was based on preliminary work by Veolia.

6.7.1.2 2010 Biosolids Dewatering Technical Memorandum (TM)

In 2010, Carollo developed the Biosolids Dewatering Technical Memorandum (TM) to:

- Identify biosolids options to reduce the City's dependence on the landfill and maximize beneficial uses of biosolids.
- Evaluate technologies to produce dewatered biosolids and recommend a preferred dewatering technology.
- Evaluate technologies to produce Class A biosolids suitable for beneficial reuse and recommended a preferred Class A technology.

The 2010 Biosolids Dewatering TM evaluated several dewatering technologies including: belt filter presses (BFPs), centrifuges, and screw presses. Centrifuges were recommended. Although they had the highest equipment cost, the annual operating cost and life cycle cost were found to be lower in comparison to BFPs and screw presses. In addition, centrifuges would provide increased cake solids, which would reduce the capacity requirements for downstream equipment (e.g., dewatered sludge hoppers, equipment to produce Class A sludge such as dryers, etc.).

The 2010 Biosolids Dewatering TM also evaluated several technologies to produce Class A biosolids. Production of high quality biosolids, such as Class A biosolids, is more sustainable than landfill disposal. There are more disposal alternatives for Class A biosolids, such as using them as an alternative to chemical fertilizers, which helps to minimize future disposal costs. Five processes for producing Cass A biosolids were evaluated including: Class A screw press, direct-drying belt dryer, indirect-drying Thermaflite Bioscru, solar greenhouse gas dryer, and composting. Indirect drying was recommended because it was substantially less expensive than the other alternatives with respect to capital costs. Although indirect drying was found to have higher operating costs than solar drying, the feasibility of constructing new sludge drying beds within the City limits was determined to be unlikely given real estate costs and public impacts. In addition, indirect drying can utilize digester gas to supply a large portion of its energy requirement.

The 2010 Biosolids Dewatering TM recommended a dewatering and drying facility be implemented at the plant site in the location of the existing Solids Handling Building (which is currently underutilized and used to house air compressors). The project could be implemented in phases to address plant needs appropriately and spread capital costs. The first phase would provide on-site dewatering and would produce Class B biosolids. It would include a dewatering/drying building, dewatering equipment, and support facilities. The second phase could be implemented once funding is available and would include the implementation of the drying equipment.

6.7.1.3 Facility Plan

Based on the findings of the Facility Plan, implementing a dewatering facility at the plant site is considered a critical project to meet the terms of the biosolids agreement with WCWD and avoid increasing biosolids disposal costs.

Implementing biosolids drying to produce Class A biosolids is not considered a critical project because there are no immediate drivers for producing Class A biosolids. As discussed in subsequent sections, biosolids disposal regulations are becoming more stringent and disposal options for Class B biosolids will become increasingly limited. Given this and other capital needs, it is recommended the CIP include a biosolids post-processing project that should be implemented as part of a long-term project. The schedule for this project should be reassessed when the timing of future biosolids disposal regulations is more certain and alternative biosolids post-processing, beneficial use, and disposal options are more developed.

6.7.2 Basis of Design

To determine the future flows and loads that would be sent to the dewatering facility, sludge flows and loads for current and future conditions were developed. The sludge flows and loads were developed using a BioWin model and the projected plant influent flows and loads presented in Chapter 2.

Table 6.2 summarizes the projected solids flows and loads. These values were used the primary basis for the development and evaluation of the dewatering facility improvements.

Table 6.2 Current and Future Sludge Production
WWTP Facility Plan
City of Richmond and Veolia Water

Parameter	2016		2040	
	ADAL	MML	ADAL	MML
Primary Sludge Production, dry ppd	9,100	19,100	12,900	26,900
WAS Production, dry ppd	7,900	10,700	11,400	15,400
Digested Sludge Production, dry ppd	10,000	17,700	13,900	25,200
Digested Sludge to Dewatering, gpd	54,500	77,600	77,500	109,000

Note:
(1) Digested sludge production based on 95 percent capture in WAS thickening and 50 percent destruction of volatile solids during digestion.

6.7.3 Alternatives Analysis

Three alternatives were analyzed for biosolids dewatering: centrifuges, screw presses, and rotary presses.

6.7.3.1 Screw Presses

Screw presses are comprised of an enlargening screw that is enclosed in a screen. Solids are conditioned with polymer and loaded into the top of the screw press. The screw conveys the solids to the discharge end of the press. As the solids are conveyed, they are pushed through a continually decreasing volume due to the enlargement of the screw. This increases the pressure along the length of the screw press, and forces the free water in the solids through the external screen. The separated water (pressate) is collected and discharged at the bottom of the screw press and returned to the liquid treatment process. The dewatered cake is discharged at the end of the screw press and conveyed for ultimate use and disposal.

The screw press is gaining popularity in the municipal WWTPs due its mechanical simplicity, which allows it to be operated virtually unattended. Screw presses can achieve a cake solids concentration of 16 to 18 percent, which is relatively low compared to the other technologies. Screw presses also have a relatively low level of solids capture (less than 95 percent).

6.7.3.2 Rotary Press

Rotary press dewatering, also recognized as rotary fan press dewatering, is comprised of low- and high- pressure zones, which rely on gravity, friction, and pressure differential to dewater solids. Before entering the low-pressure zone, solids are dosed with polymer and fed into a channel bound by screens on each side. The channel curves with the circumference of the unit, making a 180-degree turn from inlet to outlet. In this low-pressure zone, free water gravity drains through the filtering screen pores, which move in continuous but slow, concentric motion. Solids gradually enter the high-pressure zone as they travel towards the machine outlet where the pressure is controlled. Cake accumulates against the outlet gate, and the motion of the screens squeezes out additional water. The cake is continuously released through the pressure-controlled outlet and conveyed for ultimate use and disposal. Filtrate generated from both pressure zones is collected and returned to the liquid treatment process.

Rotary presses are gaining favorable attention from wastewater agencies as a viable dewatering technology. Although installation data is minimal, the dewatering performance of rotary presses is considered comparable to screw presses. Rotary presses can achieve a cake solids concentration of 13 to 22 percent, based on local installations and manufacturer data. Rotary presses also have a relatively low level of solids capture (less than 95 percent).

6.7.3.3 Centrifuges

A dewatering centrifuge uses centrifugal force generated through high-speed spinning to separate sludge solids from the liquid stream and compress the solids into thickened sludge. Feed solids are pumped into a feed tube which extends into the rotating assembly

of the centrifuge. The rotating assembly rotates at high speeds in the range of 2,500 to 2,900 rpm to create high centrifugal forces. The forces cause the solids and liquids to separate. The separated liquid (centrate) is collected and returned to the liquid treatment process. The separated solids are collected and are conveyed to the discharge end of the rotating assembly where they are collected for ultimate use and disposal.

Operator oversight can be minimized with typical operations and control features provided by manufacturers. Unattended operation is possible, though not common. Centrifuges can achieve the highest cakes solids of the technologies considered, about 20 - 27 percent solids. Centrifuges also have a relatively high level of solids capture (95 to 98 percent).

6.7.3.4 Alternative Comparison

To evaluate screw presses and centrifuges further, both a qualitative review and net present value analysis were performed. The qualitative review is present in Table 6.3.

Table 6.3 Summary of Advantages and Disadvantages of Dewatering Technology
WWTP Facility Plan
City of Richmond and Veolia Water

Alternative	Advantages	Disadvantages
• Screw Press	• Unattended operation feasible and common • Low O&M attention required • Few mechanical parts • Low power consumption • Less sensitivity to sludge feed	• Lower cake solids concentration, solids capture, and throughput compared to centrifuges • Larger footprint compared to rotary presses and centrifuges • Narrow operating range
• Rotary Press	• Low O&M attention required • Few mechanical parts • Low power consumption • Smaller footprint compared to screw presses	• Fewer installations compared to other technologies • Lower cake solids concentration, solids capture, and throughput compared to centrifuges
• Centrifuge	• Highest cake solids concentration, solids capture and throughput • Wide operating range • Smaller footprint compared to screw presses • Less sensitivity to sludge feed	• Unattended operation feasible but not common • High O&M attention required • High energy consumption • Higher noise generation

A comparison of the performance and life cycle cost of these alternatives is shown in Table 6.4.

Table 6.4 Performance Comparison of Biosolids Dewatering Alternatives
WWTP Facility Plan
City of Richmond and Veolia Water

Parameter	Centrifuge	Screw Press	Rotary Press	Rotary Press
Number of Units	2	3	12	12
Expected Dewatered Solids, percent(1)	25	18	22	13
Hours of Operation, hours per day/days per week	9/5	24/5	24/5	24/5
Average Cake Production, wet tons/year	10,200	14,100	11,600	19,600
Bare Equipment Cost(2)	$1,100,000	$1,590,000	$900,000	$900,000
Annual O&M Cost(3)				
Annual Power Cost	$43,000	$33,000	$61,000	$61,000
Annual Polymer Cost	$127,000	$152,000	$127,000	$127,000
Annual Hauling Cost	$306,000	$423,000	$348,000	$588,000
Total Annual O&M Cost	$476,000	$608,000	$536,000	$776,000
Present Worth Operation Costs(4)	$7,140,000	$9,120,000	$8,040,000	$11,640,000
Life Cycle Cost(5)	$8,240,000	$10,710,000	$8,940,000	$12,540,000
Building Footprint Increase(6)	Baseline	+25%	+0%	+0%

Notes:
(1) The expected dewatered solids content for centrifuges and screw presses is based on pilot testing done at plant site. The solids content for rotary presses is based on the manufacturer rating of 20 to 23 percent and expected performance of 13 percent.
(2) Bare equipment costs do not include freight, installation, etc.
(3) The annual operating costs for each alternative do not include operating costs for components common to all alternatives. Labor was not included in the O&M costs, since significant variation between alternatives is not expected for those items.
(4) Annual O&M costs are converted to present worth value based on 3 percent inflation rate, 6 percent discount rate, and 20-year analysis period.
(5) Life cycle cost is the equipment cost plus the present worth value of annual O&M costs.
(6) The life cycle costs do not include additional costs for a different building size.

6.7.4 Recommended Improvements

Of the alternatives evaluated, centrifuges are the recommended alternative because they are estimated to have the lowest 20-year life cycle cost. The dewatering system would be housed in a building and include centrifuges, filtrate pumps, chemical facilities, an odor control system, and a sludge cake load out facility with a cake hopper.

A preliminary layout of the dewatering facility is shown in Figure 6.1. Design criteria for the centrifuges are presented in Table 6.5.

Table 6.5 Design Criteria for Centrifuge Dewatering
WWTP Facility Plan
City of Richmond and Veolia Water

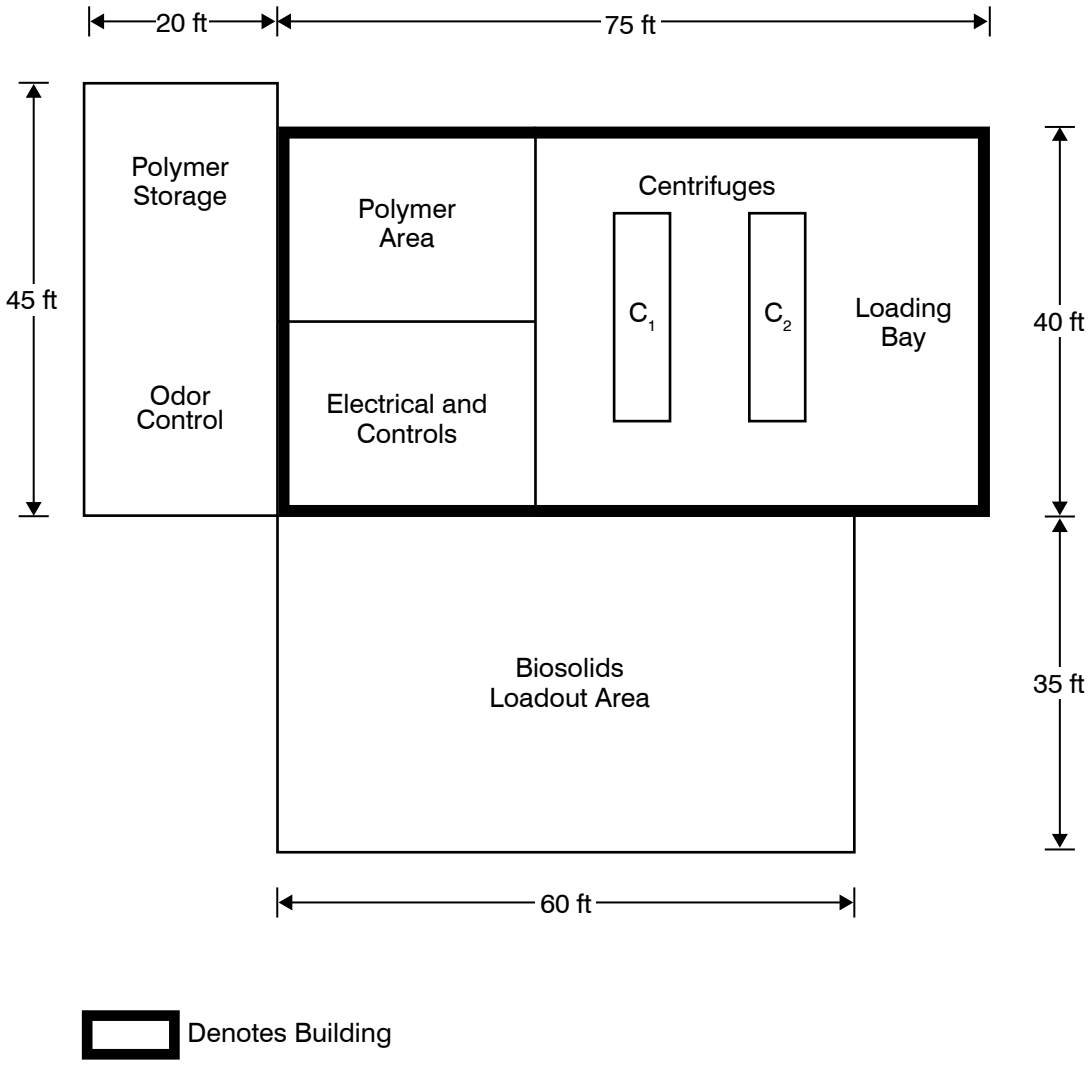
Parameter	Units	Value
Type	-	Centrifuge
Number of Units	-	1 Duty + 1 Standby
Capacity, each	gpm	500
	lb/hr	4,500
Operating Time	hours/day	9
	days/week	5
Typical Polymer Consumption	lb/dry ton	25
Cake Solids Content	percent	20 to 27
Typical Solids Capture	percent	95

Note:
(1) Based on Westfalia Centrifuge Model CF8000.

6.7.5 Digested Sludge Storage

Due to the intermittent operation of the dewatering equipment, storage would be required for the digested sludge when the dewatering equipment is not operating. The volume of digested sludge storage required to accommodate a three day weekend and operating the dewatering equipment nine hours a day was estimated based on the projected flows and loads in Chapter 2. Assuming only one digester in service at current MM flows and loads, the digester has enough excess capacity to provide this storage. However, the digester would not have enough storage around 2030, requiring the construction of a digested sludge storage tank.

Based on the projected 2040 MM flows and loads, it estimated that about 50,000 cf of storage would be required. The existing abandoned digested sludge storage tank should be demolished and replaced with a new tank. Since this project is not required for more than 10 years, it has been listed as a long-term project in the CIP.



DEWATERING FACILITY LAYOUT

FIGURE 6.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

rich0616f1-10034.ai

6.7.6 Biosolids Disposal Options

6.7.6.1 Immediate-Term Recommendations

The 2010 Master Plan analyzed four sludge disposal options:

- Class B sludge land application at disposal sites utilizing either truck or rail-haul.
- Thermal drying of the biosolids and disposal of the dried solids utilizing either truck or rail-haul.
- Truck or rail-haul of biosolids to an existing Class A processing facility (e.g., composting or drying facility).
- Biosolids-to-energy facilities.

The economic analysis of biosolids disposal options hinges on tipping fees. Lower tipping fees favor disposal of dewatered biosolids, whereas higher tipping fees favor thermal drying. The tipping fees presented in the Master Plan are still representative of current tipping fees, which range from $30 to $70 per wet ton.

While a thermal drying facility provides flexibility if biosolids disposal locations and/or regulations change in the future, the Master Plan recommended disposal of dewatered biosolids at a landfill since it appears to benefit the City more in the short term. The Master Plan recommended provisions be made to allow for the construction of a thermal drying facility in the future if regulations change and/or disposal fees increase. For these reasons, it is recommended that disposal of dewatered biosolids to a landfill be implemented for the short term.

As part of the Dewatering Facility Project, the City needs to develop a biosolids disposal agreement. This should be developed prior to beginning design. Due to the proximity of the WCCSL and the existing agreement for biosolids disposal between WCCSL, WCWD and the City, it is recommended the City dispose of biosolids at the WCCSL while feasible.

6.7.6.2 Long-Term Recommendations

It is important to note, as discussed in Chapter 4, biosolids disposal regulations are becoming more stringent. California legislation is requiring the reduction of waste being sent to a landfill by 75 percent by 2020, the elimination of diversion credit for green waste used as alternative daily cover by 2020, and is pushing to eliminate 100 percent of organic waste (including biosolids) from landfills by 2025. As a result, the ability to use biosolids as landfill alternative daily cover and dispose of biosolids at landfills is likely not an option beyond 2025 and it may need to be significantly reduced by 2020.

To comply with anticipated biosolids disposal regulations, other biosolids disposal options need to be considered. There are several alternatives (described below), each with differing

regulatory and policy pressures that affect whether they are viable long-term alternatives. There is some uncertainty as to the specific timing and requirements for each WWTP and funding may become available to support financing the required improvements. At this time, long term reliable options for biosolids include developing marketable products and collaborating on regional solutions.

It is recommended the City include a biosolids post-processing project in the capital improvement plan and reserve site space for a biosolids post-processing facility.

6.7.6.2.1 *Biosolids Disposal Alternatives*

Solids can be disposed of or beneficially used depending on their material content and the extent they have been stabilized. Future biosolids disposal options that could be implemented to meet anticipated disposal regulations include:

- **Land application.** Land application options primarily include agricultural land, but also include mining land, and land that is being rehabilitate due to fire damage. Class B or Class A biosolids could be land applied. There would be more disposal options for Class A biosolids, given they are a higher quality. As discussed above, there has been increasing pressure to ban land application, especially of Class B biosolids. Twenty-two counties in California have implemented either a complete or a partial ban on biosolids land application through either a direct ban or impracticable requirement. Only three counties specifically allow Class B biosolids land application: Sonoma, Solano, and Merced Counties. Dewatered cake represents the most basic and most common form of land-applied biosolids.

- **Ash disposal.** Ash is the end product of combusted sewage sludge and can be classified as either non-hazardous or hazardous based on its pollutant concentrations. The ash is typically landfilled; however, it can be beneficially used in the production of brick or cement products if (a) a nearby facility can be identified, (b) price is right, and (c) the quality of ash is consistent so that it meets manufacturer's and end user expectations. Multiple hearth and fluidized bed incineration produce ash. Plasma arc oxidation, pyrolysis, and gasification produce a biochar that may be used as soil amendment or disposed in a landfill, similar to ash.

- **Biosolids compost.** Dewatered cake can be mixed with various other materials (e.g., soil) and processed to create soil amendments (i.e., compost) or topsoil replacement products. In general, compost products are considered the most acceptable beneficial use products available to the public. This is because compost products are associated with food, yard, and agricultural wastes that the public is more familiar with and so are more likely to accept biosolids compost. The list of potential feedstock materials that can be used include green waste, wood chips, sawdust, sand, lime, cement kiln dust, wood ash, and others. Soil amendment

products are generally treated to Class A pathogen density standards. The soil amendment class of products usually has a pleasant, earthy odor and pleasing overall appearance to the general public.

- **Dried biosolids for fertilizer.** Dewatered cake can be dried to form fertilizer products. The dewatered biosolids could be dried on site or hauled to a composting facility. Thermally dried biosolids products generally contain less than 10 percent moisture. The product appearance can range from uniform spherical pellets to less uniform granules. The overall appearance of thermally dried products is generally acceptable to the public.

- **Pyrolysis char/oil.** Pyrolysis is a thermal conversion technology that can convert sludge into a char or oil having an energy content ranging from 4,500 to 9,000 Btu per pound. The process also produces a syngas that can be used as a fuel. These materials can be used in waste-to-energy facilities and cement kilns. There are no currently operating pyrolysis facilities in the U.S. that take in sludge or biosolids, however this may change based on the anticipated biosolids disposal regulations.

- **Regional opportunities.** Regional opportunities would include hauling dewatered solids to a central facility that could utilize the solids as a fuel to produce energy.

6.7.6.2.2 *Regional Efforts*

For planning future management of biosolids, the City and Veolia should be aware of the Bay Area Biosolids to Energy (BAB2E) Coalition efforts. The BAB2E is comprised of nineteen Bay Area agencies, including the City of Richmond. The Coalition was formed to create a local sustainable solution to diversify biosolids management options with the development of a regional facility or facilities that will use biosolids and possibly other renewable feedstocks to generate renewable energy.

Many of the Coalition member agencies capture the biogas generated during anaerobic digestion of their solids and utilize that biogas for cogeneration of electricity and/or heating. After anaerobic digestion, the biosolids still have useful energy content.

Most of the participating agencies presently utilize a combination of hauling biosolids for land application and/or alternative daily cover at landfills and would like to see these beneficial uses preserved. However, increasingly restrictive regulations will require that biosolids no longer be accepted at landfills within the next 5 to 10 years. These increasingly restrictive regulations are driving the need for long term sustainable disposal/beneficial use alternatives.

The Coalition is currently exploring regional opportunities to diversify biosolids management options and generate renewable energy. The six projects under way (either being evaluated or preparing for demonstration) are described below.

- Delta Diablo:
    - In partnership with Mt. Diablo Resource Recovery (MDRR), is currently evaluating Anaergia's pyrolysis technology to determine sizing, phasing, and needed support infrastructure to convert 33 tons per day (tpd) of post-anaerobic digested biosolids and 80 tpd of food waste into an ammonium sulfate fertilizer product, a high-nutrient bio-char soil amendment, and 1.7 megawatts (MW) of carbon-negative renewable electricity.
    - In partnership with MDRR, is currently evaluating PHG's gasification technology to determine project size, phasing, optimal feedstock ratios, and needed support infrastructure to convert 1 truck per day of green waste from MDRR and 25 percent of Delta Diablo biosolids to produce approximately 500 kW of electricity and reduce GHG emissions by 85 percent.
- Dublin San Ramon Services District: In partnership with Synagro and SCFI Group, is currently evaluating the SCFI AquaCritox® technology to determine project viability. The technology will further break down volatile solids in the biosolids. The heat generated can be used to power the process and produce steam and/or hot water to heat their anaerobic digesters and offset the use of fossil-fuel based energy and the associated greenhouse gas emissions. In addition, the product solids are rich in nutrients and can serve as a valuable soil amendment.
- Silicon Valley Clean Water: In partnership with BioForceTech (BFT) Corporation, approximately half of the biosolids will be dried by BFT's onsite BioDryer™ process. After drying, pyrolysis will be used to further reduce the solids mass. The byproducts of the process are syngas and biochar, both having a high reuse value. The facility will begin operation in fall 2016.
- Fairfield-Suisun Sewer District: In partnership with Lystek, has constructed a full-scale merchant project with a capacity to process 150,000 wet tons of biosolids per year. The facility will help to optimize the operation of the anaerobic digesters, produce a federally registered biofertilizer, enhance biogas production, and can also process organic waste streams. The facility began operation in August 2016.
- West County Wastewater District: In partnership with Synagro and SCFI, is currently evaluating the SCFI AquaCritox® technology to determine project viability and needed support infrastructure to treat waste activated sludge (WAS), in lieu of treating it with anaerobic digestion. This will free up 40 percent of the digester capacity for alternative bio-sources.

It is recommended that the City of Richmond continue participating in the Coalition and consider regional opportunities. Participating in regional opportunities could potentially reduce the cost of biosolids post-processing.

6.7.7 Centrate/Filtrate Management

6.7.7.1 Background and Regulatory Impacts

At WWTP's with anaerobic digesters, the centrate (which is also referred to as filtrate) from the dewatering process can have very high concentrations of nitrogen and phosphorus. Given digested solids are currently pumped to and dewatered at sludge drying lagoons at the WCWD WPCP, the centrate from the digested solids is currently collected and treated at the WCWD WPCP.

When the dewatering facilities are implemented at the plant, the centrate would need to be treated at the plant. The centrate would increase the overall ammonia and phosphorous load to the plant, and increase the influent ammonia concentration by about 20%.

The Regional Water Quality Control Board (RWQCB) may require the City to treat the additional ammonia load from the dewatering centrate. If that is the case, additional improvements would be required, such as upgrades to the secondary treatment process or side-stream treatment.

6.7.7.2 Treatment Alternatives

There are two primary alternatives for treating the centrate ammonia load:

- **Secondary Treatment Process Upgrades.** Upgrade the secondary treatment process to provide nitrification and denitrification. To minimize the required aeration volume and optimize the secondary process, implement a centrate and RAS reaeration basin (CaRRB) to treat the ammonia load from the centrate.
- **Side Stream Treatment.** Implement a side-stream treatment process to remove nutrients from the centrate prior to returning it to the headworks.

6.7.7.2.1 *Secondary Treatment Process Upgrades*

The secondary treatment process would be upgraded to provide nitrification and denitrification. It is anticipated that new aeration basins, additional blowers, and new alkalinity feed facilities would be required. Additional aeration basins would be required to provide a longer SRT. Additional blowers would be required to provide sufficient air. An alkalinity facility would be required to maintain the pH of the effluent to support full nitrification. Although several chemicals such as sodium hydroxide (caustic), magnesium hydroxide, or lime can be used, it is assumed that new caustic storage tanks, metering pumps, and a containment area would be provided for this alternative.

The secondary treatment process upgrades would also include the addition of a centrate and RAS reaeration basin (CaRRB). The basin could be a stand-alone basin or a channel along the influent end of the aeration basins. RAS and centrate would be pumped to the CaRRB channel, aerated and treated, and then flow by gravity to the influent end of the

aeration basins. The CaRRB zone would efficiently nitrify the high ammonia load of the centrate and in the process would produce nitrifiers that would be returned to the aeration basins.

Increasing the number of nitrifiers returned to the aeration basins improves total nitrogen removal efficiency and reduces the aeration volume required. This reduces capital and O&M costs. Given this, it is advantageous to implement CaRRB if you need to upgrade the plant for nutrient removal. It is recommended the City implement CaRRB if the Dewatering Facility Project is implemented at a time where nutrient removal requirements are certain.

It is important to note, CaRRB would only be feasible if the plant were fully nitrifying (providing complete removal of ammonia). If the Dewatering Facility is implemented at time where nutrient removal requirements are not certain, the City may want to evaluate implementing a side-stream treatment processes instead of upgrading the secondary treatment facilities for nitrification and denitrification.

6.7.7.2.2 *Side-Stream Treatment*

There are a wide range of side-stream treatment alternatives that could be implemented to treat the centrate ammonia. Currently, side-stream treatment is not commonly implemented in the Bay Area.

Anammox-based Processes

Of the side-stream alternatives, anammox-based processes are becoming more commonly implemented. Anammox-based processes use the aerobic nitrification process and the anoxic deammonification process to remove ammonia and nitrogen. Anammox bacteria growth rate is very slow compared to conventional wastewater microorganism growth rates, and as a result, retention of anammox biomass is crucial for process reliability. The two most commonly implemented anammox-based processes are ANITA Mox and DEMON.

The ANITA Mox process, provided by Kruger Veolia, retains anammox biomass growth on plastic media suspended in a flow-through reactor. The ANITA Mox process has been shown to be very effective for side-stream treatment, typically achieving 80 to 90 percent nitrogen removal. Compared with traditional nitrification and denitrification processes, anammox treatment processes use less than half the energy (due to reduced aeration requirements) and do not require an external carbon source or additional chemicals. Sludge production is also typically lower.

An ANITA Mox process would include an equalization tank and ANITA Mox reactor. Given the dewatering facility would not be operated continuously, an equalization tank would be required to provide a steady feed to the ANITA Mox process. The reactor would contain the following equipment: HDPE media (approximately 50 percent of reactor volume), screen assemblies to retain the media within the reactor, medium bubble aeration grids, and submersible mixers. Ancillary equipment to support the reactor would include feed pumps,

aeration blowers, foam suppression pumps, and instrumentation and controls. The reactor tank is assumed to be an open concrete structure.

The DEMON process is a side-stream treatment technology provided by World Water Works. Performance of the DEMON process is similar to ANITA Mox in that 80 to 90 percent removal of nitrogen can be achieved. The main difference between the two processes is that DEMON utilizes a sequencing batch reactor (SBR) process configuration with a cyclone separator to grow and retain the anammox bacteria.

The DEMON process would require the same components as described for ANITA Mox, except a larger equalization tank would be needed and a new DEMON reactor would be constructed instead of an ANITA Mox reactor. The DEMON reactor would contain the following equipment: cyclone with submersible pumps, Messner type aeration panels, a decanter, and submersible mixers. Ancillary equipment to support the reactor would include feed pumps, aeration blowers, and instrumentation and controls.

As mentioned previously, anammox-based processes are relatively new, but are gaining popularity as a side-stream treatment technology. To date, there are two installations and four pilot studies of ANITA Mox in the U.S. and six applications in Europe. The DEMON process is the most common of the anammox-based side-stream treatment technology. To date, there are three installations of DEMON in the U.S. and almost 40 installations in Europe.

Ammonia Recovery Treatment Processes

Another type of side-stream treatment would be an ammonia recovery system. In an ammonia recovery system, the ammonia from the centrate is stripped out of solution and converted into a fertilizer product, typically ammonium sulfate. Ammonia recovery systems are new. ThermoEnergy and Anaergia Inc. are two companies that have developed an ammonia recovery process. Currently, there is an installation of a ThermoEnergy Ammonia Recovery Process (ARP) in New York City.

The ThermoEnergy ARP process uses ion exchange columns with a proprietary resin to remove ammonia from the filtrate/centrate and creates a solution with a high ammonia concentration. This solution is cooled to form zinc ammonium sulfate hexahydrate crystals, which are then roasted to release ammonia gas. This ammonia gas is then sent to a sulfuric acid scrubber to form ammonium sulfate, which can be used as a fertilizer.

With the Anaergia process, the centrate is heated up and also stripped of carbon dioxide to increase the pH (higher temperatures and pH allow more of the ammonia to be stripped from the centrate). The centrate then passes through ammonia strippers. The gas from these strippers contains air, ammonia gas, and water vapor. This gas is then sent to a gas scrubbing unit that uses sulfuric acid to scrub the ammonia from the gas and convert it into ammonium sulfate.

6.7.7.3 Recommendation

As discussed above, if the RWQCB requires the City to treat the additional ammonia load from the dewatering centrate, the City will need to implement secondary treatment upgrades or side-stream treatment improvements. The most appropriate alternative will depend on the magnitude and timing of nutrient removal requirements.

If nutrient removal requirements require nitrification and denitrification of the entire process flow, then major secondary treatment improvements would be required independent of the implementation of the Dewatering Facility. It would be most cost effective to design these secondary treatment improvements to treat the additional ammonia load from the dewatering process. To reduce cost and optimize the secondary process, it is recommended these improvements include a CaRRB basin. For planning purposes, the Facility Plan CIP includes a long-term project (Level 2 Nutrient Removal Improvements as described in Chapter 7) that would provide nitrification and denitrification of the entire process flow.

If nutrient removal requirements do not require nitrification and denitrification of the entire process flow, then implementing a side-stream treatment process would likely be most cost effective. If this is required, the Dewatering Facility project could cost an additional $8 to 10.5 million.

NEAR-TERM PROJECTS

7.1 INTRODUCTION

This chapter summarizes near-term projects that are recommended for implementation in 5 to 10± years. Some of these projects were identified in the 2010 Master Plan as projects that are required to reliably treat current flows and loads. Other projects have been identified by plant staff since the 2010 Master Plan as projects that are important to maintaining safe and reliable plant operations. Other projects were identified through the assessments of this Facility Plan. These projects are considered near-term projects based on the needs determined through the performance, capacity, and condition assessments and regulatory review, which are summarized in Chapters 3, 4, and 5.

The near-term projects include:

- Level 1 Nutrient Removal Improvements
- Thickening Facility.
- Sodium Bisulfite System Replacement.
- Digester Gas Facilities Repair.
- Cogeneration Facility.
- Collection System SCADA Upgrades.
- WWTP SCADA Upgrades.
- 3-Water System Improvements.
- WWTP Lighting Improvements.
- WWTP Street Paving Improvements.
- Site Protection from Rock Slides.
- Seismic Upgrades for Existing Solids Building.
- Low-Lift Effluent Pump Station

For each project, this chapter summarizes the project background and drivers, basis of design, recommendations, and site layouts. Project alternatives were developed and analyzed where pertinent to the future planning (i.e., where alternatives have a significant impact on the overall site layout or project cost). As needed, costs were developed to

compare alternatives. Project costs for the recommended projects are summarized in Chapter 10.

7.2 SITE LAYOUT OF NEAR-TERM PROJECTS

See Chapter 10 for an overall site layout of the near-term projects.

7.3 BASIS OF COSTS FOR ALTERNATIVES ANALYSIS

Refer to Chapter 6 for information on the cost estimating approach used in this chapter.

7.4 LEVEL 1 NUTRIENT REMOVAL IMPROVEMENTS

7.4.1 Background

As discussed in Chapter 4, Level 1 nutrient removal requirements are anticipated to be issued in 2019 and have a compliance date of 2024. Level 1 requirements consist of optimization efforts where nutrient loads are reduced as much as possible with minimal capital investment. The timing and magnitude of the Level 1 nutrient removal requirements are not certain at this time. The achievable levels of reduction would be plant specific and would largely depend on available infrastructure and whether there is excess treatment capacity or tanks that can be modified or operated for nutrient reduction.

For planning purposes, it is recommended the City include a Level 1 Nutrient Removal Improvements Project in the Facility Plan CIP. This project is based on the assumption the Level 1 requirements will require minor upgrades to maximize use of the existing aeration basins for nutrient removal. This assumption and the project scope should be revisited and updated as the Level 1 requirements become more defined and certain.

7.4.2 Basis of Design

This project would include minor upgrades to the existing aeration basins. These upgrades would provide some nitrogen removal during dry weather conditions.

7.4.3 Recommended Improvements

It is recommended that the aeration basins be upgraded so they can operate in a Modified Ludzak-Ettinger (MLE) configuration on a seasonal basis. Operating in an MLE configuration would provide full nitrification (ammonia removal) and partial denitrification (nitrogen removal).

The MLE process is a modification of the current conventional activated sludge process. It includes an anoxic zone followed by an aerobic zone, and an internal recycle of mixed liquor from the effluent end of the aeration basin to the anoxic zone at the front end of the aeration basin. Ammonia is converted to nitrate in the aerobic zone. The nitrate formed in

the aerobic zone is then returned to the anoxic zone for denitrification by the internal recycle of mixed liquor. The amount of denitrification achieved depends on the amount of nitrate recycled, available carbon, and detention time.

Operating in an MLE configuration to provide partial nitrogen removal requires more aeration basin volume and more aeration air compared to the current activated sludge process. As a result, operating in an MLE configuration would only be feasible during low flow and load conditions. Given nitrification occurs more readily at warmer temperatures, operating in MLE mode during dry weather periods is expected to result in full nitrification and some denitrification.

The Level 1 Nutrient Removal Improvements would include:

- Convert Aeration Basins No. 1 and 2 to an MLE process by adding mixed liquor return pumps and piping within the basins.

7.5 THICKENING FACILITY

7.5.1 Background

As stated in Chapter 3, only one of the two DAFTs is functional and available for thickening WAS. The 2010 Master Plan recommended replacing DAFT No. 1 with a gravity belt thickener (GBT). Although the DAFT No. 2 electrical and mechanical equipment are heavily corroded, it is still functional. Therefore, DAFT No. 2 could be left in service as a standby unit. The Master Plan recommended replacing DAFT No. 2 with a GBT when it is no longer economical to operate.

This project is considered necessary in the near-term because the existing thickening system does not meet standard reliability criteria in having standby capacity should DAFT No. 2 go out of service.

7.5.2 Basis of Design

To determine the future flows and loads that would be sent to the thickening facility, sludge flows and loads for current and future conditions were developed. The sludge flows and loads were developed using a BioWin model and the projected plant influent flows and loads presented in Chapter 2.

Table 7.1 summarizes the projected solids flows and loads. These values were used the primary basis for the development and evaluation of the thickening facility improvements.

Table 7.1 Current and Future WAS Production WWTP Facility Plan City of Richmond and Veolia Water				
	2016		2040	
Parameter	ADAL	MML	ADAL	MML
WAS Flow to Thickening, mgd	0.16	0.21	0.23	0.31
WAS Production, dry ppd	7,900	10,700	11,400	15,400
Approximate WAS Solids, percent	0.6	0.6	0.6	0.6

7.5.3 Alternatives Analysis

Two alternatives were analyzed for WAS thickening: GBTs and rotary drum thickeners (RDTs).

7.5.3.1 Gravity Belt Thickeners

GBTs consist of a flocculation tank and gravity belt that moves over rollers. WAS from the secondary treatment process would be conditioned with polymer in the flocculation tank and then distributed evenly across the belt. Free water would drain by gravity from the flocculated WAS through the porous belt as the WAS is conveyed to a discharge point. The thickened WAS would be conveyed to the digestion process. The free water would be conveyed to the headworks.

7.5.3.2 Rotary Drum Thickeners

RDTs consist of a flocculation development tank and a porous rotary drum screen, which is supported by a frame and enclosed with covers. Disc thickeners use a sloped perforated disc with a rotating arm in a covered tank. WAS from the secondary process would be conditioned with polymer and flocculated in the flocculation development tank. The flocculated WAS would then flow to the rotary drum screen. In the rotary drum screen, free water would drain by gravity from the flocculated WAS through the drum screen as the thickened WAS is conveyed to the discharge end of the drum. The thickened WAS would be conveyed to the digestion process. The free water would be conveyed to the headworks.

7.5.3.3 Alternatives Comparison

A comparison of the performance, polymer usage, and power consumption of these two alternatives is shown in Table 7.2. Table 7.3 presents the cost comparison for the evaluated treatment alternatives. Table 7.4 summarizes how each thickened technology meets economic and noneconomic evaluation criteria.

Table 7.2 Performance Comparison of WAS Thickening Alternatives
WWTP Facility Plan
City of Richmond and Veolia Water

Parameter	Units	Gravity Belt Thickener	Rotary Drum Thickener
Thickened Solids	percent	4	4 - 6
Polymer Dose	ppd	10 - 20	5 - 10
Power Consumption(1)	kWh	6.8	8.2

Note:
(1) Power consumption is based on manufacturer supplied hp information, including equipment motors, feed and discharge pumps, a booster pump, and a polymer system.

Table 7.3 WAS Thickening Alternative Analysis
WWTP Facility Plan
City of Richmond and Veolia Water

Item	Gravity Belt Thickener	Rotary Drum Thickener
Number of Units	1	2
Bare Equipment Cost(1)	$200,000	$370,000
Annual O&M Cost(2)		
Power Cost	$3,000	$3,000
Polymer Cost	$62,000	$31,000
Total Annual O&M Cost	$65,000	$34,000
Present Worth O&M Costs(3)	$970,000	$510,000
Life Cycle Cost(4)	$1,170,000	$880,000

Notes:
(1) Bare equipment costs do not include freight, installation, etc.
(2) The annual operating costs for each alternative do not include operating costs for components common to all alternatives. Labor was not included in the O&M costs, since significant variation between alternatives is not expected for those items.
(3) Annual O&M costs are converted to present worth value based on 3 percent inflation rate, 6 percent discount rate, and 20-year analysis period.
(4) Life cycle cost is the equipment cost plus the present worth value of annual O&M costs.

Table 7.4 Evaluation Summary of Dewatering Alternatives WWTP Facility Plan City of Richmond and Veolia Water		
Evaluation Criteria	**Gravity Belt Thickeners**	**Rotary Drum Thickener**
Reliability	0	0
Ease of O&M	0	0
Unattended Operation	0	0
Odor Containment	-	+
System Simplicity	0	0
Power and Polymer Usage	-	+
Flexibility	0	0
Site Efficiency	-	+
Net Present Value	-	+

Note:
(1) Legend: + Better; 0 Neutral; - Worse.

Based on this analysis, it was determined that RDTs would be the best alternative for thickening WAS. RDTs are recommended because they have a relatively low life cycle cost and relatively low resource consumption (e.g., energy and polymer use). Furthermore, RDTs are easy to operate, have minimal housekeeping considerations, contain odors well, and have a compact site footprint.

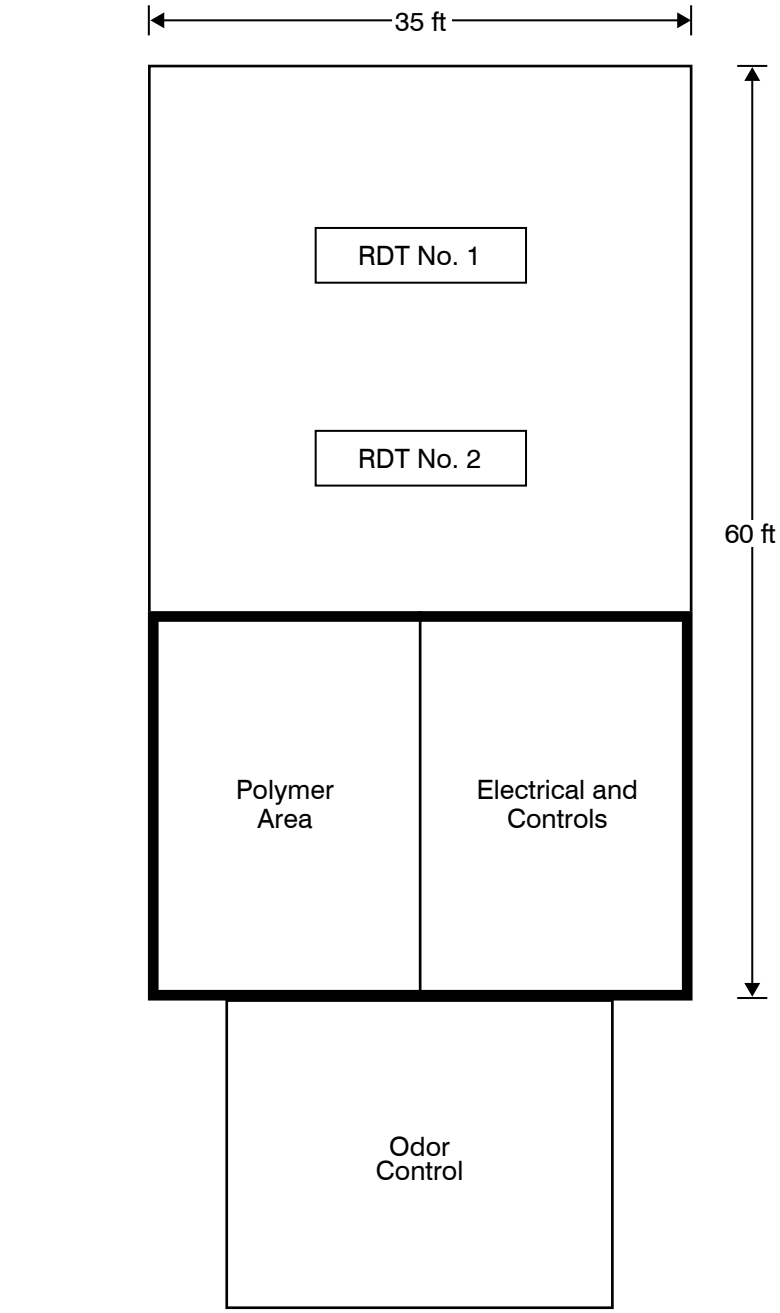
7.5.4 Recommended Improvements

It is recommended the thickening facility be housed on a concrete base slab with a canopy and include the RDTs, thickened WAS pumps, chemical facilities, and an odor control system.

A preliminary layout of the thickening facility is shown in Figure 7.1. Design criteria for the RDTs are presented in Table 7.5.

Table 7.5 Design Criteria for WAS Thickening WWTP Facility Plan City of Richmond and Veolia Water		
Parameter	**Units**	**Value**
Type	-	Rotary Drum Thickener
Number of Units	-	1 Duty + 1 Standby
Capacity, each	gpm	300
Operating Time	hours/day	8
	days/week	5
Typical Polymer Consumption	lb/dry ton	5 to 10
Thickened Solids Content	percent	4 to 6
Typical Solids Capture	percent	95

Note:
(1) Based on Parkson ThickTech RDT unit model RDT300.



THICKENING FACILITY LAYOUT

FIGURE 7.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

rich0616f2-11034.ai

7.6 SODIUM BISULFITE SYSTEM REPLACEMENT

7.6.1 Background

The sodium bisulfite (SBS) system is used to dechlorinate the Richmond and West County effluent prior to discharge to the San Francisco Bay. The Richmond effluent is dechlorinated at the end of the chlorine contact basin, and the West County effluent is dechlorinated at the Confluence Structure. The SBS system consists of two SBS feed pumps and three 10,000 gallon storage tanks.

As stated in Chapter 5, the SBS storage tanks have deteriorated from sun exposure and are in need of replacement. The sodium bisulfite pumps are not reliable and require high maintenance. The interior surfaces of the concrete containment structure have been exposed to chemicals. The SBS yard piping from the SBS tanks to the confluence structure is suspected to be in poor condition and in need of replacement.

This project is considered necessary in the near-term because the sodium bisulfite facility is in poor condition and is essential to meeting the requirements of the NPDES permit.

7.6.2 Basis of Design

As stated in Chapter 3, the current average SBS dose is 27 mg/L. It was assumed that this dose would continue to be used in the future. Based on this dose, the existing SBS tanks would have 17 days of storage at the projected 2040 MMF (for the WWTP and the WCWD WPCP) and a chlorine residual of 6 mg/L. This is sufficient storage capacity, and therefore, the tanks would be replaced with similar sized units.

The existing SBS system has one feed pump dedicated for the Richmond effluent and one pump for the WCWD effluent. It is recommended that an additional standby pump be installed that can be used to dechlorinate either the Richmond or WCWD effluent to add redundancy to the system. For planning purposes, it is recommended that the project include replacement of all above grade and below grade SBS piping, from the tanks to the injection points. The SBS yard piping is suspected to be in poor condition. All piping should be inspected and evaluated for replacement as part of this project.

It is also recommended that a standby SBS tote be installed near the confluence structure as a backup dechlorination facility. The tote would be manually operated as needed. The tote should be insulated to prevent freezing during cold weather conditions.

A summary of the design criteria for the SBS system is presented in Table 7.5.

Table 7.5 Design Criteria for SBS System WWTP Facility Plan City of Richmond and Veolia Water		
Parameter	**Current (2015)**	**Future (2040)**
Average Annual		
Richmond Effluent Flow, mgd	7.5	9.6
WCWD Effluent Flow, mgd(1)	3.8	5.7
Combined Effluent Flow, mgd	11.3	15.7
Combined Chlorine Residual, mg/L	5	5
SBS Dose, mg/L(2)	27	27
SBS Usage, gpd(3)	570	770
SBS Storage, days(4)	53	39
Maximum Month		
Richmond Effluent Flow, mgd	13.9	17.9
WCWD Effluent Flow, mgd	14.8	17.9
Combined Effluent Flow, mgd	28.7	35.8
Combined Chlorine Residual, mg/L	6	6
SBS Dose, mg/L(2)	27	27
SBS Usage, gpd(3)	1,440	1,790
SBS Storage, days(4)	21	17

Notes:
(1) WCWD ADWF flows are based on sending 5.5 mgd to RARE facility for reuse.
(2) Dose based on 1.47 lbs of sodium bisulfite needed to neutralize 1 lb of chlorine plus 10 percent excess.
(3) Based on 40 percent sodium bisulfite solution.
(4) Storage based on three 10,000 gallon tanks.

7.6.3 Recommended Improvements

The SBS improvements would include the following:

- Three 10,000 gallon SBS storage tanks.
- Three SBS feed pumps.
- Replacement of SBS injectors.
- Replacement of SBS piping (both buried and above grade).
- Standby SBS tote located at the confluence structure.
- Coating on the interior surfaces of the concrete containment structure.
- Replacement of existing ladders with stairs for entry into the containment area.

7.7 DIGESTER GAS FACILITIES REPAIR

7.7.1 Background

Digester gas is currently stored in the headspace of the Dystor covers on top of the digesters and then flared with the three waste gas candlestick flares, which are about 50 years old. These flares are corroded and in need of repair. Currently, only two of these flares are operational. The pilot light on the third flare currently does not work and should be replaced in-kind so that it can be used as a standby flare.

As discussed in Chapter 5, the majority of the above ground digester gas piping is ductile iron and suspected to be corroded from condensation inside of the pipes. As digester gas cools after leaving the digesters, water condenses from the gas. Currently, there are not any condensate and sediment traps to remove this water. Instead, water is removed by a 1-inch condensate drain connected to a drop leg off the main digester gas pipe in the Digester Control Building. The interior diameter of the piping is also suspected to be reduced from mineral scaling and deposition of grease. The buried digester gas piping is polyethylene piping that was installed in 2009. This piping is assumed to be in good condition.

This project is considered necessary in the near-term because the above-grade digester gas piping is in poor condition and conveying digester gas to the flare is essential for compliance with the WWTP's air permit and overall site safety.

7.7.2 Recommended Improvements

It is recommended the replacement of the digester gas piping and repairs to the waste gas flares be implemented in two phases.

7.7.2.1 Phase 1 - Digester Gas Facilities Repair

All of the existing above ground digester gas piping should be replaced in-kind with stainless steel piping. Condensate and sediment traps should be installed on the digester gas piping at each of the two digesters. These traps would more efficiently remove water from the gas than the current condensate drain. The traps also have the additional benefit of separating out entrained solids from the gas stream.

It is assumed below-grade piping is currently in good condition and would be in good condition when this project is implemented. As a result, replacement of that piping is not included in this project. This should be verified as part of preliminary design.

Replacing the existing flares would require approval from the BAAQMD and trigger a new air permit. In addition, the candlestick type of flares is no longer approved, so a new enclosed flare would be required. However, repairing and replacing components with identical components, without increasing the capacity of the flare, should not require a new air permit.

It is recommended that the flares be repaired since it should not trigger a new air permit. The repairs should be made in about 5 years. The flares are adequately functional, but it is recommended the flares be repaired at the same time as the digester gas piping so the improvements are coordinated. The flare stack and wind shroud are both corroded and should be replaced with identical components. The pilot light and piping on the third flare should be replaced with identical components to provide a standby flare.

7.7.2.2 Phase 2 - Waste Gas Flare Replacement

The condition of the gas pilots and burners should be assessed during the repair project to determine if they need to be replaced in a future project. Given burners are almost 50 years, they are beyond their expected useful life and could fail. Given their age, it is unlikely that an identical replacement burner would be available.

Therefore, it is recommended that the flares be replaced with new enclosed flares within the next 10± years.

7.8 COGENERATION FACILITY

7.8.1 Background

Digester gas produced by the anaerobic digestion process is currently used to fuel boilers that heat the digesters and the excess gas is flared. This excess digester gas is a valuable resource that can be used to produce power. Cogeneration systems use digester gas to generate electricity and useable heat. The sizes and costs of these facilities depend on the amount of digester gas available. For this reason, the WWTP's digester gas production was estimated in order to establish a preliminary cogeneration power production capacity.

The 2010 Master Plan analyzed cogeneration options and recommended building a 600 kW fuel cell system. At the time of this analysis, digester gas production was analyzed and determined to be quite low. Digester improvements were recommended to increase gas production. The cogeneration facilities were sized based on a theoretical gas production, once digester improvements were completed, of 161,000 standard cubic feet per day (scfd).

Since 2010, the following digester improvements have been made: Dystor covers were installed on both digesters, two new digester mixing pumps, new heating building with two boilers and heating loops, three new heat exchangers, and associated piping and electrical improvements. As a result of these improvements, digester gas production has increased. However, gas production is still significantly less than 161,000 scfd.

Although the 2010 Master Plan recommended implementing this project in the near-term, this project is recommended for implementation in 10 to 20± years. The economic benefit of implementing cogeneration is less than what was projected in the 2010 Master Plan. This is primarily because the gas production rates are estimated to be lower based on recent operating data and digester gas improvements. Given the economic benefit is not as great,

this project could be implemented after other projects that are more critical to process performance and plant safety are implemented. This project could be implemented to meet sustainability goals in that it maximizes use of onsite resources and reduces overall electricity usage.

7.8.2 Basis of Design

As part of the Facility Plan, the WWTP's digester gas production was estimated in order to establish a preliminary cogeneration power production capacity. Historical gas production and sludge flow data from 2012 to 2015 was examined. However, both flow meters are old and are not routinely calibrated. Through this analysis, it was determined that both the gas flow meter and primary sludge flow meter are likely recording artificially low values, which is also consistent with feedback from plant staff.

Gas production was calculated based on historical VSS concentrations, adjusted primary sludge flows, TWAS flows, digested sludge flows, and an assumed gas production rate of 12 cf/lb VSS destroyed. It is assumed the current average gas production is 92,000 scfd. This is a reasonable assumption based on comparable wastewater treatment facilities. It was assumed annual gas production would increase 1 percent per year based on the flow and load projections included in Chapter 2. (Flow and loads are anticipated to increase at 1.3 percent per year. For conservative analysis of the cogeneration alternatives, it was assumed gas production would increase at 1 percent per year).

Based on the estimated gas production, a 335 kW facility was selected to evaluate the economics of a cogeneration system.

As discussed above, digester gas is currently used to fuel boilers that heat the digesters as required for anaerobic digestion. The cogeneration facility would be designed to produce enough heat to meet average heating demands of the digestion process. The boilers should remain in place and would be powered by natural gas if peak heating demands cannot be met by the cogeneration system or if the cogeneration facilities are out of service.

7.8.3 Cogeneration Technologies

Three technologies were considered for utilizing digester gas for cogeneration: reciprocating fuel cells, microturbines, and engine generators. As discussed, below, reciprocating engine generators were determined to be the most appropriate technology for the WWTP and were selected for further evaluation.

7.8.3.1 Fuel Cells

A fuel cell is an electrochemical device that combines hydrogen from the digester gas and oxygen from the air to produce electricity and usable heat. Fuel cells are similar to batteries except they do not need to be recharged and can produce electricity as long as fuel is supplied. Originally, fuel cells were developed for operation with natural gas. More recently, digester gas, scrubbed almost to the quality of natural gas, has been used for fuel cells at

wastewater treatment facilities. Emissions from fuel cells are extremely low, and they typically do not require an air permit to operate.

Fuel cells do have some drawbacks. They need to be taken out of service every 18 months for maintenance and parts replacement. Fuel cells also require a gas conditioning system to remove contaminants from the digester gas and to convert the methane in the gas to hydrogen. These gas scrubbing systems, critical for the fuel cells' reliability, can be the weak link, depending on the quality of the digester gas. Finally, the fuel cell stacks last only five to seven years, leading to significant periodic costs that detract from economic viability.

Although fuel cells provide less heat than reciprocating engines, they produce electricity much more efficiently. Typically, their overall efficiency is approximately 69 percent, with 47 percent converted to electricity and 22 percent converted to recoverable heat. However, during winter months, when not enough waste heat is available, natural gas is required to supplement the digesters' heating demands.

Generally, fuel cells have a higher capital cost than reciprocating engines. Given the lower overall efficiency, higher capital cost, and periodic need to replace the fuel cell stacks, fuel cells were eliminated from further consideration.

7.8.3.2 Microturbines

Microturbines are small gas turbines that operate at very high speeds to produce power and heat. They produce low emissions, typically below the threshold for an air permit. Similar to fuel cells, microturbines require a conditioning system to remove contaminants from the digester gas. Their overall efficiency is usually around 58 percent, with 29 percent converted to electricity and 29 percent converted to recoverable heat. Thus, their overall efficiency is significantly lower than that of reciprocating engine generators and fuel cells, and they have very high capital costs. For these reasons, microturbines were excluded from further evaluation.

7.8.3.3 Reciprocating Engine Generators

Reciprocating engine generators are comprised of an internal combustion engine and an electrical generator. The engine can be fueled by diesel, natural gas, propane, or digester gas. The electrical generator converts the shaft power of the engine into electricity. Exhaust heat from the unit can also be recovered in heat exchangers to heat digesters and other spaces in buildings. The overall efficiency of reciprocating engines, as a percentage of fuel input energy, is about 76 percent. Of that amount, 34 percent is converted to electricity and 42 percent is converted to recoverable heat.

To lower the risk of engine fouling and to meet air quality permit limits, a gas conditioning system would be required to remove contaminants from the digester gas. The conditioning system would consist of three major components: hydrogen sulfide (H_2S) removal, gas compression (including moisture removal, compression, and heat exchange system), and

siloxane removal. It should be noted that gas conditioning systems are fairly complex and require periodic maintenance to resupply the scrubbing media.

Internal reciprocating engines are recommended over fuel cells and microturbines because they have higher efficiency and lower capital cost.

7.8.4 Alternatives Analysis and Recommendation

Two alternatives were considered in this cogeneration analysis:

- **Alternative 1:** Construct a 335 kW cogeneration facility with reciprocating engine generators in a building.
- **Alternative 2:** Construct a 335 kW cogeneration facility with reciprocating engine generators in a stand-alone generator enclosure.

The economic analysis of these two alternatives is summarized in Table 7.6. The second alternative has a lower capital cost and a smaller footprint, but due to the limited space of a shipping container, the O&M effort can be more difficult and costly. However, even with higher O&M costs, the expected payback period for Alternative 2 is less than Alternative 1. Appendix I summarizes the estimated annual savings and operational costs for the cogeneration facility.

Table 7.6 Cogeneration Alternative Analysis
WWTP Facility Plan
City of Richmond and Veolia Water

Item	Alternative 1: Building	Alternative 2: Stand-Alone Enclosure
Average Net Power Generated, kW	286	286
Project Cost(1)	$6,130,000	$4,910,000
25-Year Average Annual Savings/(Costs)		
O&M for Engine and Gas Scrubbing	($102,000)	($122,000)
Natural Gas	($51,000)	($51,000)
Electricity Savings	$549,000	$549,000
Green Power Credit	$18,000	$18,000
Average Annual Savings	$414,000	$394,000
Payback Period, years(2)	**21**	**16**

Notes:
(1) The total project cost was distributed over 20 years based on a loan with a 6 percent interest rate and 3 percent inflation.
(2) Payback period is calculated based on the assumed loan payback period, interest rate, and inflation rate. See Appendix I for the detailed analysis of the payback period.

The amount of grant funding that would be available in the future at the implementation of this project is unknown. Grant funding for cogeneration projects is expected to be reduced

and be more competitive in the future. Therefore, this analysis assumed that no grant funding would be available.

Given the long payback period of both alternatives, a cogeneration facility project is a lower priority project. It should be implemented after projects that are critical to the overall reliability and safety of the treatment facility.

Cogeneration should only be considered further if there is a driver other than cost savings, such as a desire to discontinue flaring of digester gas. If the City chooses to go forward with a cogeneration project, the digester gas and primary sludge flow meters should be replaced. After replacement of these flow meters, a study should be performed to determine the actual digester gas production. Once the digester gas production is determined, a preliminary design study should be performed to determine the feasibility of a cogeneration facility.

7.9 COLLECTION SYSTEM SCADA UPGRADES

7.9.1 Background

The existing collection system lift station wireless communication system connects 19 sites, including lift stations, tower structures, and other intermediate radio sites, back to the WWTP. As discussed in Chapter 5, the existing wireless communication system suffers from low reliability and signal drops. The City would like to improve reliability of communications between the collection system lift stations and the WWTP.

The existing system is based upon Proxim's 5.0 GHz Ethernet/IP 5054R antenna mounted radio. One of the issues with an antenna mounted radio is that when it locks-up and needs a hard reset or power cycle, a trained technician is needed to climb up to the antenna/radio unit to physically reset it. Further, these radios have been discontinued by the manufacturer and are not available for purchase anymore.

This project is considered necessary in the near-term because the collection system communication system is critical to the routine operation of the collection system lift stations. If the lift stations are not operated properly, the risk of sanitary sewer overflows is increased.

7.9.2 Basis of Design

The new communication system would be designed to function more effectively than the existing system. It would address the two primary issues with the existing system, which include:

- **Terrain**: Neighboring hills present a physical obstruction to radio frequency (RF) signals.

- **Water Bodies**: A number of small to medium sized water bodies exist between various communicating links and because water absorbs RF radiation, it is possible that the existing signals are severely deteriorated due to this phenomenon.

7.9.3 Recommendations

7.9.3.1 Summary of Recommended Improvements

It is recommended that the existing 5.0 GHz Proxim radio based communication system be phased out to be replaced by a cellular radio communication system. As described below, the advantages of this type of system outweigh the disadvantages.

- Advantages of cellular communication system:
  - Constant reliable communications. City-wide network coverage by various cellular providers ensures reliable operation.
  - Ease of installation. Minimal conduit work and minimal modifications to the existing towers is anticipated.
  - The cellular service providers are responsible for maintenance of the cellular networks themselves.
  - Remote reset is feasible. Depending on the manufacturer and model of radio selected, it would be possible to remotely reset/power cycle the radios.
  - High speed, high bandwidth data availability.
  - Ability to roll in data costs to the existing cellular data plan used by the City.
- Disadvantages of cellular communication system:
  - There is a monthly data fee associated with each cellular radio.
  - There is reduced security of information because the City's data would pass through the hands of a third party.
  - No control over the wireless network. If the wireless system goes down due to issues at the service provider, there is nothing that the City can do to re-establish communications. The service provider must fix it on their end. Occurrence of this is typically rare.

7.9.3.2 Project Implementation

It is recommended the upgrades to the existing communication system be implemented in two stages to maintain reliable operation of the lift stations. The first stage would confirm and replace the communication system at sites that do not have reliable communications with cellular radios. This includes but is not limited to sites in the worst case locations for radio coverage (Canyon Estates #2, Keller Beach Sub, Ferry Point Base, Brickyard Sub, and Port Sub sites). After the cellular radios installed in Phase 1 have been in operation for one year, the second stage would replace all remaining sites with cellular radios.

7.10 WWTP SCADA AND PLC UPGRADES

7.10.1 Background

As discussed in Chapter 5, the WWTP SCADA and Programmable Logic Controllers (PLCs) are in need of replacement. The SCADA system and PLCs are used to monitor and control plant operations.

The SCADA system includes work stations and a communication network that allows operators to control and monitor the status of all primary plant processes. There are workstations at the maintenance shop area and administration building. The current SCADA software platform is a Rockwell Software RSView32 system. The manufacturer is phasing this product out and significantly reducing support services for this product. Given this, the SCADA system needs to be upgraded.

In addition to the SCADA system software, the SCADA system communication network also needs to be replaced because it does not provide reliable communication between the workstations and the plant processes. The hardwired communication system was damaged due to flooding in pullboxes. It was replaced with a wireless communication system, but the wireless communication system is susceptible to failure and does provide communication to all plant processes.

PLCs located throughout the plant site are used to control and monitor equipment. There are 20 PLCs throughout the plant site. About a third of the PLCs are in poor condition and need to be replaced in the near term (within the next 10± years). About half of the PLCs are in fair condition and would need to be replaced within 10 to 15± years. The remaining PLCs would be replaced as part of other capital improvement projects recommended in the Facility Plan.

There are two network topologies used at the facility, Ethernet and Data Highway Plus (DH+). A site evaluation of the SCADA system was performed, and cables could be recognized in each PCM that belonged to each network.

Replacing the SCADA system and PLCs is recommended because these facilities are essential to the routine operation of the WWTP facilities. If the SCADA system or PLCs do not work or work less efficiently due to reduced manufacturer support, there would be increased risk of permit violations and reduced efficiency in overall plant operations.

7.10.2 Basis of Design

Per City and plant staff preferences, the existing SCADA software system would be replaced with Wonderware. This is a modern SCADA platform. It generally has similar functionally and is historically lower cost compared to other major software platforms. SCADA upgrades to hardware or network infrastructure would be compatible with the Wonderware HMI.

The existing SCADA hardware should be converted from a wireless system to a fiber optic system. The fiber optic system would be a faster more reliable communication system than the existing wireless system. The fiber optic system would be routed through the ductbanks being implemented as part of the Electrical Distribution System Rehabilitation Project, which is anticipated to be completed in 2016.

Improvements to the SCADA and PLCs hardware would be designed to be scalable to allow for incremental upgrades to the system. This would allow PCM cabinets to be replaced on as-needed basis, depending on their condition.

7.10.3 Recommendations

To spread capital costs, it is recommended the WWTP SCADA Improvements be implemented in two phases, which are described below.

7.10.3.1 Phase 1: SCADA Software Upgrade and PLC Replacements

This phase would include installation of new SCADA hardware and development of a Wonderware application to replace the current SCADA application in kind. A new, physically separate SCADA network would be created. A new personal computer would be connected to the SCADA network to provide access to the HMI system.

This phase would also include the replacement of PLCs in poor condition. The project would include replacing the electrical cabinets that house the PLCs and replacing the existing PLCs with PLCs that have an Allen Bradley's ControlLogix and CompactLogix platform. These PLCs are the current generation of controller technology available from Allen Bradley, and the manufacturer offers migration support for the Allen Bradley PLCs currently used at the site.

A fiber optic cable would be routed through the electrical ductbanks being implemented as part of the Electrical Distribution System Rehabilitation Project. The fiber optic cable would connect the new SCADA system to the PLCs throughout the plant.

7.10.3.2 Phase 2: Additional PLC Replacements

This phase would also include the replacement of PLCs that are currently in fair condition.

7.10.4 Project Considerations

7.10.4.1 Assumptions

It is assumed that physical connection to the PLC data used in the existing RSView32 application can be achieved by an Ethernet connection to the existing network rack in the Network Room. No modification of the existing network would be required.

It is assumed that PLCs communicate only with the existing SCADA system and not with other PLCs (Peer to Peer). This could not be determined from the site evaluation.

7.10.4.2 Standardization

Standardization should be considered for some items before these projects are implemented. By developing and following standards early on, all systems would have a similar "look and feel." This would improve the overall quality of the SCADA and PLC automation system. Integration strategy with the SCADA system can be re-used, even though system upgrades and/or PLC replacements may be executed years apart. This results in an improved maintainability of the facility's automation.

For the SCADA software improvements, these items include:

- Screens - Size, background color, header information, basic layout
- Security - Logins, Access limits
- Color - Operational colors, alarm status (acknowledged, cleared, in alarm, warnings)
- Navigation - Menu bars, folder trees, navigation buttons

For the PLC replacements, these items include:

- PLC Type
- Communication Protocols
- Tag name Convention
- Programming Standardization

7.10.4.3 SCADA Architecture

Two alternatives for the SCADA Architecture for Wonderware were evaluated, including:

- Standard SCADA Network Architecture.
- Redundant SCADA Network Architecture (also referred to as "Mission Critical Architecture").

The primary difference between the two alternatives is the Redundant SCADA Network Alternative includes a backup gateway between the operator interface (e.g., a computer) and the PLC. The gateway facilitates communication between the operator interface and the PLC. The redundant gateway is good for overall reliability, but not required.

For the Redundant SCADA Network Architecture, two 19-inch racks would be installed to house all new hardware required. The racks would house the HMI central servers and would be configured in a redundant fashion so that in the case of failure in one rack, the other rack would provide access. The two racks would be in separate physical locations in case of catastrophic failure, ideally this means separate buildings.

For the Standard SCADA Network, the hardware is reduced and only a single new 19-inch rack is required. This reduces the construction cost and software licensing required, but increases the risk of plant downtime as there is no redundancy to the system.

To reduce near-term capital costs, it is recommended a Standard SCADA Network be implemented. Provisions should be included to allow for expanding the system in the future to a Redundant SCADA Network. Project costs included in the Facility Plan CIP are based on a Standard SCADA Network, with provisions for future expansion.

7.10.4.4 Security

The new system should also take into consideration cyber security threats. Regardless if the HMI system is air gapped or not, the network should be designed and treated as if its visible to web. To mitigate these concerns, the following items should be considered (at a minimum):

- Strict firewall access rule sets for allowing outside access to the SCADA network.
- Strict controls on the hardware allowed to connect to the SCADA network.
- Computer management policies that disable unused USB ports.
- Network switch management policies that disable unused Ethernet ports.
- Absolutely no internet access from the SCADA network.

All SCADA software packages on the market have security vulnerabilities. If security is of paramount importance, a detailed study should be performed to further investigate the platforms under consideration. For additional information related to security of SCADA, consult the National Institute of Standards and Technology (NIST) Special Publication 850-32, which recommends a Defense-In-Depth strategy of protection for SCADA networks and contains discussion independent of the platform used.

7.11 3-WATER SYSTEM IMPROVEMENTS

7.11.1 Background

The plant 3W water system consists of two pumps located near the north end of the aeration basins. A backup pump is also located at the chlorine contact basin. The 2010 Master Plan stated that the 3W system has both flow and pressure problems, as well as the solids in the 3W system can cause pump seal problems. The Master Plan recommended replacing the 3W pumps with higher capacity pumps when they reach the end of their useful life.

New 3W pumps were installed in 2015, along with automatic cleaning strainers. These pumps each have a capacity of 1,100 gpm at 195 total dynamic head (TDH).

Based on findings of the condition assessment and discussions with plant staff, the 3W piping does not provide enough pressure and flow to the various 3W demands across the plant (e.g., spray headers in the primary clarifiers).

A project to replace the existing 3W piping system with a new 3W piping system is considered necessary in the near-term to facilitate reliable operations and maintenance of the treatment facilities. This is relatively low-cost project that would provide significant improvements plant wide. Some of the few improvements include, but are not limited to:

- Higher water pressure and flow would allow for more effective surface spray in the primary clarifiers. This would allow the sprays to more effectively direct scum and trash towards the scum skimmer for ultimate removal from the process stream.
- Higher water pressure for future facilities, such as the headworks screenings handling and grit handling equipment. Higher water pressure would allow for better cleaning of screenings and grit and therefore, reduced odors.
- Higher water pressure at hoses would allow for more effective cleaning of process areas.

7.11.2 Basis of Design

The new 3W system should be designed to accommodate both current and future 3W demands. The major current and future 3W demands are summarized in Table 7.7. Current 3W demands were developed from data listed in the WWTP O&M manuals and industry standard values for spray water. Future 3W demands were developed based on the facility improvements recommended in this Facility Plan, equipment manufacturer data, and industry standard values for spray water.

The current 3W distribution system supplies all of the major process areas. This project would include replacing the existing 3W pipes to provide 3W to the existing facilities. The piping should be adequately sized to accommodate future 3W demands and be configured to allow for easy expansion of the system to provide 3W to future facilities.

As shown in Table 7.7, the existing 3W pumps have sufficient capacity for future 3W demands. An analysis of the distribution system indicated that the pumps can also provide sufficient pressure (40 psi) throughout the system.

Table 7.7 Current and Projected 3W Demands WWTP Facility Plan City of Richmond and Veolia Water		
Process Area	**Demand (gpm)**	
	Current	**Future (2040)**
Influent Pump Station/Headworks	45	70
Grit	-	34
Primary Clarifiers	580	580
Aeration Basins	580	330(1)
Secondary Clarifiers	150	150
Disinfection	160	160
Thickening	-	36
Digestion	-	-
Dewatering	-	100
Odor Control	-	52
Total	**1,515**	**1,460**

Notes:
(1) Based on installing new spray nozzles at the end of each basin and removing the nozzles along the entire length of the basin.

7.11.3 Recommended Improvements

The 3-Water System Improvements would consist of replacing the entire 3W distribution system piping. It is recommended the piping be sized for future 3W demands presented in Table 7.7.

It is assumed installation of new 3W pipe to extend to future facilities would be implemented as part of the future facilities projects (e.g., the Level 2 Nutrient Removal Improvements would include 3W yard piping to convey 3W to the new aeration basins).

7.12 WWTP LIGHTING IMPROVEMENTS

7.12.1 Background

Since the 2010 Master Plan, it has been determined the lighting system at the WWTP is inadequate and in need of upgrades. As discussed in Chapter 5, there are several areas around the WWTP that are not well lit at night, which causes a safety hazard for plant staff. The lighting system includes lights along the major roadways and process areas; however, most lights do not work. In addition to this, there is no perimeter lighting at the WWTP. As a result, plant staff cannot easily spot intruders at night, and there have been instances of intruders entering the plant site in recent years.

A project to replace to upgrade the existing lighting system is considered a necessary near-term project to improve the overall safety of plant staff.

7.12.2 Recommended Improvements

It is recommended the lighting system be upgraded in phases. The first phase should include low-cost improvements that can be implemented to provide a noticeable improvement in overall visibility at night. Subsequent phases could be implemented in 10 to 20± years to expand and provide significant improvements to the existing lighting system. These improvements would be more extensive and costly. As a result, it is recommended they be implemented after other projects that are critical to the overall reliability of the treatment process are implemented.

It is assumed lighting of future facilities would be implemented as part of the future facility projects.

7.12.2.1 Lighting Improvements - Phase 1

It is recommended the first phase of lighting improvements include repairing non-functioning lights in the roadways and process areas. This is a relatively low-cost improvement that would improve lighting throughout the site. This should be implemented in the next 5 to 10 years. Some lights would require the replacement of light bulbs, other lights would require new light poles.

Figure 7.2 depicts the site lighting system after the Phase 1 improvements are made.

7.12.2.2 Lighting Improvements - Phase 2

It is recommended the second phase of lighting improvements include replacing the entire lighting system in the roadways and process areas. The new lighting system would include more light fixtures and high efficiency LED lights. More light fixtures would be provided in the process area to provide better lighting of the facilities.

Figure 7.3 depicts the site lighting system after the Phase 2 improvements are made.

7.12.2.3 Lighting Improvements - Phase 3

It is recommended the third phase of lighting improvements include installing light fixtures at the plant perimeter to provide lighting up to the existing fenceline of the WWTP.

Figure 7.4 depicts the site lighting system after the Phase 3 improvements are made.

7.13 WWTP PAVING IMPROVEMENTS

7.13.1 Background

As part of the condition assessment conducted as part of this Facility Plan, it has been determined there are portions of the pavement at the WWTP that are in poor condition. A majority of the pavement that is in poor condition is located along the main route through the plant that is heavily used and used by large trucks. These large trucks include trucks conveying chemical to the chemical storage tanks, as well as City trucks and buses that are washed out and cleaned in the open space located at the south end of the plant.

A figure illustrating the condition of the pavement is included in Chapter 5 as part of the condition assessment. Figure 7.5 illustrates the main route through the plant that is heavily used and used by large trucks.

A project to replace the portions of the pavement at the WWTP that are in poor condition is considered a necessary near-term project to improve the overall condition and operability of the plant roadways. This would improve driver safety around the plant site and prevent the development of potholes which ultimately prevents damage or excessive wear of City vehicles.

7.13.2 Recommended Improvements

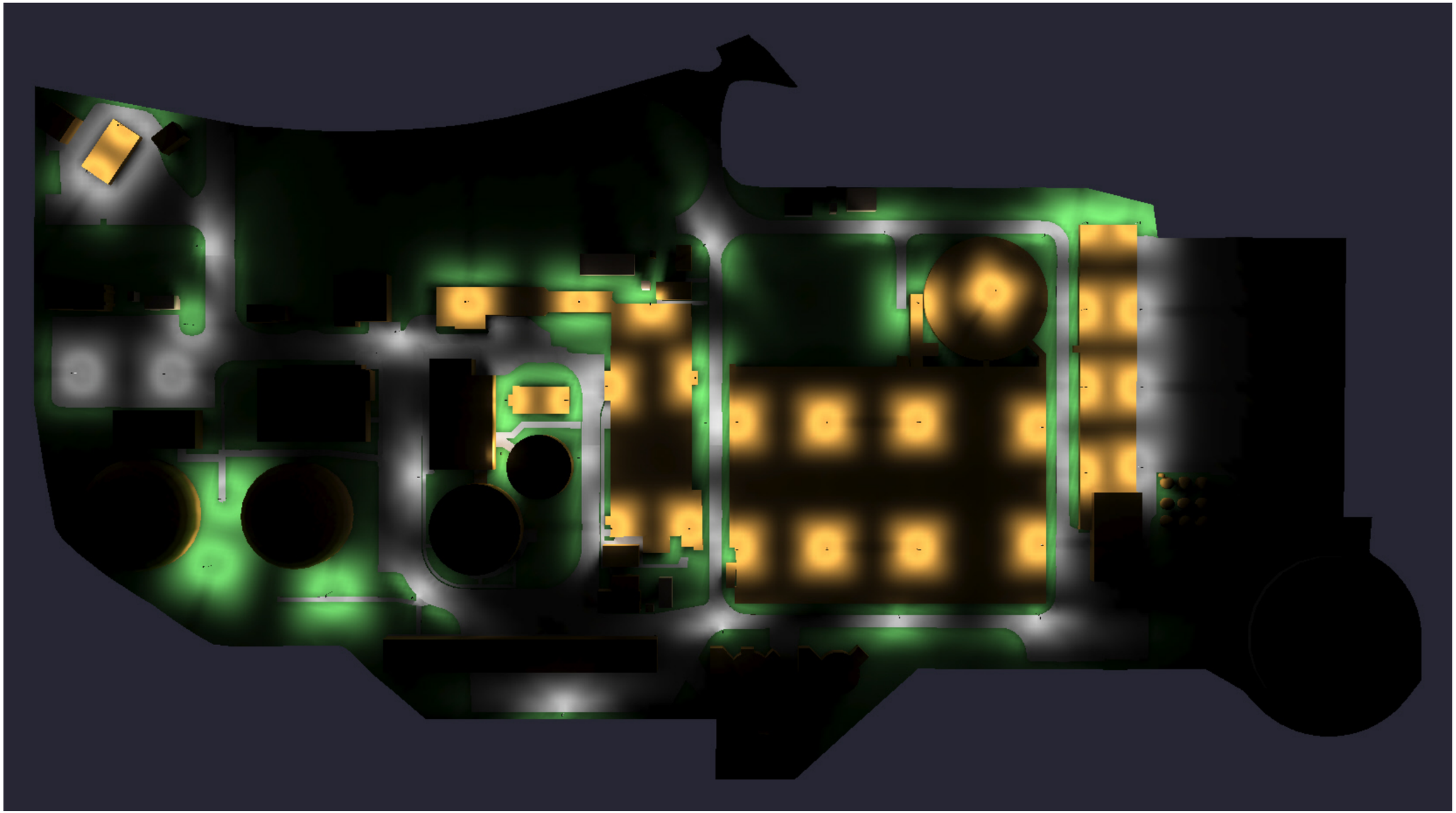
The recommended areas for pavement replacement are shown in Figure 7.5. It is assumed paving required for future facilities would be implemented as part of the future facility projects.

7.14 SITE PROTECTION FROM ROCK SLIDES

7.14.1 Background

The west side of the WWTP is located at the base of a hill, and boulders occasionally roll down the hill and break through the fence. These boulders represent a potential hazard to plant staff and could cause damage to structures located on the west side of the plant, such as the confluence structure and maintenance shop. The 2010 Master Plan recommended implementing a rock-restraining fence on the west side of the plant to protect staff and equipment from falling rocks.

A project to implement a wall to project the site from rock slides is considered a necessary near-term project to improve the overall safety of plant staff and to protect WWTP facilities from damage.



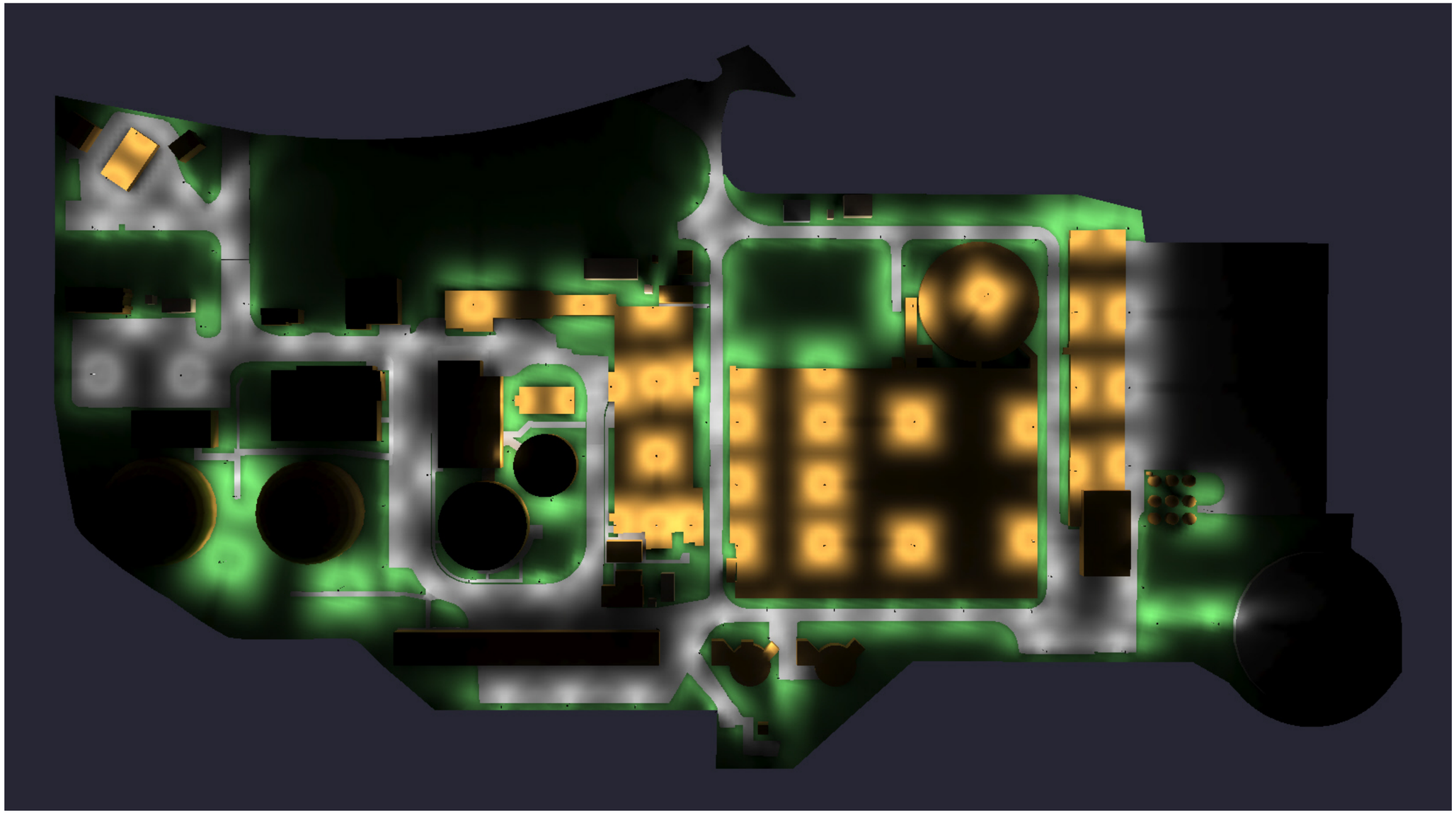
PLANT LIGHTING SYSTEM AFTER PHASE 1 IMPROVEMENTS

FIGURE 7.2

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f28-11034.ai



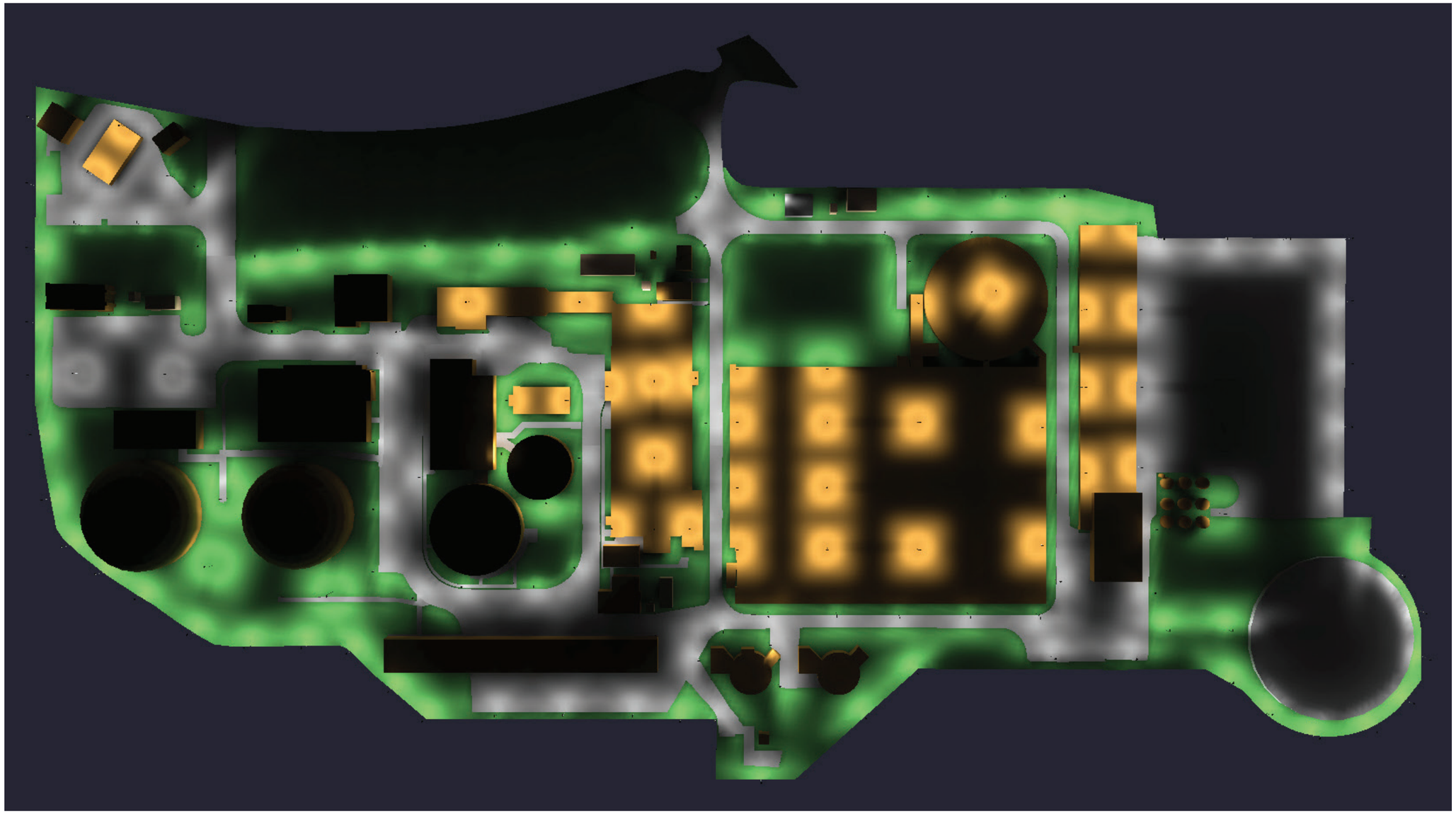
PLANT LIGHTING SYSTEM AFTER PHASE 2 IMPROVEMENTS

FIGURE 7.3

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f34-11034.ai



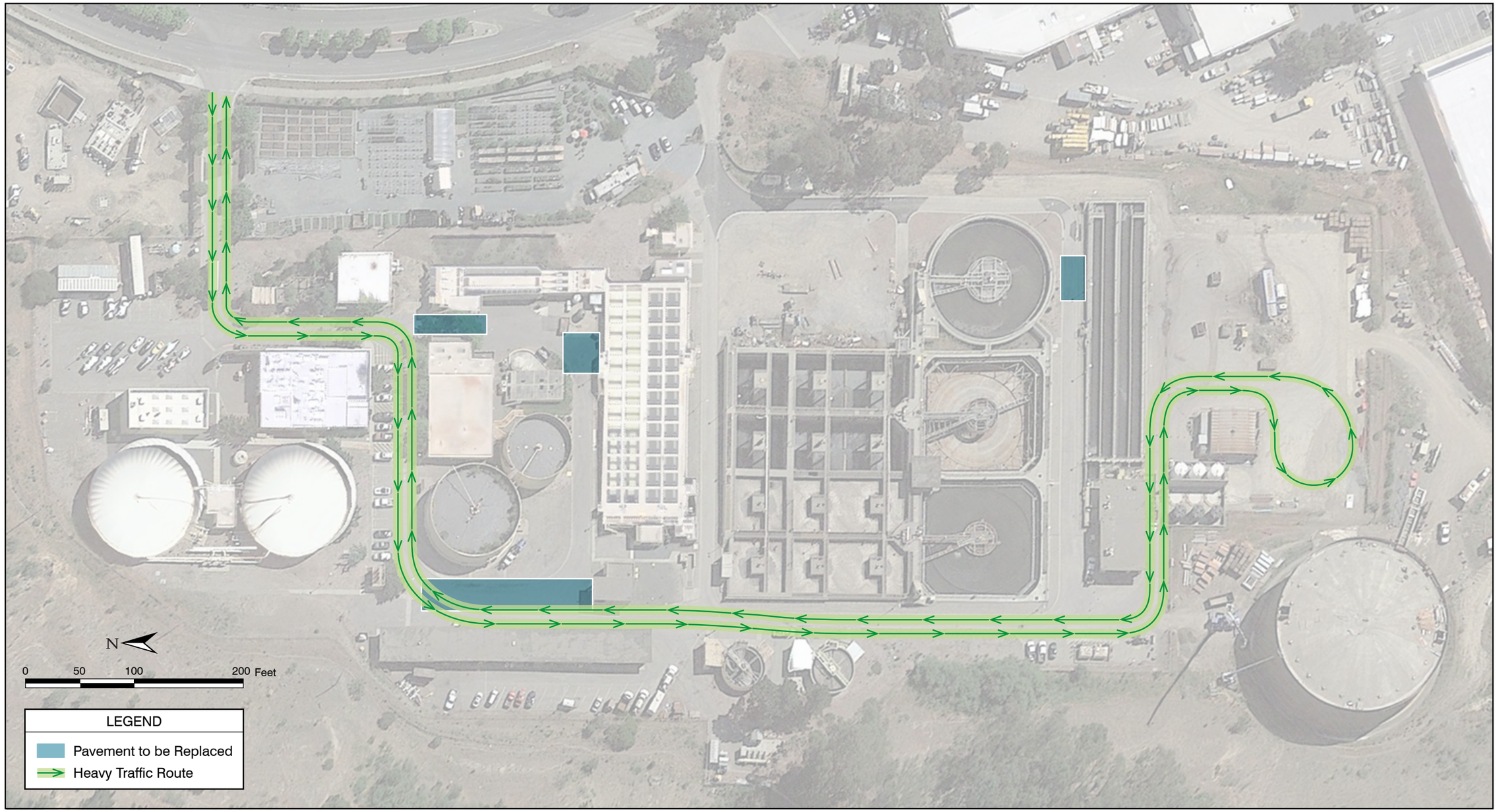
PLANT LIGHTING SYSTEM AFTER PHASE 3 IMPROVEMENTS

FIGURE 7.4

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f29-11034.ai



PAVEMENT REPLACEMENT

FIGURE 7.5

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f17-11034.ai

7.14.2 Alternatives Analysis

Three alternatives were looked at for protecting the WWTP site from rock slides: catchment area, wire/cable mesh drapery, and barriers.

Using a catchment area would consist of creating a ditch at the bottom of the hill to contain the rocks. The width of the catchment is determined based on the design percentage of rockfall contained and the height of the hill. The width increases as the percent contained increase and the height of the hill increase. The hill by the WWTP is tall and steep, and there is not enough space available onsite to construct a catchment area. For example, per Caltrans design criteria, a hill about 80 feet tall requires a catchment area of 50 feet to contain 80% of falling rocks; the hill adjacent to the plant is approximately 145 feet tall in comparison. Given there is limited site space on the west side of the plant, catchment areas were eliminated from further consideration.

Wire or cable mesh drapery could be used to cover the hill and control the fall of rocks into a catchment area. Anchored wire or cable mesh drapery could also be used to retain rocks on the slope. It was assumed that place a mesh drapery on the hill would be very difficult to implement from an environmental perspective. The permitting process is anticipated to be extensive and mitigation measures to offset environmental impacts could be costly. As a result, mesh drapery was also eliminated from further consideration.

Barriers can be used to stop falling rocks. There are two main types of barriers: rigid and flexible. Rigid barriers would consist of a concrete wall, but they are susceptible to shattering when hit by a rock. Flexible barriers are made from cables or nets that deform when they are hit by a rock. It is recommended a barrier be implemented at the plant site because it has relatively small footprint, can be implemented within the plant boundaries, and does not have significant environmental impacts.

7.14.3 Recommended Improvements

It is recommended that further analysis of the two barrier options be performed in a predesign report. For planning purposes, it was assumed that a concrete wall would be built and would be contained within the existing plant perimeter.

The location of the wall is shown on the site layout in Chapter 10.

7.15 SEISMIC UPGRADES FOR SLUDGE CONTROL BUILDING

7.15.1 Background

The existing Solids Handling Building is currently underutilized. It houses two air compressors which are used to support plant operations, but otherwise does not house any other facilities used for maintenance or operations.

An analysis was performed to determine if the Solids Handling Building could be used to house the future dewatering facilities or other future facilities. The analysis includes a seismic evaluation of the building with respect to current seismic codes.

7.15.2 Building Analysis

The Solids Handling Building is not recommended to house the future dewatering facilities because dewatering buildings are typically designed to be 20 to 25 feet tall, and the existing SHS building is only 15 feet tall.

Major modifications would be required to upgrade the building to meet current seismic codes. Modifications would include demolishing about 25 percent of the existing building area, because it is a higher elevation than the rest of the building. This portion of the building has a higher elevation because it was formerly used to house a solids storage hopper that has since been demolished. Demolition of this portion of the building would require a new exterior wall along the eastern side of the building. In addition this this, interior shear walls and footings and roof collectors would need to be constructed. The shear walls limit the space available for future equipment and would impact efficient use of the building space. There are utility trenches below the building floor that are full of piping and utilities, some of which are still in service. These trenches would likely make the retrofit design complex.

Given the seismic improvements would be extensive, it is recommended the building not be re-purposed such that a seismic retrofit would be required. Therefore, the building could be demolished to free up site space or used without seismic upgrades for storage. If demolished, both the SHS Building and the abandoned elutriation tanks located adjacent to the SHS Building could be demolished as part of the Dewatering Facility Project or a future biosolids post-processing project. Demolition of the SHS Building and Elutriation Tanks would require re-routing of process piping and utilities located in and around these facilities. For planning purposes, to minimize near-term capital costs, it is recommended the SHS Building and Elutriation Tanks be demolished as part of a future biosolids post-processing project when site space is needed.

7.16 LOW-LIFT EFFLUENT PUMP STATION

7.16.1 Background

As discussed in the hydraulic capacity assessment in Chapter 3, to avoid adverse impacts to the treatment process, the maximum flow through outfall during high-tide conditions should be limited to 35 mgd. Given flows regularly exceed 35 mgd during wet weather events, a solution to this hydraulic condition is required.

In addition, due to projected rises in the base sea level in the future from climate change, the outfall hydraulic capacity will decrease with time.

To address this hydraulic limitation, a low-lift pump station could be installed at the confluence structure. The low lift pump station would only operate when the water level in the confluence structure is high.

This improvement should be implemented in the next 10± years. This improvement would eliminate submergence of the secondary clarifier weirs, which adversely impacts secondary clarifier performance and could result in NPDES permit violations.

7.16.2 Basis of Design

The low-lift pump station would be designed to operate only when water levels in the confluence structure rose above a certain level. The low-lift pump station would provide enough capacity to pump up to 62 mgd under maximum tide conditions. This is the maximum capacity of the outfall under maximum tide conditions. WCWD could discharge 21 mgd, which is the permitted wet weather capacity of the WCWD WPCP. Richmond could discharge 41 mgd, which is greater than the estimated maximum daily flow at the plant.

7.16.3 Recommended Improvements

Improvements would include a low-lift effluent pump station located near the existing confluence structure.

LONG-TERM PROJECTS

8.1 INTRODUCTION

This chapter summarizes major long-term projects that are anticipated to be needed in the next 10 to 20± years. These are potential projects that could have a significant impact on the overall WWTP site layout and long-term capital improvement costs. Although the primary focus of the Facility Plan is the critical and near-term projects that are anticipated to be needed in the next 10± years, it is important to consider long-term facility needs to ensure site space is used efficiently and capital improvement projects are prioritized appropriately.

This chapter is not a comprehensive overview of all long-term projects that are required at the WWTP. Certain WWTP improvements, such as replacement and rehabilitation (R&R) improvements, will be needed for aging infrastructure. These R&R improvements are discussed at a high level in Chapter 10, which summarizes the recommended capital improvement plan.

Major long-term projects that are discussed in this chapter include those related to meeting anticipated nutrient removal requirements and potential regulatory requirements to eliminate wet weather bypassing.

The long-term projects include:

- Level 2 Nutrient Removal Improvements.
- Level 3 Nutrient Removal Improvements.
- Wet Weather Improvements.

For each project, this chapter summarizes the project background and drivers, basis of design, recommendations, and site layouts. Project alternatives were developed and analyzed where pertinent to the future planning (i.e., where alternatives have a significant impact on the overall site layout or project cost). As needed, costs were developed to compare alternatives. Project costs for the recommended projects are summarized in Chapter 10.

8.2 SITE LAYOUT OF LONG-TERM PROJECTS

See Chapter 10 for an overall site layout of the long-term projects.

8.3 BASIS OF COSTS FOR ALTERNATIVES ANALYSIS

Refer to Chapter 6 for information on the cost estimating approach used in this chapter.

8.4 COMPARISON OF CAS AND MBR FOR NUTRIENT REMOVAL

As discussed in Chapter 4, increasingly stringent nutrient removal requirements are anticipated to be issued over the next 30± years. Treatment processes commonly considered to meet the anticipated requirements include:

- **Conventional Activated Sludge (CAS).** Conventional activated sludge process comprised of aeration basins and secondary clarifiers.
- **Membrane Bioreactors (MBR).** Conventional activated sludge process comprised of aeration basins and microfiltration membranes.
- **Split Flow CAS/MBR.** Separate CAS and MBR treatment trains.

As part of the recycled water feasibility analysis included in Chapter 9, CAS and Split Flow CAS/MBR implementation alternatives were developed and analyzed for nutrient removal and reuse. As discussed in that chapter, CAS and Split Flow CAS/MBR capital costs to produce recycled water are estimated to be about the same; however, Split Flow CAS/MBR capital costs to meet nutrient removal requirements are estimated to be about 20± percent more. The decision to implement CAS or Split Flow CAS/MBR treatment should be evaluated further when the timing, scope, and method of funding a recycled water project is determined and nutrient removal regulations are more defined.

Given there are significant capital improvements required at the WWTP that are essential to overall reliable plant operations, it is assumed improvements to produce recycled water would only be implemented if shown to be financially viable. For example, if recycled water improvements could be funded with grant funding or by recycled water customers. Therefore, the capital improvement plan included in this Facility Plan is based on the lowest cost option for nutrient removal, which is the CAS alternative.

8.5 LEVEL 2 NUTRIENT REMOVAL IMPROVEMENTS

8.5.1 Background

As discussed in Chapter 4, Level 2 nutrient removal requirements are anticipated to be issued in the next 10 to 15 years (2027±) and have an estimated compliance date of 2037±. Level 2 nutrient removal requirements consist of making necessary plant upgrades to achieve the targeted levels of nutrient reduction. It is anticipated the effluent targets being proposed would be based on seasonal averages (i.e., dry season from May through September and wet season from October through April) as opposed to a daily, weekly, or monthly target. This is based on the premise that shorter averaging periods would result in overly-conservative designs that are costly, but offer little or no additional water quality benefit.

The anticipated effluent limits for season averaging periods are as follows:

- Ammonia < 2 mg/L.
- Total Nitrogen < 15 mg/L.
- Total Phosphorous < 1 mg/L.

Improvements to the secondary treatment process would be required at the WWTP to address these regulations.

8.5.2 Basis of Design

The Level 2 Nutrient Removal Improvements would be designed to meet the anticipated effluent limits listed above. It is assumed the facilities would be sized for future 2040 flow and load conditions included in Chapter 2.

8.5.3 Recommended Improvements

8.5.3.1 Ammonia and Total Nitrogen Removal

The anticipated ammonia and total nitrogen limits could be met by using the MLE process. A total of six aeration basins would be required. The existing Aeration Basins No. 1 and 2 would be converted to the MLE process, the equalization basins would be converted to Aeration Basins No. 3 and 4, and two new aeration basins would be constructed. Due to the elimination of the equalization basins, a pipeline would need to be constructed to bypass primary effluent flows greater than 20 mgd around secondary treatment and to the chlorine contact basins.

The aeration basins would be operated at a 7 day SRT and an MLSS concentration of 3,000 mg/L during ADWF and an MLSS concentration of 3,300 mg/L during MMF.

8.5.3.2 Phosphorous Removal

Phosphorus limits could be met by either removing the phosphorus from the liquid stream biologically or chemically. Biological phosphorus removal (BPR) has the advantage of not requiring on-going chemical costs, but requires more space since an anaerobic zone of approximately 10 to 20 percent of the basin volume is required. Additionally, the anaerobic zone would utilize the vast majority of the volatile fatty acids present in the primary effluent and therefore, either the anoxic zones would need to increase in size or a supplemental carbon source would be required to denitrify. Due to limited site space, BPR is not recommended.

Chemical phosphorous removal could be achieved with Chemically Enhanced Primary Clarification (CEPT). CEPT would include adding ferric and polymer to the primary clarifiers to increase the total solids removed in the primary clarifiers. With the increased solids remove, phosphorous concentrations would be reduced to below the limit of 1 mg/L.

CEPT would also increase the amount of BOD that is removed in the primary clarifiers. Given BOD provides the carbon required to support the denitrification process, methanol (an alternate carbon source) would need to be added to the aeration basins to meet the total nitrogen limits.

8.5.3.3 Summary of Major Project Elements

The Level 2 Nutrient Removal Improvements would include:

- Converting the existing Aeration Basins No. 1 and 2 to an MLE process.
- Converting the existing equalization tanks into Aeration Basins No. 3 and 4.
- Construction of Aeration Basins No. 5 and 6.
- One new blower in the Blower Building to meet aeration demands for higher flows and loads.
- RAS/WAS pumping modifications.
- Construction of a bypass pipeline to route primary effluent to the chlorine contact basins.
- CEPT Facility located adjacent to the Primary Clarifiers.
- Methanol Feed Facility located near the Aeration Basins.

8.6 LEVEL 3 NUTRIENT REMOVAL IMPROVEMENTS

8.6.1 Background

As discussed in Chapter 4, Level 3 nutrient removal requirements are anticipated to be issued in the next 15 to 20 years (2037±). The compliance date is uncertain, but would be about 10± years beyond that. Level 3 nutrient removal requirements consist of making necessary plant upgrades to achieve the targeted levels of nutrient reduction. Similar to the Level 2 requirements, the effluent targets being proposed would be based on seasonal averages.

The anticipated effluent limits for season averaging periods are as follows:

- Ammonia < 2 mg/L.
- Total Nitrogen < 6 mg/L.
- Total Phosphorous < 0.3 mg/L.

Improvements throughout the treatment process would be required at the WWTP to address these regulations. Given these improvements would be required in the next 20±

years and the scope and magnitude of the requirements is uncertain, these improvements are not included in the capital improvement plan presented in Chapter 10.

8.6.2 Basis of Design

The Level 3 Nutrient Removal Improvements would be designed to meet the anticipated effluent limits listed above. It is assumed the facilities would be sized for future 2040 flow and load conditions included in Chapter 2.

8.6.3 Recommended Improvements

8.6.3.1 Total Nitrogen Removal

The anticipated total nitrogen limits cannot be achieved in the aeration basins alone. As a result, it was assumed denitrification filters would be required. Denitrification filters are a proven attached growth processes that has been successfully used to achieve nitrogen removal to this level.

The Dravo Corporation initially patented and marketed single media, downflow, deep bed denitrification filters. Since then, the product licenses have since been sold to Tetra Engineered Systems. These filters typically follow secondary clarification and combine tertiary filtration with secondary denitrification. This process requires that nitrification be provided upstream. They also require a source of carbon, usually methanol, be added. This process would provide nearly complete denitrification. Denitrification filters are unique in that they provide both suspended solids removal and nitrogen removal. For planning purposes, a 9,000 sf area on the WWTP site was set aside for future denitrification filters and methanol feed facilities.

8.6.3.2 Phosphorous Removal

The anticipated phosphorous limits are at the limits of current technology. Dentrification filters can be operated to meet total phosphorous (TP) limits as low as 0.15 mg/L. To achieve lower TP limits, metal salts could be added to the influent to the denitrification filters. The salts precipitate the phosphorous out of the process stream. Emerging technologies and alternatives should be evaluated in the future, when the time and scope of the nutrient limits is more certain.

8.6.3.3 Summary of Major Project Elements

The Level 3 Nutrient Removal Improvements would include:

- Denitrification filters, including a methanol feed facility and metal salts feed facility.

8.7 WET WEATHER IMPROVEMENTS

8.7.1 Background

As discussed in Chapter 4, the NPDES permit requires the City to comply with specific tasks to reduce blending of wet weather flows above 20 mgd. Future facilities may be required at the WWTP to minimize blending events.

8.7.2 Basis of Design

To ensure enough site space is reserved for future facilities required to minimize blending events, it is assumed wet weather improvements would need to be sized to completely eliminate wet weather blending events. The treatment process would need to treat a maximum influent flow of 40 mgd. As discussed in the capacity assessment included in Chapter 3, this is the maximum influent flow that can be pumped through the treatment process.

8.7.3 Recommended Improvements

It is recommended the secondary treatment process be optimized and upgraded to provide a wet weather treatment capacity of 40 mgd. This is recommended, as opposed to providing equalization facilities, because equalization facilities would take up significant site space.

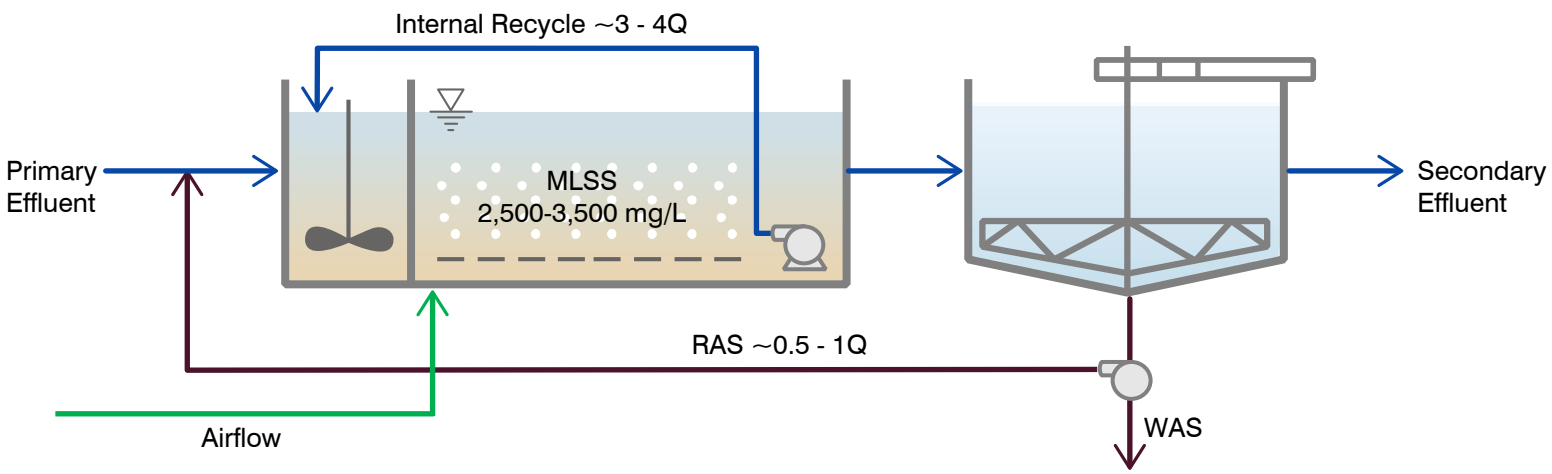
To minimize the aeration basin volume required for treatment, it is recommended the aeration basins be configured to operate in contact stabilization mode during wet weather flow periods. In contact stabilization mode, the solids loading to the secondary clarifiers are reduced. This allows the secondary clarifiers to treat a higher flow. When operating in contact stabilization mode, ammonia and total nitrogen removal is reduced. This is assumed to be acceptable because wet weather periods are typically short and nutrient limits are anticipated to be annual limits (not daily limits).

Figure 8.1 includes schematics of MLE and contact stabilization modes operation. The primary difference between the two modes, is where influent flows enter the basin.

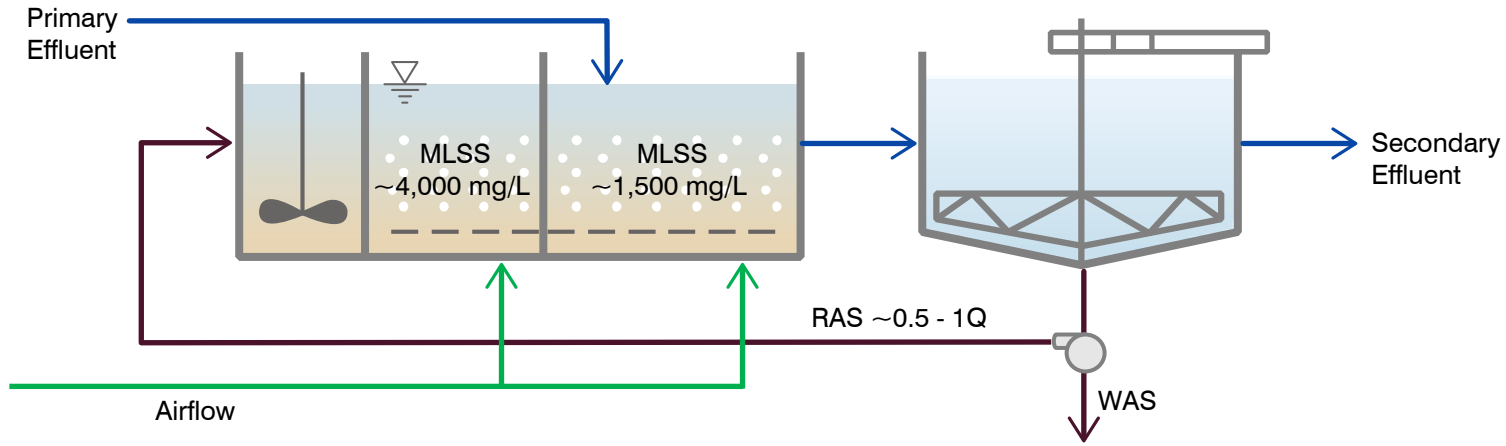
- In MLE mode, the primary effluent and RAS flows enter the influent end of the aeration basins. In addition, mixed liquor is recycled from the effluent end of the basins to the influent end of the basins. In this mode, the MLSS concentration would be about 3,000 mg/L across the aeration basin.

- In contact stabilization mode, RAS flows enter the influent end of the basin; however, primary effluent enters the middle of the basin. In addition, mixed liquor is not recycled from the effluent end to the influent end of the aeration basins. In feeding the process flow this way, the MLSS concentration is higher at the influent end of the basin and lower at the effluent end. The overall MLSS inventory (pounds of MLSS) is the same, but it is concentrated in the upstream end of the basin.

MLE



CONTACT STABILIZATION



MLE AND CONTACT STABILIZATION PROCESS CONFIGURATIONS

FIGURE 8.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f6-11034.ai

For example, if the aeration basins are normally operated at a MLSS concentration of 3,000 mg/L in MLE mode, then the basins could be operated in contact stabilization mode to maintain an MLSS concentration of 4,500 mg/L in the front end of the basin and an MLSS concentration of 1,500 mg/L in the back end of the basin. At an MLSS concentration of 1,500 mg/L and an SVI of 150 mL/g, the secondary clarifiers would have a treatment capacity of 40 mgd.

The secondary clarifiers do not have a hydraulic capacity of 40 mgd. Significant improvements would need to be implemented to accommodate the higher flows. For planning purposes, it is assumed the secondary clarifiers would need to be replaced and hydraulic improvements would need to be implemented to increase the hydraulic capacity of the secondary treatment process to 40 mgd.

8.7.3.1 Summary of Major Project Elements

The Wet Weather Improvements would include:

- Gates and piping located at the aeration basins to allow for contact stabilization operation.
- Demolition of the existing secondary clarifiers.
- Three new secondary clarifiers.

RECYCLED WATER FEASIBILITY STUDY

9.1 INTRODUCTION

This chapter summarizes an investigation into the feasibility of reusing treated effluent from the WWTP by conveying it to East Bay Municipal Utility District's (EBMUD's) water recycling facilities. This analysis was conducted for two purposes: to support decisions regarding implementation of a future recycled water project and to ensure that wastewater treatment objectives and selected WWTP improvements are compatible with the State goal of maximizing water reuse. Alternatives were developed to provide additional treatment to bring WWTP secondary effluent to water quality standards suitable for reuse and to convey the treated effluent to EBMUD water recycling facilities. In addition, the roles, responsibilities, and contractual relationships between various agencies were investigated to identify issues that may impact the successful implementation of a recycled water project.

While significant challenges to WWTP effluent reuse exist, there are specific steps that can be taken now that will facilitate future water recycling projects. However, since the timing, scope, and funding of such projects has yet to be determined, a recycled water project has not been included in the recommended capital improvement plan (Chapter 10).

This chapter includes:

- A description of EBMUD's recycled water program and its facilities located in the vicinity of the Richmond WWTP, including current and projected recycled water demands and water quality requirements.
- An assessment of the technical feasibility of providing treated wastewater from the Richmond WWTP to EBMUD, including an evaluation of alternative methods of improving the quality of Richmond WWTP effluent (especially salinity and ammonia) and a hydraulic analysis of existing and new infrastructure required to convey secondary effluent to EBMUD's reclamation facilities.
- A summary of institutional issues related to the reuse of Richmond WWTP effluent including benefits to EBMUD, West County Wastewater District (WCWD), and other potential partners and interagency issues and agreements required to integrate the City of Richmond facilities into a regional recycled water program.

9.2 EBMUD WATER RECYCLING PROGRAM

For more than 30 years, EBMUD has been providing recycled water to various customers to supplement the drinking water they import from the Mokulemne River. Currently, EBMUD has the capacity to supply as much as 8.6 mgd of recycled water to industrial, institutional,

and commercial customers for a variety of non-potable uses, and they have established a goal to more than double that amount to 20 mgd by 2040. Of particular interest to the City of Richmond, EBMUD treats secondary effluent from the WCWD at two Richmond area recycled water facilities and provides high quality recycled water to Chevron's Richmond Refinery for cooling and boiler operations. Since Chevron's demand for recycled water regularly exceeds WCWD's wastewater flow, the Richmond WWTP could potentially provide additional treated effluent to EBMUD to increase their recycled water supply.

9.2.1 Existing Recycled Water Facilities

EBMUD has two reclamation facilities that receive and further treat secondary effluent. These include the Richmond Advanced Recycled Expansion (RARE) Water Treatment Plant and the North Richmond Water Reclamation Plant (NRWRP), both of which supply recycled water to the Chevron Refinery. A process flow diagram for these two reclamation facilities is shown in Figure 9.1. High quality recycled water is produced at the RARE facility, which uses microfiltration and reverse osmosis to generate water suitable for use as boiler feed water at the refinery.

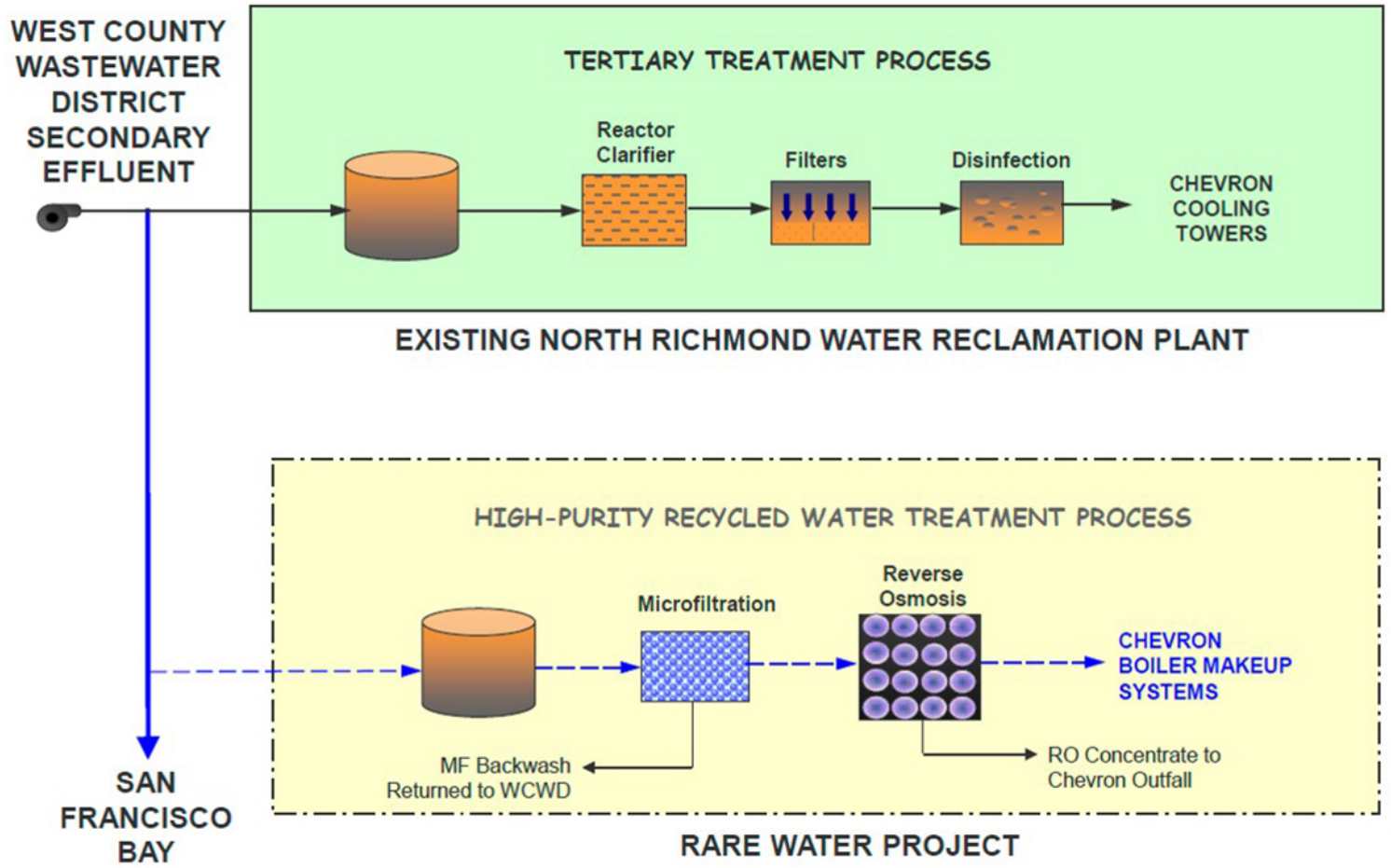
9.2.2 Current and Projected Recycled Water Demand and Supply

Per the Richmond Advanced Recycled Water Expansion (RARE) Agreement between EBMUD and WCWD, EBMUD receives chlorinated secondary effluent from the WCWD WWTP. Per the RARE Agreement, EBMUD is allowed to use up to 12.5 mgd of WCWD's secondary effluent. Since the RARE facility began operating in 2010, a majority of dry weather flows discharged from WCWD have been reused. As stated above, Chevron's current water demands exceed this recycled water supply, so the demand must be supplemented with potable water.

Table 9.1 summarizes EBMUD's existing and projected recycled water demands. As shown, the projected recycled water demand is expected increase to about 10.9 mgd. An additional 4.6 mgd of recycled water would be required to meet this increased demand and entirely eliminate the use of potable water. Even though EBMUD can use up to 12.5 mgd of WCWD's effluent, WCWD's current ADWF is about 8 mgd. Therefore, there is an opportunity for Richmond to provide secondary effluent to EBMUD for reuse.

9.2.3 Current Recycled Water Quality Requirements

Due to the high quality required for the ultimate use of the recycled water, minimum secondary effluent water quality requirements are stipulated by EBMUD. These requirements are presented in Table 9.2.



PROCESS FLOW DIAGRAM OF NRWRP AND RARE FACILITIES

FIGURE 9.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f19-11034.ai

Table 9.1 Current and Projected EBMUD Recycled Water Demand
WWTP Facility Plan
City of Richmond and Veolia Water

Recycled Water Demand	Approximate Average Recycled Water Demand		
		Estimated Future	
	Current (mgd)	Additional (mgd)	Total (mgd)
Chevron Refinery Cooling Towers[1]			
WCWD Effluent	3.5	--	3.5
Potable Water	0.2	--	--
New Secondary Effluent Supply	--	1.6	1.6
Total	**3.7**	**1.6**	**5.1**
Chevron Refinery Boilers[2]			
WCWD Effluent	2.8	--	2.8
Potable Water	0.7	--	--
New Secondary Effluent Supply	--	2.6	2.6
Total	**3.5**	**2.6**	**5.4**
Richmond Country Club[3]			
WCWD Effluent	--	--	--
Potable Water	--	--	--
New Secondary Effluent Supply	--	0.4	0.4
Total	**0**	**0.4**	**0.4**
Total			
WCWD Effluent	6.3	--	6.3
Potable Water	0.9	--	--
New Secondary Effluent Supply	--	4.6	4.6
Total	**7.2**	**4.6**	**10.9**

Notes:
(1) Treated at North Richmond Plant.
(2) Treated at RARE Plant.
(3) Richmond Country Club's recycled water demand is for March through September only.

Table 9.2 RARE Influent (Secondary Effluent) Water Quality Requirements
WWTP Facility Plan
City of Richmond and Veolia Water

Constituent	Value	Sampling Frequency
Ammonia (NH_3-N), mg/L	< 1.0	Continuous
Total Chlorine Residual, mg/L	> 1.0	Continuous
Conductivity, µmhos/cm	< 900	Continuous
Total Dissolved Solids (TDS), mg/L	< 900	Continuous
Total Hardness, mg/L as $CaCO_3$	< 150	Continuous
Silica, mg/L	< 25	Continuous

Note:
(1) Sampling by online analyzer located at the WWTP.

In summary, while effluent from the Richmond WWTP constitutes a convenient source of water that could augment local recycled water deliveries, it exceeds EBMUD's water quality limits for both salinity and nutrients (specifically ammonia). As a result, further assessment of the feasibility of an effluent reuse project will require an evaluation of salinity and nutrient reduction alternatives.

9.3 SALINITY REDUCTION

The influent wastewater to the WWTP contains high levels of salinity. As stated in Chapter 2, the average influent conductivity (a measure of salinity) was 3,400 µmhos/cm, which is significantly higher than the RARE feed water requirement of 900 µmhos/cm. Salinity impacts the load on the reverse osmosis system at the RARE facility. A salinity evaluation was conducted to determine the source of the high levels of salinity. Alternatives were then analyzed for reducing the salinity.

9.3.1 Influent Salinity Data Analysis

Three potential sources were analyzed to determine the source of the high salinity, including: landfill leachate, industrial discharges, and San Francisco Bay water intrusion to the collection system.

9.3.1.1 Landfill Leachate

The WWTP receives an average of 10,500 gpd of leachate with an average conductivity of 15,400 µmhos/cm (2012-2015). Although the leachate has a very high salinity concentration, the amount of leachate treated is relatively small—less than 0.2% of the average daily flow of 7.3 mgd. As a result, during dry weather periods the leachate contributes at most about 30 µmhos/cm to the salinity of the effluent (about 1 percent). During wet weather the contribution to effluent concentration is even more negligible. Given this, the leachate does not have a significant impact on the overall influent salinity.

9.3.1.2 Industrial Dischargers

Salinity data is not available for commercial/industrial dischargers. However, they are not expected to have a significant impact on the overall influent salinity because their discharge flows only contribute about 10 percent of the overall plant influent flows.

Salinity data related to industrial discharge is not currently monitored. However, as shown discussed in Chapter 2, industrial water users discharge about 0.7 mgd, representing about 12% of the total flow of 6.0 mgd (ADWF). Even if one were to assume that the salinity of industrial discharges were as much as 50% higher than domestic discharge, the overall impact on effluent salinity would be less than 10%. Given this, it is assumed the industrial dischargers do not have a significant impact on the overall influent salinity.

9.3.1.3 San Francisco Bay Water Intrusion

To determine if the high influent salinity is due to infiltration of water from San Francisco Bay into the collection system, hourly influent salinity data was collected and analyzed to determine if there is a relationship between tidal cycles and salinity concentrations. Figure 9.2 compares the hourly influent conductivity collected with the hourly tidal water surface elevation over a one-week period from February 18, 2016 to February 26, 2016. The hourly tidal water surface data was from National Oceanic and Atmospheric Administration (NOAA) Station 9414863 Richmond, CA; the elevations were based on the local station datum.

As shown on Figure 9.2, the hourly influent salinity data has a similar trend to the hourly tidal water surface elevation. Maximum daily influent salinity readings occur shortly after the maximum daily tides. Similarly, minimum daily salinity readings occur shortly after the minimum daily tides. Therefore, the high influent salinity is most likely due to large quantities of water from the San Francisco Bay infiltrating into the collection system.

9.3.2 Salinity Reduction Alternatives

Two alternatives were considered for reducing salinity: collection system rehabilitation and tertiary treatment consisting of membrane filtration and reverse osmosis.

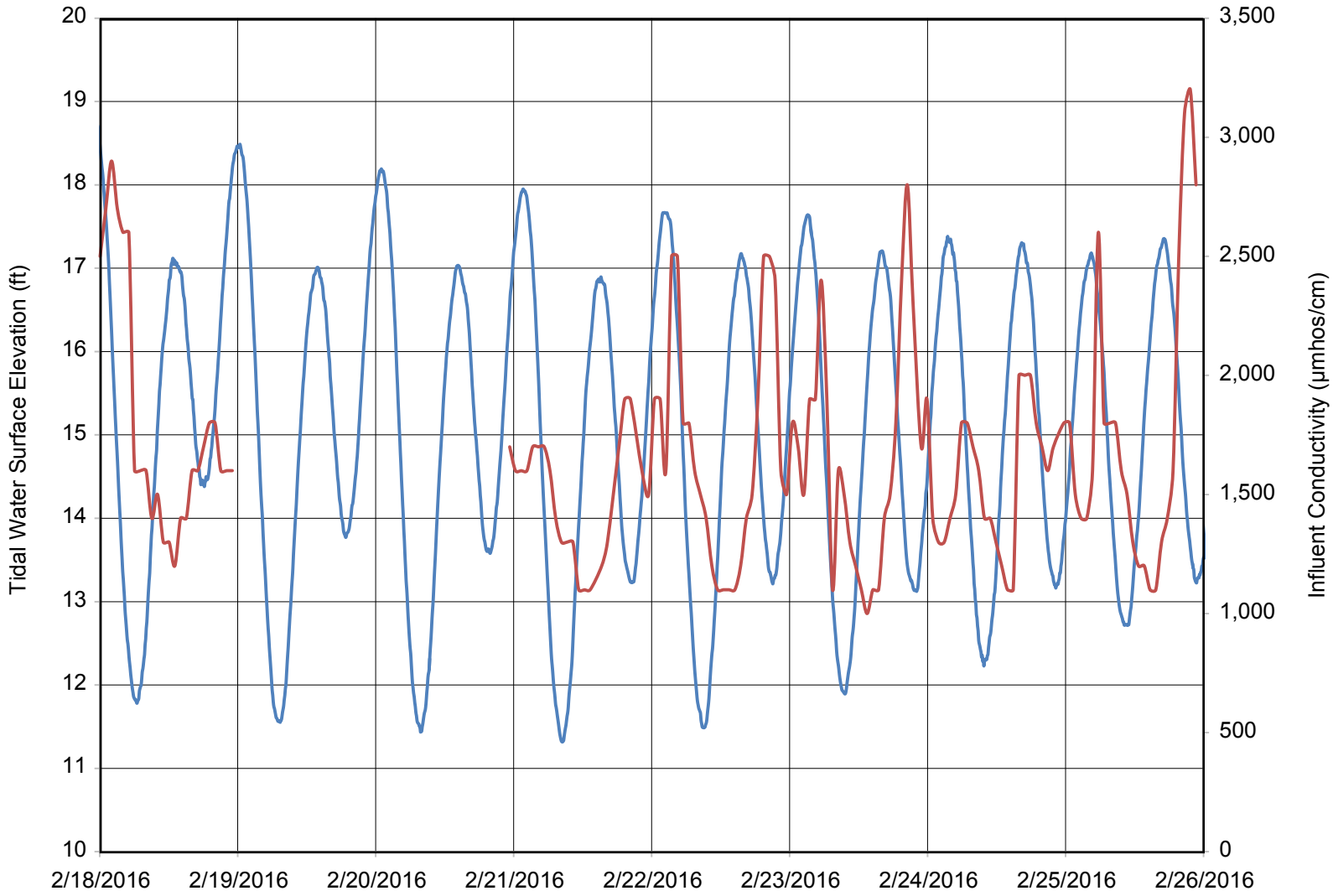
9.3.2.1 Collection System Rehabilitation

Given the high influent salinity is most likely due to the infiltration of water from San Francisco Bay into the collection system, the pipes closest to the Bay could be lined or replaced to reduce the amount of infiltration. These new pipes/liners would reduce the amount of infiltration in the near-term. However, this approach would likely not be a permanent solution because the amount of infiltration would start to increase again as the new pipes/liners age. In addition to this, if sea-level rise occurs, Bay water intrusion is anticipated to worsen.

It is important to note that improvements have been implemented in recent years that have decreased the salinity of the WWTP effluent by more than 25% by reducing the intrusion of Bay water into the collection system. Additional infiltration reduction measures are expected to have a relatively higher capital cost than these initial “low-cost/high-impact” projects. However, further studies should enable the City to identify the full range of benefits associated with such improvements (e.g., water quality suitable for recycled water, reduced WWTP operating costs, deferred cost of WWTP expansion, etc.) and to determine whether these improvements would be cost effective.

9.3.2.2 Advanced Treatment (MF/RO)

The primary technology used to reduce the salinity of water is reverse osmosis (RO). This treatment train is often referred to as “MF/RO” since microfiltration (MF) is normally required upstream of the RO units to remove particulates and prevent fouling of the RO membranes.



LEGEND
NOAA Tidal Water Surface Elevation
Influent Conductivity

HOURLY INFLUENT CONDUCTIVITY AND TIDAL WATER SURFACE ELEVATION

FIGURE 9.2

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f20-11034.ai

As previously stated, the RARE facility provides membrane filtration and RO treatment to further purify secondary treated water from the WCWD facilities to produce up to 3.5 mgd of high purity recycled water for Chevron's boilers. It is important to note, however, the RARE facility is not designed to treat influent water with salinity as high as Richmond's effluent (3,400 µmhos/cm) and does not have capacity to treat an additional 4.6 mgd of recycled water to meet the additional projected demand. Therefore, if EBMUD were to expand the RARE MF/RO facilities sufficiently to allow for further treatment of up to 4.6 mgd of Richmond's treated wastewater at the higher salinity load they could utilize Richmond's secondary effluent to meet all identified future needs. This approach would also provide economies of scale and other advantages due to the presence of supporting infrastructure.

Another alternative would be to treat approximately 3.5 mgd with a new MF/RO Facility located at the Richmond WWTP site. An additional 1.1 mgd of secondary treated effluent from the existing facilities could be blended in with MF/RO permeate to supply EBMUD with 4.6 mgd of treated effluent with an average salinity less than or equal to 900 mg/L (or 900 µmhos/cm, whichever is less). For planning purposes, it was estimated that 17,000± sf of site space would be required for a 3.5 mgd MF/RO facility.

A third option would be for the City of Richmond to build an MF/RO facility at the Richmond WWTP sized to supply the RARE facility with effluent treated to the degree that it can be pumped directly to the Chevron boilers without further treatment to supplement the amount of water not currently available from WCWD to supply the RARE facility. For example, during the past year, EBMUD supplied an average of 0.7 mgd of potable water to Chevron to augment the treated effluent supplies from WCWD to ensure that they were always able to provide adequate water for their boiler system. In this case, a modular system would be constructed that would have the ability to provide treated RO water to the RARE facility which could be directed to Chevron without additional treatment.

It should be noted, the RO process creates a brine that has very high salinity. Brine disposal alternatives should be evaluated when timing, scope, and method of funding a recycled water project is developed. Based on other similar studies, brine disposal could be difficult to permit and could be costly to implement. Brine is often disposed of through deep water outfalls similar to the West County Agency (WCA) pipeline currently used for WWTP effluent. However, addition of brine to the outfall will require an amendment to the City's NPDES discharge permit along with associated costs.

9.4 NUTRIENT REMOVAL

As shown in Table 9.2, secondary effluent supplied to EBMUD's reclamation facilities must have an ammonia concentration of less than 1 mg/L. This low ammonia limit is required because ammonia is corrosive to Chevron's boilers and cooling towers. Note that this requirement for ammonia is significantly lower than the monthly limit of 32 mg/L required by the NPDES permit.

As stated in Chapter 3, the WWTP process does not currently achieve complete ammonia removal (nitrification). On average, only 26 percent of the influent ammonia is removed, resulting in typical secondary effluent concentrations of 20 to 35 mg/L. In order to provide secondary effluent to the RARE facility, the WWTP process will need to be optimized and potentially upgraded to reliably achieve full nitrification. As discussed in Chapter 6, it is recommended that a Nitrification Optimization Study be conducted after the Aeration System Upgrades are implemented to determine what is causing the low ammonia removal rate and what operating parameters (MLSS and SRT) would provide complete ammonia removal.

9.4.1 Nutrient Removal Alternatives

The timing of the nutrient removal requirements discussed in Chapter 3 may provide additional impetus for investing in nutrient removal improvements that will allow the City of Richmond to supply recycled water to EBMUD. Since the nutrient removal requirements are expected to include annual mass loading limits, supplying recycled water will divert some of the WWTP's nutrient loading from the Bay and help towards meeting the new nutrient requirements.

Two alternatives were analyzed for providing recycled water and meeting the nutrient removal requirements:

- **Conventional Activated Sludge (CAS).** Includes expansion of existing CAS process, which is comprised of aeration basins and secondary clarifiers.
- **Split Flow CAS/MBR.** Includes expansion of existing CAS process, which is comprised of aeration basins and secondary clarifiers, as well as a separate MBR treatment train. The MBR treatment train would be comprised of aeration basins and microfiltration membranes.

Site layouts were developed for both alternatives to ensure all facilities required for reuse and nutrient removal could fit within the plant site. The site layouts also include facilities discussed above that are required to meet the salinity limit.

9.4.1.1 Conventional Activated Sludge

Chapters 6, 7, and 8 discuss the improvements needed to expand and upgrade the existing conventional activated sludge (CAS) process to meet anticipated nutrient removal requirements for ammonia and total nitrogen. Implementing recycled water may alter the timing of these improvements.

A potential sequence of the improvements required for recycled water and nutrient removal is described below. This is one of several possible sequences, and assumes drivers to implement a recycled water project would occur before nutrient regulations need to be met. This sequence describes how the CAS facilities could be expanded to provide 4.6 mgd of secondary effluent to EBMUD for reuse and meet anticipated nutrient regulations.

A site layout showing all of the improvements required is shown in Figure 9.3.

9.4.1.1.1 *Recycled Water/Level 1 Nutrient Removal*

As stated in Chapter 6, it is assumed that the Aeration System Upgrades, Secondary Clarifier Improvements, and Nitrification Optimization Study would optimize the secondary treatment process. Given the capital cost of implementing these projects is significant, these projects are anticipated to fulfill the Level 1 nutrient removal requirements. Assuming these improvements provide full nitrification, no additional aeration basins would be required to meet EBMUD's ammonia limit of 1 mg/L.

To meet the salinity requirements, dechlorinated effluent would be diverted downstream of the chlorine contact basins to an MF/RO Facility. To meet EBMUD's chlorine residual requirement of greater than 1 mg/L, the effluent from the MF/RO Facility would be dosed with chlorine. Given the effluent has already been disinfected in the chlorine contact basins, only a small chlorine dose would be required and could be achieved with a chlorine feed facility. Additional chlorine contact basins and sodium hypochlorite storage tanks would not be required.

9.4.1.1.2 *Level 2 Nutrient Removal*

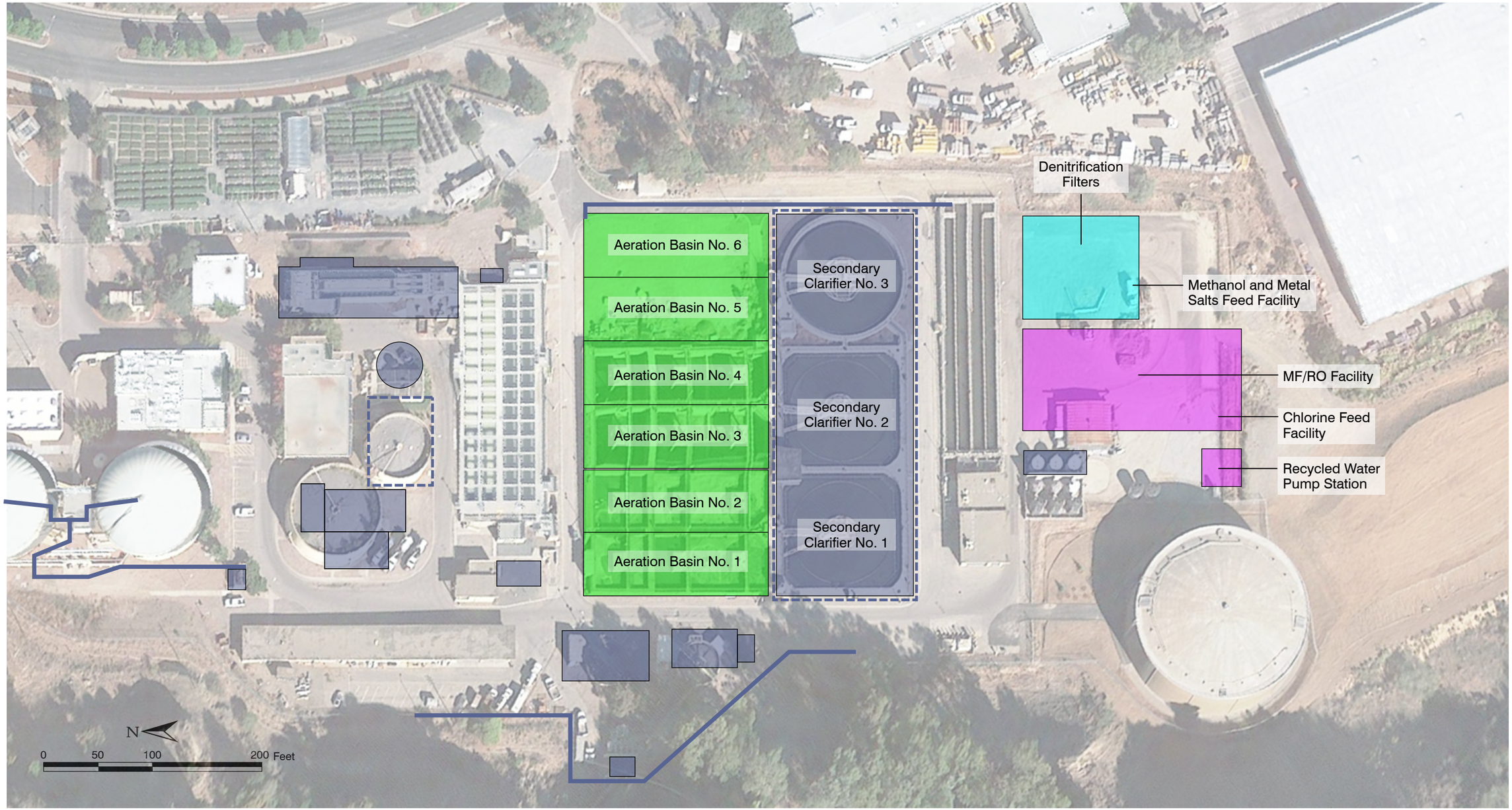
Level 2 nutrient removal requirements would include converting the existing Aeration Basins No. 1 and 2 to an MLE process. As stated in Chapter 7, Level 2 nutrient removal requirements would require six aeration basins. The equalization basins would need to be upgraded and converted into Aeration Basins No. 3 and 4, and Aeration Basins No. 5 and 6 would need to be constructed.

9.4.1.1.3 *Level 3 Nutrient Removal*

As stated in Chapter 8, denitrification filters would be required to meet the Level 3 nutrient removal requirements.

9.4.1.2 Split Flow CAS/MBR

Membrane bioreactors (MBRs) are a combination of activated sludge reactors and membrane facilities. Membrane systems are pressure driven solids separation processes, which use membranes with extremely small pore spaces to remove particles. Typically, a vacuum is applied to a header pipe connected to the membranes, which draws the treated effluent through the membranes and into the pump. These systems can be used to replace clarifiers and filtration in the activated sludge process. Without the limitations set by solids flux in secondary clarification, the mixed liquor can be more concentrated (up to 10,000 mg/L) than with conventional activated sludge, which reduces the size of the activated sludge process. MBRs produce a high quality effluent that is superior to the effluent from both final clarification and tertiary filtration.



Recycled Water and Nutrient Removal Improvements

- Recycled Water
- Level 2 Nutrient Removal
- Level 3 Nutrient Removal
- Future Facilities

SITE LAYOUT OF CAS ALTERNATIVE

FIGURE 9.3

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f22-11034.ai

The sequence of the improvements required for implementing a Split Flow CAS/MBR system for recycled water and nutrient removal are described below. This is one of several possible sequences, and assumes drivers to implement a recycled water project would occur before nutrient regulations need to be met.

A site layout showing all of the improvements required is shown in Figure 9.4.

9.4.1.2.1 *Recycled Water*

To provide recycled water, a 5 mgd MBR facility would be constructed. This facility would require the conversion of one equalization basin to an aeration basin (Aeration Basin No. 4) and MBR tanks and supporting facilities. It is assumed that this basin would be configured as an MLE process in preparation for Level 2 nutrient requirements.

To meet the salinity requirements, the MBR effluent would flow to a 5 mgd RO/UV Facility. Given the MBR process provides microfiltration, additional microfiltration facilities downstream of the secondary process would not be required. The MBR effluent would be treated with RO and disinfected with the UV facilities. The disinfected effluent would be diverted by the recycled water pump station from the process flow and dosed with chlorine to meet EBMUD's chlorine residual requirement of greater than 1 mg/L. The remaining MBR effluent would be combined with the disinfected effluent from the chlorine contact basins and discharged to the Bay.

9.4.1.2.2 *Level 2 Nutrient Removal*

Level 2 nutrient removal requirements would include converting the existing Aeration Basins No. 1 and 2 to an MLE process. It is anticipated these requirements would have no impact on the MBR system.

9.4.1.2.3 *Level 3 Nutrient Removal*

With the MBR facility, there is not enough site space available to use denitrification filters to meet the Level 3 nutrient removal requirements. Therefore, the aeration basins would need to be converted from MLE to the 4-stage Bardenpho process. The Bardenpho process would require additional anoxic zones in the aeration basins. This would result in derating the capacity of the aeration basins. To offset this decrease in capacity, the equalization basin would be converted into Aeration Basins No. 3.

9.4.1.3 Capital Cost of Alternatives

A comparison of the capital costs of the improvements required for recycled water and Level 3 nutrient requirements for the two alternatives is presented in Table 9.3.

Table 9.3 Cost Comparison of CAS and MBR WWTP Facility Plan City of Richmond and Veolia Water

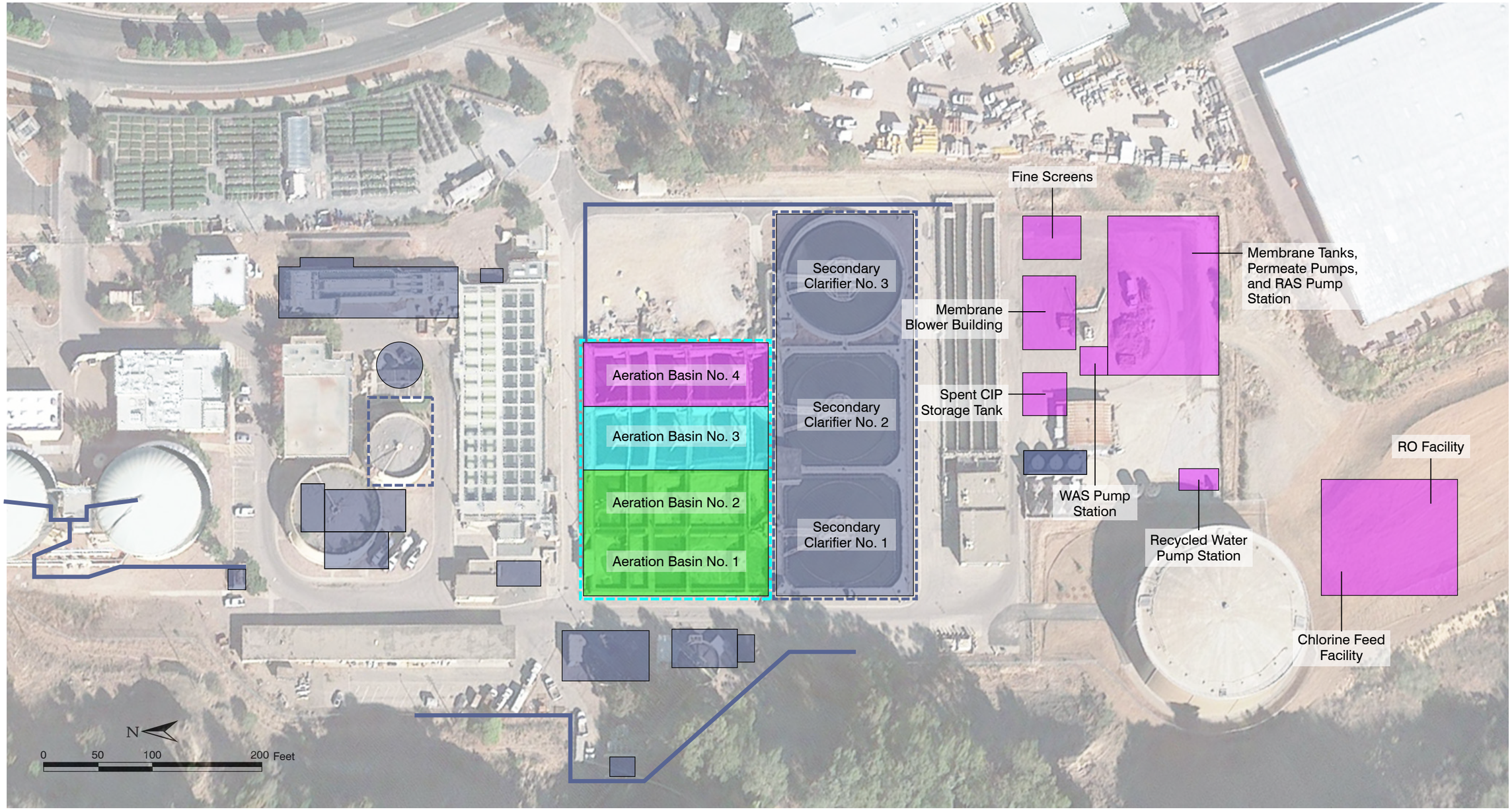
Element	CAS	Split Flow CAS/MBR	Delta (CAS - MBR)
Facilities Needed for Nutrient Removal[(1)]			
Aeration Basins	$53,400,000	$30,200,000	
Membrane Tanks and Support Facilities	--	$62,600,000	
Denitrification Filters	$24,500,000	--	
Subtotal	**$78,000,000**	**$93,000,000**	**($15,000,000)**
Facilities Needed for Recycled Water[(2)]			
UV Facility	--	$8,900,000	
Microfiltration/RO Facility	$38,800,000	--	
RO Facility	--	$19,700,000	
Subtotal	**$39,000,000**	**$29,000,000**	**$10,000,000**
Total	**$117,000,000**	**$122,000,000**	**($5,000,000)**

Note:
(1) Capital costs are presented in 2016 dollars.

As shown in the table, CAS and Split Flow CAS/MBR implementation costs to produce recycled water are about the same; however, CAS implementation costs to meet nutrient removal improvements are slightly less. The decision to implement CAS or Split Flow CAS/MBR treatment should be evaluated further when the timing, scope, and method of funding a recycled water project is determined and nutrient removal regulations are more defined.

9.5 RECYCLED WATER CONVEYANCE

While the salinity reduction and nutrient removal alternatives discussed above improve the quality of WWTP effluent to the point that it can be recycled by EBMUD, the water must still be conveyed to EBMUD facilities for reuse. This section summarizes the feasibility of conveying secondary effluent from the Richmond WWTP to augment the source water supplied to EBMUD's reclamation facilities. Given the WCWD WWTP is located in close proximity to EBMUD's North Richmond Water Reclamation Plant, it is assumed all of Richmond's secondary effluent would be supplied to the RARE Facility. Conveyance alternatives were developed and evaluated. These alternatives were evaluated based on the amount of recycled water that could be supplied to EBMUD, as well as program implementation costs and operations and maintenance costs.



Recycled Water and Nutrient Removal Improvements

- Recycled Water
- Level 2 Nutrient Removal
- Level 3 Nutrient Removal
- Future Facilities

SITE LAYOUT OF SPLIT FLOW CAS/MBR ALTERNATIVE

FIGURE 9.4

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f23-11034.ai

9.5.1 Recycled Water Conveyance Alternatives

Three conveyance alternatives were evaluated for sending flow from the WWTP to the RARE Facility:

- Alternative 1 - Existing Outfall and Existing RARE Pipeline.
- Alternative 2 - Existing Outfall and New RARE Pipeline.
- Alternative 2 - New Pipeline from Richmond WWTP to RARE.

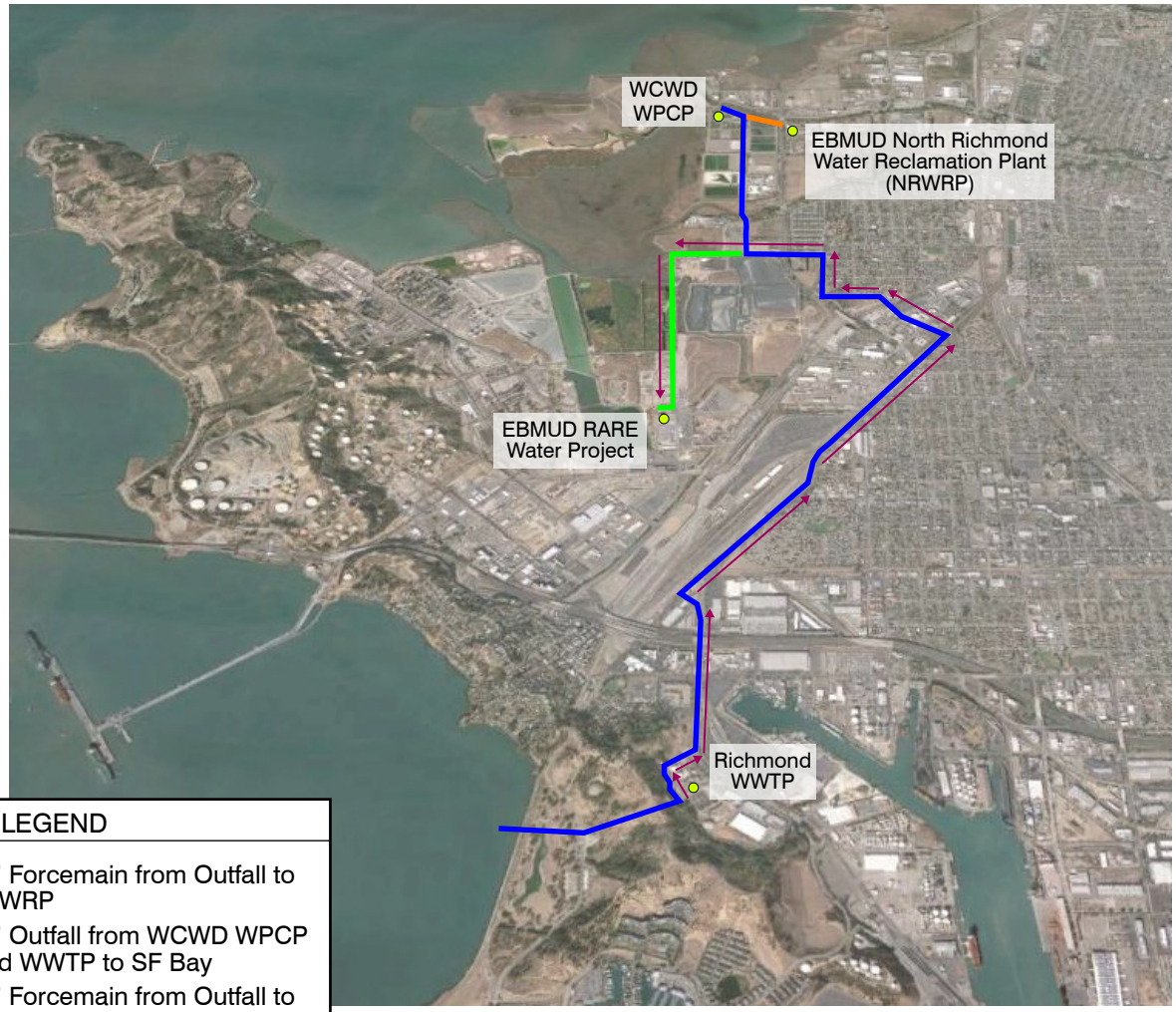
Alternative 1 would include using a portion of the existing 36" outfall pipeline between the WCWD WWTP and Richmond WWTP and the existing 18" force main to RARE. This alternative is shown in Figure 9.5.

Alternative 2 would include using a portion of the existing 36" outfall pipeline and constructing a new parallel 18" force main to RARE. This alternative is shown in Figure 9.6.

Alternative 3 would include constructing a new 24" pipeline from the WWTP to the RARE Facility. A proposed route for this new pipeline is shown in Figure 9.7.

Given WCWD uses the existing outfall to discharge all effluent that is not supplied to EBMUD for reuse, with Alternative 1 and 2 the City could only provide secondary effluent to the RARE Facility when WCWD is sending all of their secondary effluent to EBMUD.

Table 9.4 summarizes the design criteria and 20-year life cycle cost for each alternative. The program cost includes the estimated cost for constructing the pipelines and a Recycled Water Pump Station to pump the secondary effluent to the RARE Facility. The annual O&M costs are based on the amount of power required to operate the Recycled Water Pump Station. The varying lengths and diameters of the pipes between the three alternatives result in different pumping requirements and thus, the amount of power used by the pump station varies by alternative.



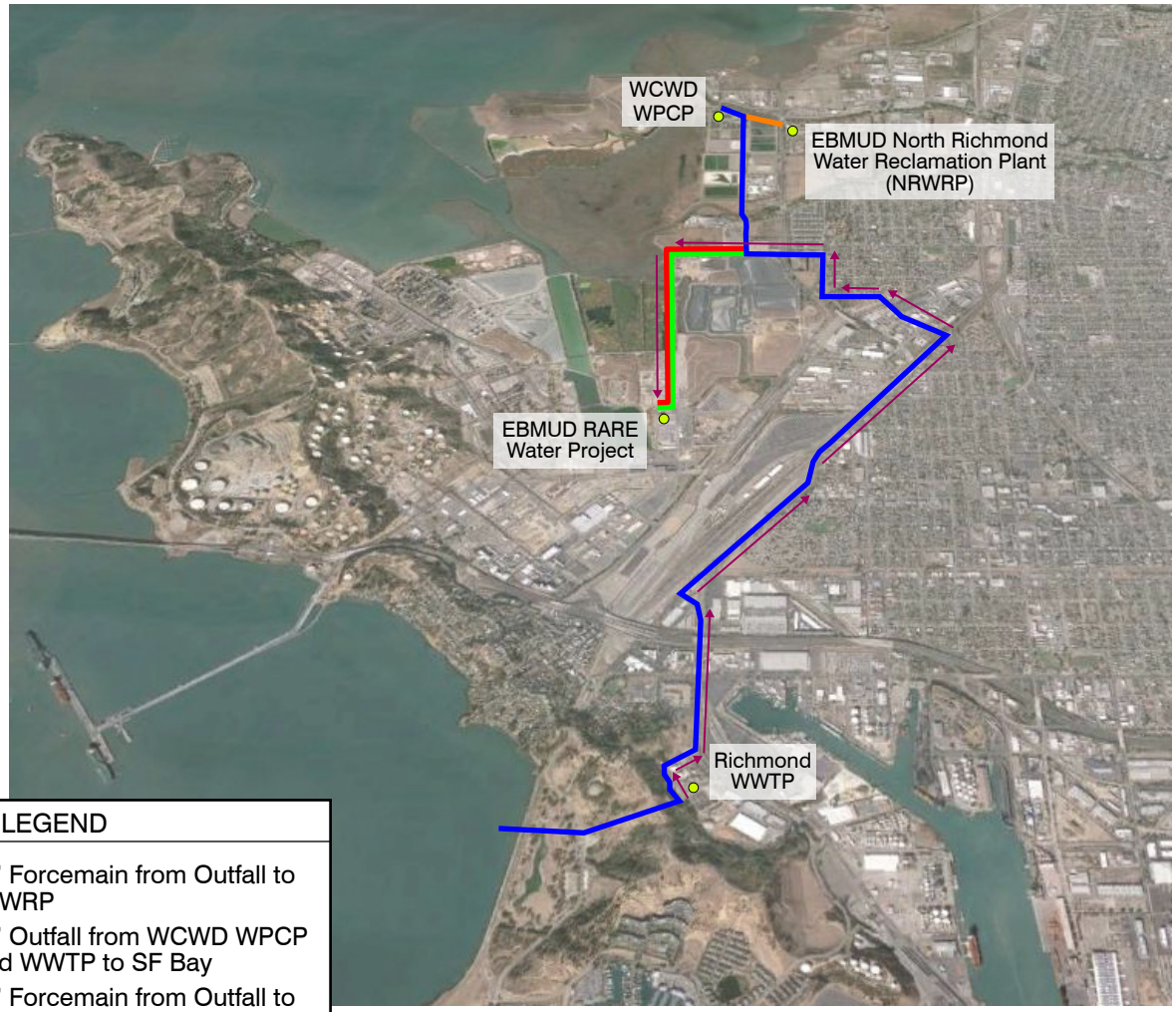
RECYCLED WATER CONVEYANCE ALTERNATIVE 1 – EXISTING OUTFALL AND EXISTING PIPELINE TO RARE

FIGURE 9.5

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f21-11034.ai



LEGEND

- Existing 18” Forcemain from Outfall to EBMUB NRWRP
- Existing 36” Outfall from WCWD WPCP to Richmond WWTP to SF Bay
- Existing 18” Forcemain from Outfall to EBMUD RARE Water Project
- New 18” Forcemain from Outfall to EBMUD RARE Water Project

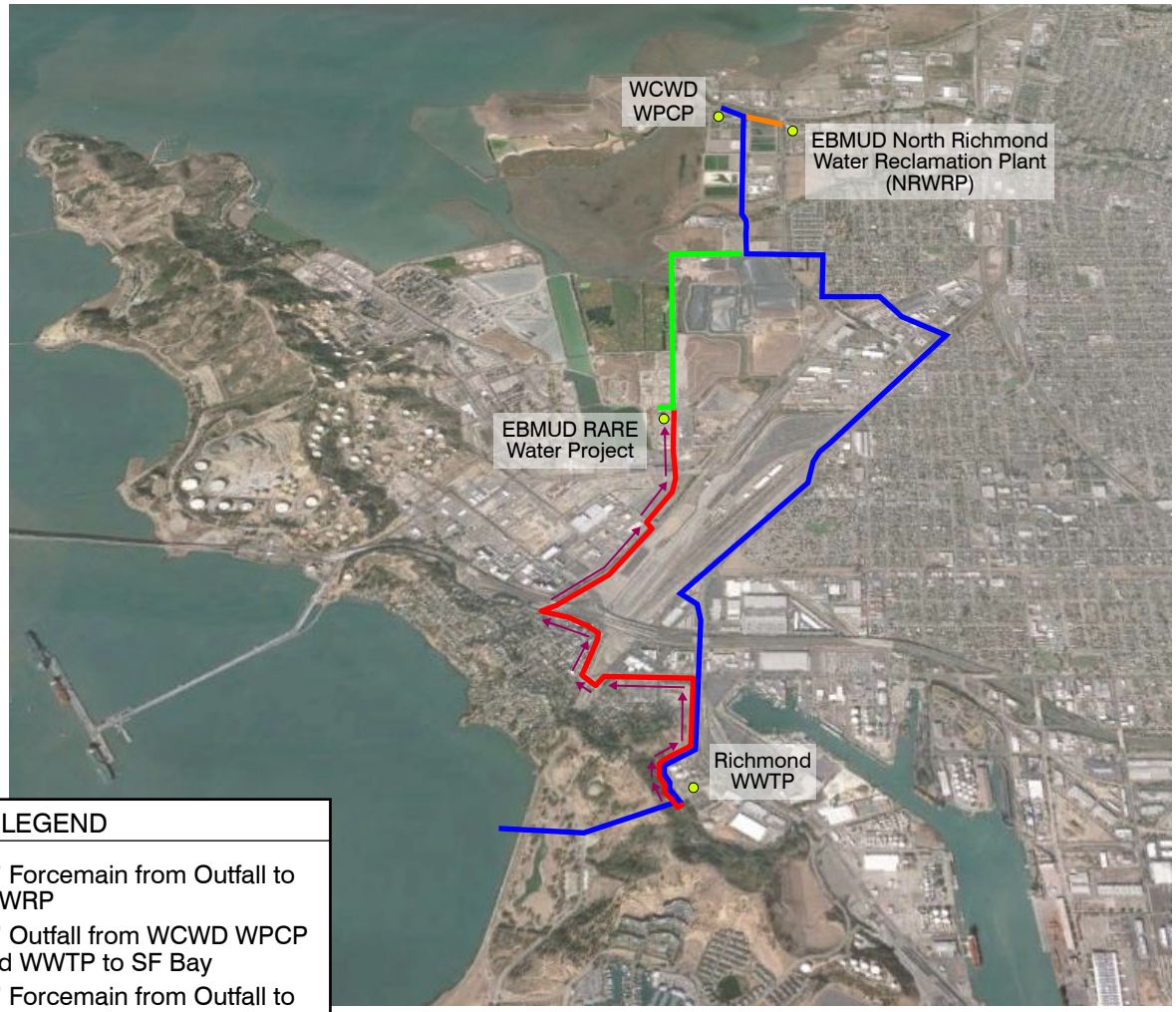
RECYCLED WATER CONVEYANCE ALTERNATIVE 2 – EXISTING OUTFALL AND NEW PIPELINE TO RARE

FIGURE 9.6

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f32-11034.ai



RECYCLED WATER CONVEYANCE ALTERNATIVE 3 – NEW PIPELINE TO RARE

FIGURE 9.7

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f33-11034.ai

Table 9.4 Summary of Conveyance Alternatives WWTP Facility Plan City of Richmond and Veolia Water			
Parameter	**Alternative 1 Existing Outfall and RARE Pipeline**	**Alternative 2 Existing Outfall and New RARE Pipeline**	**Alternative 3 New Pipeline to RARE**
Average Recycled Water Supplied from Richmond to RARE Facility, mgd[(1)]	4.5	4.5	4.5
Pump Station Firm Capacity, mgd	5.0	5.0	5.0
New Pipeline			
Diameter, inches	n/a	18	24
Length, feet	n/a	18,180	12,850
Life Cycle Cost			
Program Cost[(2)]	$3,200,000	$6,100,000	$11,400,000
Annual O&M Cost	$240,000	$110,000	$90,000
Net Present Value of 20-year Life Cycle Cost[(3)]	$6,900,000	$7,800,000	$12,800,000

Notes:
(1) Based on projected recycled water demand and supply information provided by EBMUD.
(2) Includes project construction cost and project delivery soft costs (e.g., engineering, legal, and administration).
(3) Based on an annual inflation rate of 3 percent and discount rate of 6 percent.

These conveyance alternatives should be reevaluated when the timing, scope, and method of funding a recycled water project is determined.

9.6 INTERAGENCY COORDINATION

While the City has the legal authority to provide treated wastewater for non-potable reuse, in addition to the technical water quality and distribution issues described in detail above, the City also faces several specific institutional challenges:

- A recycled water program will need to be developed jointly with EBMUD, which has the primary responsibility to serve water customers located in its service area.
- The program will also need to be coordinated with WCWD, which currently supplies EBMUD with more than half the non-potable water needs of potential customers in the Richmond area.
- To the extent these agencies control the price of potable and non-potable water in the Richmond area, the City will have to identify sufficient economic incentives to justify investment in the infrastructure required to create water suitable for reuse.

Based on the information developed and discussions with the City's potential partners, it appears that these institutional and economic issues might be favorably addressed when the need for recycled wastewater in the Richmond area becomes sufficiently critical. In the meantime, the City could prepare its infrastructure for reuse by reducing the salinity and nutrient concentration of its effluent to the extent that these steps also benefit the continued operation and maintenance of its wastewater collection and treatment system.

9.6.1 Recycled Water Partner Agencies

Wastewater collection and treatment in Richmond is essentially a joint enterprise requiring the cooperation of multiple agencies. While the City collects and treats wastewater generated by the majority of residents within its city limits, service area agreements are currently maintained with WCWD to collect and treat wastewater for a small section of north Richmond and with the Stege Sanitary District to provide similar services for a small eastern portion of the City.[1] As a result, it is not surprising that reuse of effluent should be similarly collaborative.

The following information was obtained from review of interagency agreements and interviews with agency staff to identify the institutional arrangements required for the City of Richmond and Veolia (its collection system and treatment plant management agent) to effectively participate in a regional water recycling program.

9.6.1.1 Veolia

The important working relationship between the City of Richmond and Veolia is central to the development of the City's water recycling program. In addition to their daily duties of managing, operating and maintaining Richmond wastewater collection and treatment facilities, Veolia has *"sole and exclusive responsibility for the design of the Capital Improvements…and the preparation of all plans, technical specifications drawings, blueprints or other design documents..."* [2] As such, Veolia will play a critical role in helping the City of Richmond evaluate the technical and economic implications of investments in recycled water treatment and distribution infrastructure, both now and in the future. At a minimum, any expansion of treatment facilities required to improve the quality of Richmond's effluent would likely require an amendment to the current operating agreement resulting in additional costs, as would the commitment to design and build such facilities using the present approach.

---

1 City of Richmond/Veolia Collection System Master Plan (West Yost Associates, November 2011)

2 City of Richmond and US Filter, Wastewater Treatment Facility Capital Improvements, Operations, Maintenance and Management Agreement (2002) Article V, "Design and Construction of the Capital Improvements," Section 5.5 "Company Design." [in 2004 the agreement was transferred to Veolia Water North America Operating Services following their acquisition of US Filter.]

9.6.1.2 WCWD

Richmond's close connection with WCWD is reflected in two significant contractual agreements. The primary agreement between the City of Richmond and WCWD is their participation in the West County Agency (WCA), a joint powers authority which owns and operates the deep-water outfall facility into which both the City and WCWD discharge their effluent. The agreement allows WCWD to send its treated effluent to the Richmond WWTP for discharge through the outfall into San Francisco Bay.[3]

In addition, both agencies, maintain an agreement whereby WCWD is allowed to send leachate from the West Contra Costa Sanitary Landfill (WCCSL) to the City for treatment at its Richmond WWTP. In return, WCWD accepts and treats wastewater sludge (biosolids) from the Richmond WWTP. Both leachate and biosolids are transported through the same pipeline which is operated and maintained by the WCWD.

While not directly related to Richmond's potential ability to supply recycled water to EBMUD, these agreements have been productively maintained for over forty years and provide a sound basis for interagency cooperation that may be developed further as appropriate to facilitate Richmond's participation in a regional recycled water program.

With respect to the reuse of Richmond's effluent, as noted in Section 9.2.2 one key issue is that WCWD is currently unable to send EBMUD enough effluent to satisfy Chevron's non-potable water needs. While the EBMUD plants are designed to handle as much as 8.9 mgd, WCWD flows now range between 6 and 7 mgd, down from a 2010 average of 8 mgd and less than Chevron's cooling towers and boilers current demand of 7.2 mgd[4]. Furthermore, while population in the area is projected to grow to more than 110,000 over the next 20 years (an increase of over 20%), flows are not expected to reach 10 mgd, well below the WCWD plant capacity of 12.5 mgd (ADWF), which is also the limit of WCWD's delivery agreement with EBMUD.[5]

To make up for this deficit, WCWD has been actively seeking to augment its wastewater flows. Sewage from the cities of Hercules and Pinole was identified as a potential source of additional effluent as there are places where the Hercules-Pinole collection system is adjacent to WCWD sewers. However, pursuit of this option has been suspended pending investigations by the City of Pinole into developing its own water reuse program. Other alternatives include diverting stormwater flows to the WCWD, including dry weather inflow and infiltration as well as high-level storm flows.[6]

In view of their goal of increasing their recycled water supplies, it is reasonable to suspect that WCWD would not perceive the City of Richmond's interest in water recycling as

---

3 "Joint Exercise of Powers Agreement of the West County Agency" June 1984, amended 1990, 1992, 1993 and 1996.

4 WCWD Personal Communication 5/4/16

5 WCWD "District-Wide Master Plan, Executive Summary" (Carollo Engineers, 2014) p. 4

6 WCWD Personal Communication 5/4/16

competitive, but would be open to the reuse of their treated effluent. As noted in Section 9.3, water quality concerns currently preclude the reuse of Richmond's effluent. However, if the City of Richmond were to implement improvements to produce effluent for reuse, they could expect that WCWD would welcome the opportunity to augment their supply so long as it was apparent that the City had sufficient resources to ensure reliable production of recycled water.

9.6.1.3 EBMUD

As one of the Bay area's largest water suppliers, EBMUD currently partners with a number of water agencies, wastewater districts and municipal corporations to provide, treat and supply recycled water to customers within and outside their water service area. Of particular note, EBMUD partners with WCWD to provide secondary effluent for its two Richmond area water recycling projects (NRWRP and RARE), which it further treats and supplies to Chevron and other non-potable customers in the Richmond area. EBMUD also maintains contractual relationships with the City of Richmond to ensure disposal of wastewater generated by the WCCSL. EBMUD is a party to this agreement insofar as it ensures that WCCSL leachate does not impact the quality of treated effluent it receives at its NRWRP or RARE facilities.

Consistent with EBMUD's Non-Potable Water Policy 9.05 which requires customers to use non-potable water for non-domestic purposes *"when it is of adequate quality and quantity, available at reasonable cost…"* the agency regularly cooperates with other entities to develop and implement recycled water systems.[7] In practice, however, EBMUD does not enter into agreements with agencies that require them to purchase treated effluent or recycled water (e.g. at a set rate of so many dollars per acre foot delivered or through a "take or pay" provision).[8] Instead, EBMUD accepts water from wastewater generators (for whom this option is often preferable to discharge) at a stipulated quality and quantity. Once the effluent is transmitted to them, EBMUD may provide at their own expense additional treatment as may be required for reuse.

This practice is significant with respect to the potential for reuse by the City of Richmond because it prevents the City from using revenues from the sale of recycled water to pay for the cost of salt reduction or nutrient removal. Furthermore, although EBMUD typically underwrites the cost of additional treatment and even contributes to the cost of required treatment at other agency facilities, these costs are ultimately repaid (at least in part) by EBMUD's recycled water customers. In the case of the RARE project closest to the City of Richmond treatment plant, "Chevron reimburses EBMUD for all operating and maintenance costs for the project."[9]

---

7 EBMUD Urban Water Management Plan (2015 Draft), p. 67
8 Hu, Linda. Personal Communication. 4/28/16
9 EBMUD Urban Water Management Plan (2015 Draft), p. 72

In summary, water recycling managers and staff at EBMUD have indicated that from their agency's perspective there are at least two major obstacles to the reuse of effluent from the City of Richmond.

- At this time, there appear to be other higher quality sources of water available that will allow EBMUD to meet its projected recycled water demands more cost-effectively than by treating City of Richmond effluent. These sources include wastewater from the Chevron refinery which might be recovered and treated onsite for reuse and effluent from the Hercules-Pinole and Rodeo wastewater treatment plants that might supply water to the Phillips 66 Refinery.

- Even if the City of Richmond were to further treat its effluent to the point that it was of comparable quality to effluent from WCWD, there are no funds currently identified to expand both the RARE and North Richmond Water Recycling Plant as needed to treat the additional flows.

Furthermore, with respect to the overarching issue of paying for the treatment and transport of non-potable water, EBMUD staff added that "there is growing concern about the cost to install purple pipe" and that the [EBMUD] board is weighing the relative value of investments in non-potable reuse and indirect or direct potable reuse.[10]

It should be noted that, from a technical standpoint, the City of Richmond appears to have the legal right to sell recycled water of appropriate quality for reuse directly to water customers in the EBMUD service area, provided that EBMUD is unable or unwilling to serve non-potable water itself.[11] However, no customers able to use water of the current quality have been identified, and if additional treatment is required, such an approach is unlikely to yield the revenues needed to cover the City's costs.

9.6.1.4 Other Partner Agencies

West Contra Costa County Landfill

WCCSL is a closed landfill located at Parr Boulevard and Garden Tract Road in Richmond, adjacent to the WCWD treatment plant and near the tidal wetlands of San Pablo Bay. As noted in Section 4.5.1.3, leachate collected from the Class II area of the WCCSL is sent to the Richmond WWTP for treatment to minimize the chloride concentration in recycled water supplied to EBMUD by WCWD. The multi-part agreement which facilitates this practice involves the transfer of landfill leachate to the Richmond WWTP alternating with the transfer of digested waste biosolids from the Richmond WWTP to WCWD for concentration and drying in their lagoons. While this arrangement has proved useful for several years, it is anticipated that the City will be implementing biosolids dewatering at the Richmond WWTP.

[10] Hu, Linda. Personal Communication. 4/28/16
[11] California Water Code, Section 13580.7

9.6.2 Review of Institutional Drivers and Obstacles to Richmond Reuse

9.6.2.1 Drivers

- Demand by EBMUD customers for non-potable water currently exceeds the supply of wastewater from WCWD, such that EBMUD now supplements recycled water with potable water at both its NRWRP and RARE facilities
- EBMUD customer demand for recycled water is expected to increase by up to 3.5 mgd among current and future customers, further intensifying the shortfall of available recycled water supplies.
- As noted in Section 4.3.3, future effluent discharge regulations will likely further restrict the amount of nutrients (ammonia, nitrogen phosphorus) treatment plants are allowed to send to the Bay. The need to further treat wastewater will facilitate reuse by improving the quality of recycled water available for non-potable purposes.
- Uncertainties about the reliability of current statewide water supplies suggest that the value of a "drought-proof" locally-controlled water supply will continue to appreciate in the future.

9.6.2.2 Obstacles

- EBMUD does not purchase treated effluent from local wastewater agencies, nor are they currently able to invest in off-site treatment facilities. As a result, the City of Richmond would most likely have to obtain other sources of funds to pay for required wastewater treatment improvements (including State grants and loans) and would need to cover capital and operating costs based on sewer rates alone.
- Future development of indirect or direct potable reuse projects in the EBMUD service area may limit the potential growth of demand for non-potable recycled water.
- In addition to the administrative and legal costs associated with negotiating and executing interagency agreements, significant time is often needed to implement such agreements. Furthermore, since the details of such agreements often has bearing on the feasibility of the project, development of interagency agreements is often an iterative process that must be started well in advance of project design and construction.

9.6.2.3 Areas for Further Study

- The City would significantly improve its ability to reuse effluent from the WWTP by further investigating methods to reduce the salinity of its recycled water either by eliminating the infiltration of Bay water into the collection system (upstream) or by further treating effluent at the WWTP through reverse osmosis treatment (downstream). Eliminating infiltration would also reduce wastewater flows to the

treatment plant, and removing nutrients through denitrification and/or reverse osmosis would improve the City's ability to meet future effluent nutrient limits.

- From the standpoint of institutional considerations, the City would benefit from continued collaboration with WCWD, EBMUD and other future agency partners as they continue to participate in the development of regional water recycling projects and programs.

CAPITAL IMPROVEMENT PLAN

10.1 INTRODUCTION

This chapter presents the preliminary capital improvement plan (CIP) for the Wastewater Treatment Plant (WWTP) Facility Plan and a summary of the associated capital costs. The CIP presents an estimate of the City's capital expenses over the next 30± years to address any limitations, rehabilitation needs, and recommended improvements to the WWTP.

The focus of the Facility Plan is the critical and near-term projects that are recommended for implementation in the next 10± years. The drivers for these projects are more certain; as a result, the costs and timing of these projects were developed in greater detail. Although the primary focus of this Facility Plan is the critical and near-term projects, long-term projects are included in the CIP. This ensures that all potential capital improvement projects are identified so that all site planning and financial considerations are addressed. The Facility Plan includes a high-level evaluation of long-term projects recommended for implementation in 10 to 30± years. The drivers for these projects are less certain; as a result, the costs and timing of these projects were developed at a higher level.

While it is reflective of the Facility Plan, the CIP needs to be responsive to the various planning "driver" issues that could impact the timing of the implementation of each project included in the CIP. Therefore, it is recommended that the CIP be reviewed and updated annually, and updates be incorporated into the Facility Plan and other master planning documents accordingly. Long-term costs included in the CIP should especially be evaluated in further detail as part of a future master plan update.

10.2 KEY FINDINGS AND RECOMMENDATIONS

A CIP was developed for the Facility Plan that identifies critical and near-term projects required at the WWTP over the next 10± years, as well as long-term projects required beyond the 10-year planning horizon. The CIP projects were developed to response to one of the following planning drivers: rehabilitation and repair (R&R), regulatory requirements, improved performance, and policy decision.

In developing the overall implementation schedule for the WWTP, three major phases of improvements were identified:

- **Critical Projects.** Projects recommended for implementation within the next 5± years. These projects are critical because they are considered essential to being in compliance with the current NPDES discharge permit and biosolids disposal agreement with WCWD. In addition, some of these improvements would reduce health and safety impacts to plant staff.

- **Near-Term Projects.** Projects recommended for implementation within the next 5 to 10± years. These projects are recommended for implementation in the near-term because they are required to replace and rehabilitate aging infrastructure that is essential to reliable plant operations. In addition, some of these improvements would be required to meet future regulations.
- **Long-Term Projects.** Projects recommended for implementation in the next 10 to 30± years. These projects are anticipated to be required to meet future flows and loads and future regulations, specifically with respect to nutrient removal and treatment of wet weather flows.

Figure 10.1 summarizes the 10-year CIP costs, the costs to implement the critical and near-term projects. Figure 10.2 summarizes the long range CIP costs, the costs to implement all three implementation phases. These figures show the 10-year CIP is largely comprised of projects required to improve treatment performance and to rehabilitate and repair assets. The long-term CIP projects are largely comprised of projects required to meet anticipated regulatory requirements.

Figure 10.3 includes an annual cash flow basis for the CIP based on the assumed implementation date for each project. The cash flow analysis is provided as a preliminary tool to assess impacts on the City's resources over time.

A site layout for the major projects included in the Facility Plan was developed to ensure that site space is used efficiently. Figure 10.4 shows this overall site layout. The proposed site layout takes into consideration the major facilities needed for the planning period, as well as the related support facilities needed to provide a complete site impact analysis for the WWTP.

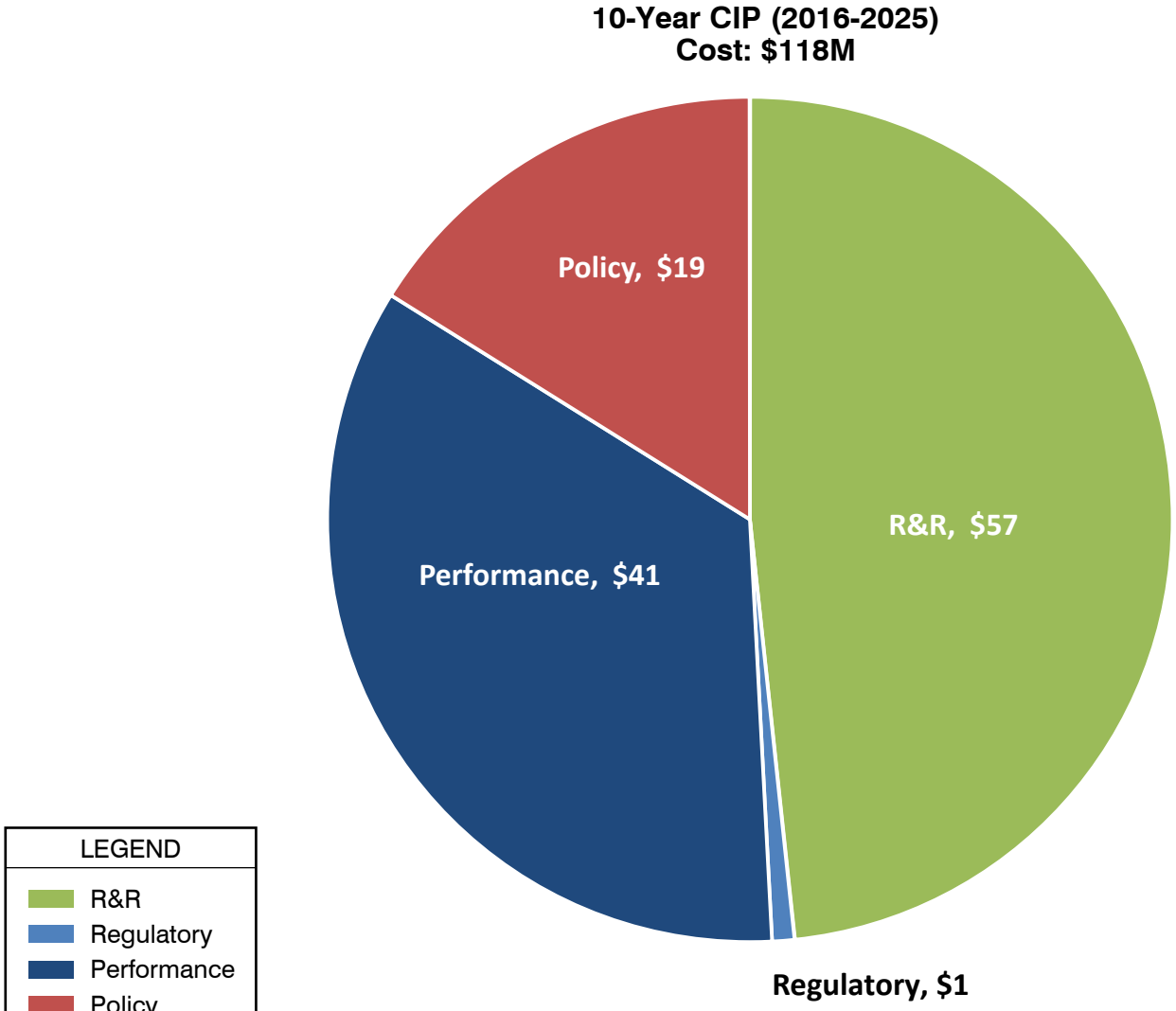
The CIP Summary Table presented in Appendix A includes a detailed list of all the CIP projects, along with their individual project cost and implementation schedule.

10.3 APPROACH TO DEVELOPING CIP

In an effort to distribute the spending throughout the planning period, individual projects were identified and prioritized based on the need and an acceptable approach to phasing the work.

10.3.1 Project Drivers

Capital projects were identified and defined at a planning level in response to the drivers identified during the master planning process. These drivers are defined below.



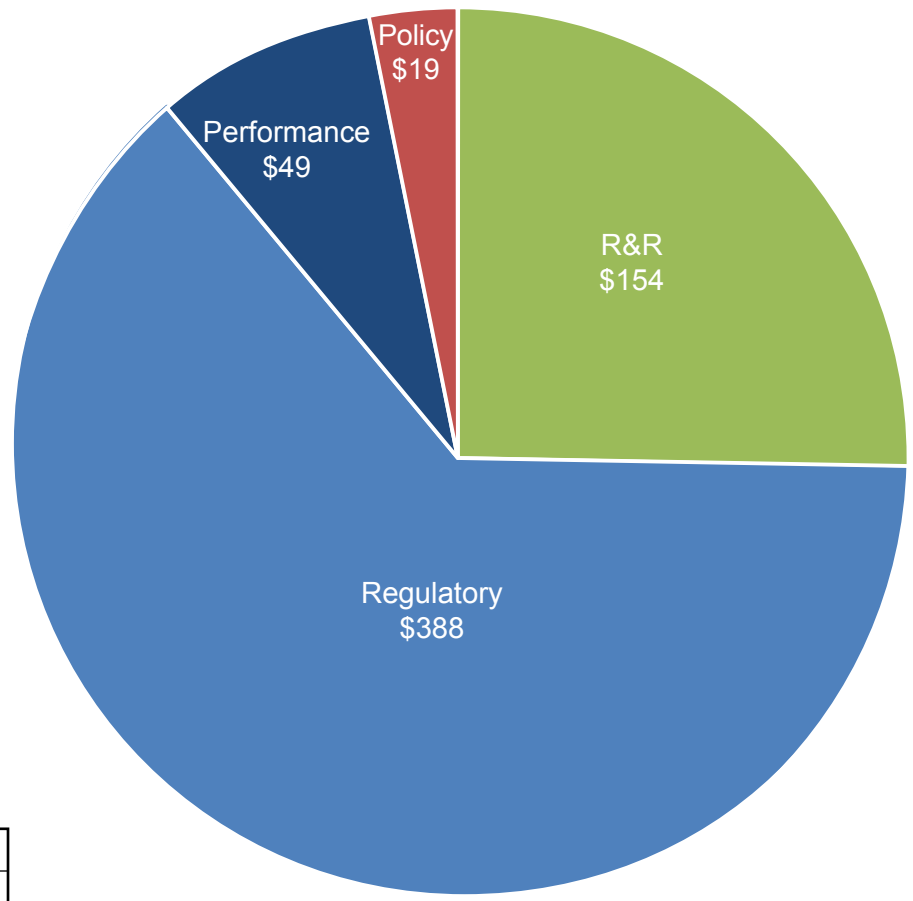
SUMMARY OF 10-YEAR CIP COSTS

FIGURE 10.1

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f38-11034.ai



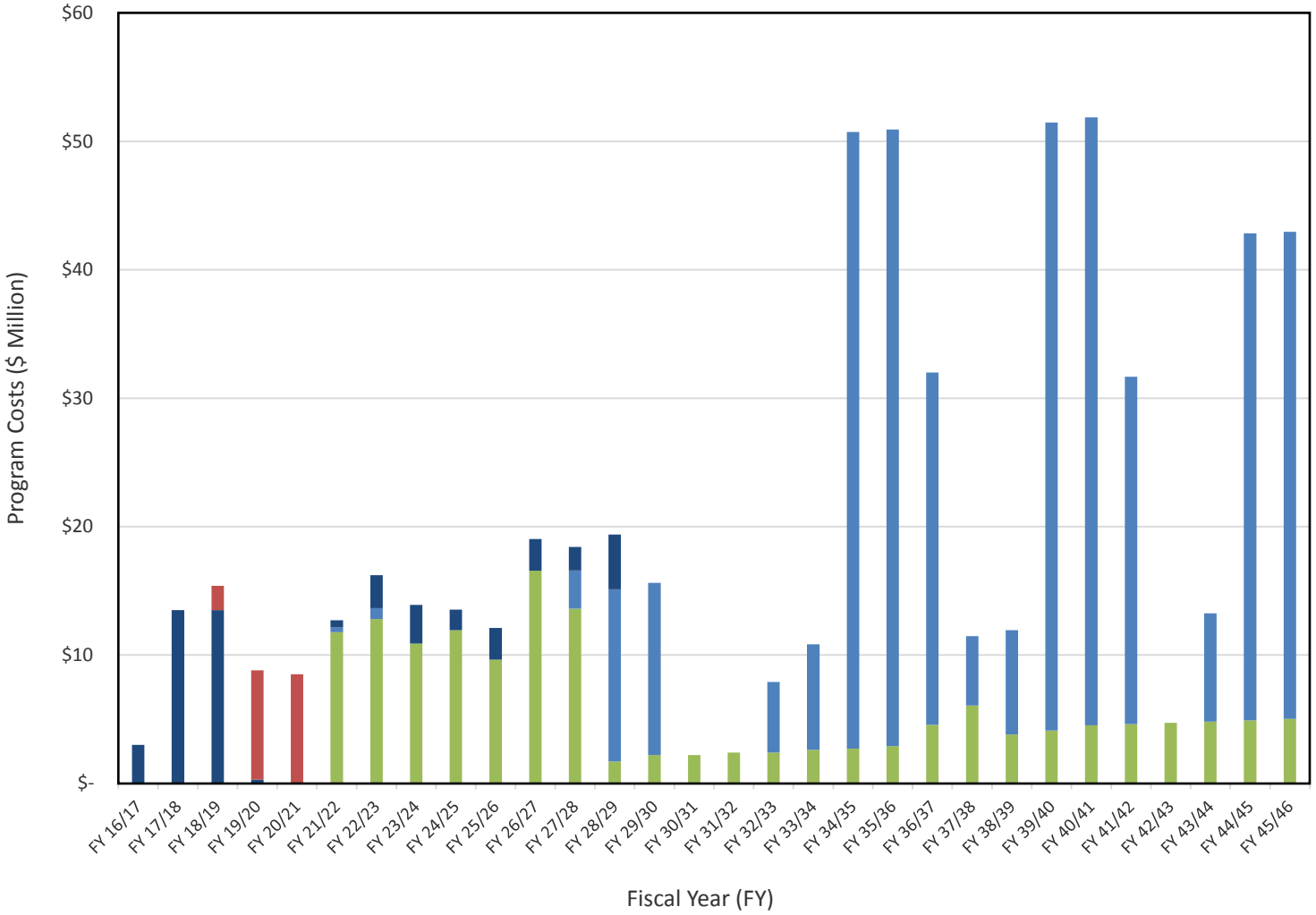
SUMMARY OF LONG RANGE CIP COSTS

FIGURE 10.2

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f39-11034.ai



LEGEND

- R&R
- Regulatory
- Performance
- Policy

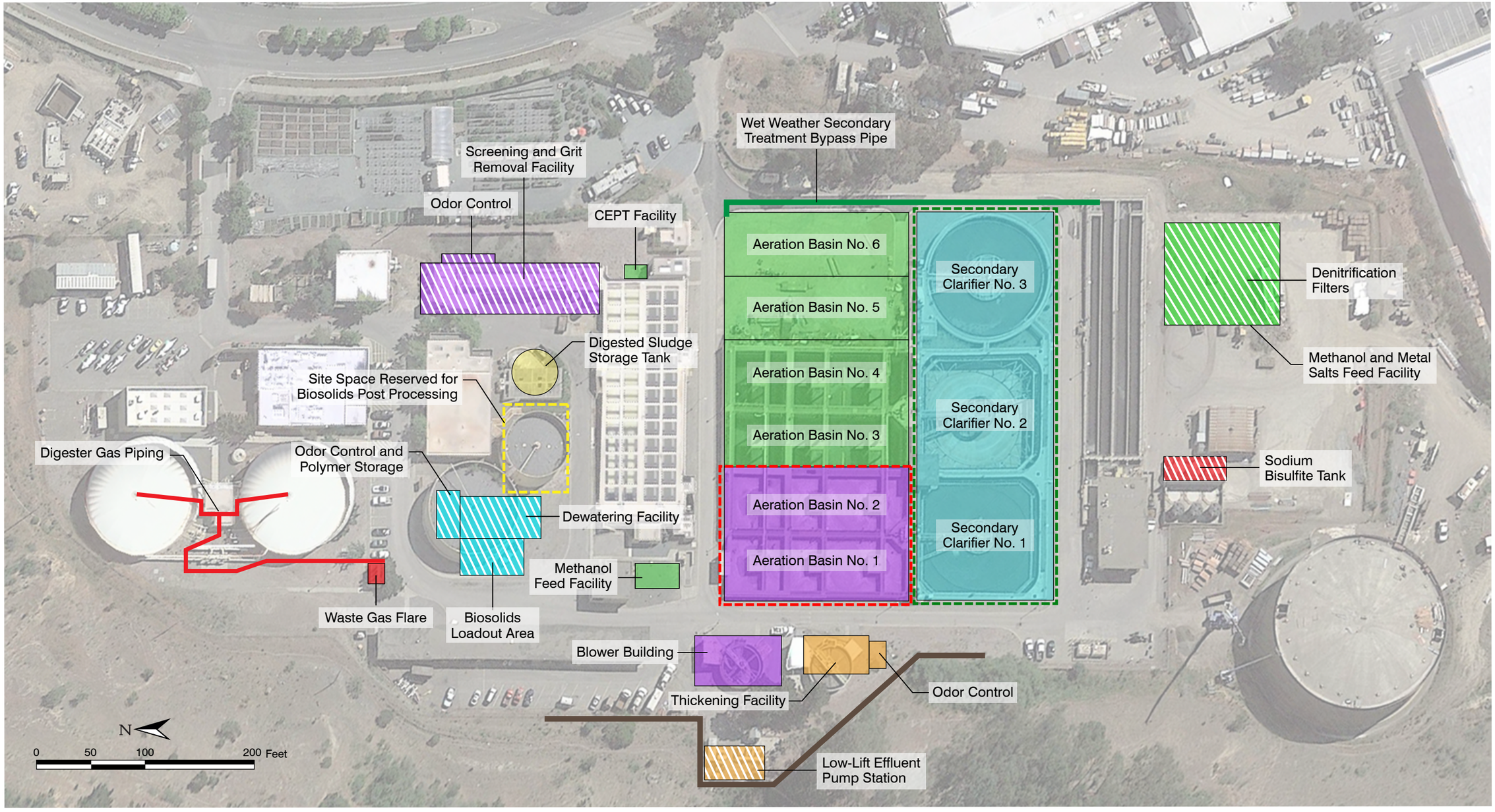
FACILITY PLAN CIP CASH FLOW

FIGURE 10.3

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f40-11034.ai



Critical Projects
- Screenings and Grit Removal Improvements
- Aeration System Upgrades
- Secondary Clarifier Improvements
- Dewatering Facility

Near-Term Projects
- Thickening Facility
- Sodium Bisulfite System Replacement
- Digester Gas Piping and Waste Gas Flare Rehabilitation
- Low-Lift Effluent Pump Station
- Site Protection from Rock Slides
- Level 1 Nutrient Removal Improvements

Not Shown:
- Collection System SCADA Upgrades
- WWTP SCADA Upgrades
- 3-Water System Improvements
- WWTP Lighting Improvements
- WWTP Street Paving Improvements

Long-Term Projects
- Level 2 Nutrient Removal Improvements
- Level 3 Nutrient Removal Improvements
- Wet Weather Improvements
- Digested Sludge Storage

SITE LAYOUT OF RECOMMENDED PROJECTS

FIGURE 10.4

CITY OF RICHMOND AND VEOLIA WATER
WWTP FACILITY PLAN

carollo

rich0616f5-10034.ai

- **Rehabilitation and Replacement (R&R)** – A R&R driver is assigned if the process or facility has reached the end of its economic useful life. This driver is established based on the need to maintain that process or facility as operationally sufficient to meet mission critical reliability and performance requirements.
- **Regulatory Requirements** – A regulatory driver is assigned when the need is driven by local, state, or national regulatory requirements.
- **Improved Performance** – A performance driver is assigned when there is a benefit in improved operations and maintenance performance related to overall reliability and/or reduced life cycle costs.
- **Policy Decision** – The policy driver is assigned when the reason is based on a management and/or political decision from the policy-makers.

10.3.2 Project Durations

The estimate of a project's duration is comprised of a planning and design component and a construction/startup component.

A critical part of the planning and design component is demonstrating compliance with the California Environmental Quality Act (CEQA) requirements and other permitting requirements. A parallel CEQA effort is underway for the critical and near-term projects anticipated to be implemented within the next 10± years. The CEQA effort for these projects is anticipated to be completed in August 2016. It is assumed the CEQA effort for the long-term projects (implemented within the next 10 to 30± years) would be performed concurrently with each project during the design phase.

Project durations were estimated under the following assumptions:

- Smaller-sized projects (those less than $5M) can be completed in two years or less, with one year for planning, design, and bidding, and one year for construction and startup.
- Medium-sized projects (those between $5M and $10M) can be completed in three years, with one year for planning, design, and bidding, and two years for construction and startup.
- Larger-sized projects (those greater than $10M) can be completed in three to five years, with one to two years for planning, design, and bidding, and two to three years for construction and startup.

10.3.3 Implementation Schedule

The project drivers define not only the need for the project, but also implementation timing. The implementation timing, together with the estimated project duration, assigns each project a start and completion date. The recommended implementation schedule for the

CIP projects is included in Appendix A. Project timing and phasing was based on the criticality of the improvements on treatment process reliability, the timing of potential future regulatory requirements, and the distribution of costs to have a relatively even cash flow throughout the CIP. The implementation schedule is very similar to the implementation schedule included in the 2010 Master Plan CIP.

10.3.4 Basis of Costs

10.3.4.1 Development of Cost Estimates

The cost estimates presented in the Facility Plan were prepared in accordance with the guidelines of the AACE International (the Association for the Advancement of Cost Engineering, 18R-97) for a Class 5 estimate. The AACE Cost Estimate Classification System includes five total estimate classes. Class 5 estimates are appropriate for planning projects before more definitive information, such as detailed designs, are available. Class 5 estimates are typically prepared for any number of strategic business planning purposes, including, but not limited to, project screening, evaluating resource needs and budgeting, and long-range capital planning as is being performed in this Master Plan. Class 5 estimates have wide accuracy ranges. Typical accuracy ranges for Class 5 estimates are -20 to -50 percent on the low side, and +30 to +100 percent on the high side. These ranges vary based on the technological complexity of the project, the availability and accuracy of appropriate reference information, and the inclusion of an appropriate contingency determination.

Construction cost estimates account for both direct and indirect costs. Direct costs include materials, labor, construction equipment required for installation, and subcontractor costs. Indirect costs include contractor general conditions, contractor overhead and profit, sales tax, and an estimating contingency.

Direct construction costs for all improvements were estimated using various references. Where possible, the costs from design estimates or construction bid tabs were used and converted to current dollars. Other cost sources included reference projects, the R.S. Means price catalog, cost curves, and vendor quotes. Costs used from design estimates, construction bid tabs, or reference projects were adjusted for location using R.S. Means location factors and for inflation using the appropriate ENR CCI. Indirect construction costs were estimated as a percentage of the direct construction cost based on experience and industry-wide standards.

The total project cost was estimated for each project as the total construction cost plus an additional allowance for overall project costs including: engineering, legal, administration, permitting costs, etc. Table 10.1 summarizes the overall approach for developing capital cost estimates. Table 10.2 summarizes the project cost multiplier of 1.58 that was used to estimate the project costs.

Table 10.1 Capital Cost Estimating Approach WWTP Facility Plan City of Richmond and Veolia Water	
Item	**Cost Formula**
	Total Direct Cost = A
Estimating Contingency	B = percent of A (variable)
Sales Tax(1)	C = 9.5 percent of half of A + B
General Conditions(2)	D = 10 percent of A + B + C
Contractor Overhead and Profit	E = 15 percent of A + B + C + D
	Total Construction Cost = A + B + C + D + E
Engineering, legal, administrative, and permitting (E.L.A.P) costs for implementing the project	E.L.A.P. = 58 percent of Total Construction Cost
	Total Project Capital Cost = Total Construction Cost + E.L.A.P.

Notes:
(1) Sales tax is assumed to be on 50 percent of the total direct cost (Item A) with estimating contingency (Item B).
(2) General Conditions accounts for mobilization/demobilization and costs incurred for project management, bonds and insurance, and temporary facilities and utilities.

Table 10.2 Project Factor Applied to Construction Cost WWTP Facility Plan City of Richmond and Veolia Water	
Item	**Cost Factor**
Engineering Design	10%
Engineering Services During Construction	5%
Third-party Construction Management Fees	10%
Environmental Mitigation	1.5%
CEQA/Permitting	0.5%
Legal and Administrative Costs and Fees	2%
Project Delivery Fees(1)	28%
Total Project Cost Factor	**58%**

Note:
(1) Includes third-party project management, testing, and inspection provided by Veolia.

10.3.4.2 Escalation of Cost Estimates

Project costs were escalated to the approximate mid-point of project construction in order to get a better representation of future costs at time of construction. The un-escalated costs presented herein are in 2016 dollars and are based on an ENR Construction Cost Index (ENR CCI) of 10,182 (20-Cities Average, February 2016).

10.3.5 Development of Rehabilitation and Replacement Projects

10.3.5.1 Near-Term R&R Projects

The near-term projects include R&R projects that were identified in the 2010 Master Plan, but not evaluated as part of the Facility Plan. The 2010 Master Plan developed an equipment list (Table 1 included in Appendix H) with the age and remaining useful life of existing plant assets to develop the timing of when each asset requires rehabilitation or replacement. From this list, the 2010 Master Plan developed three main categories (in order of high priority to low priority) for near-term projects: Priority 1, 2, and 3. Since the 2010 Master Plan, about half of the Priority 1 Projects have been completed; the majority of the Priority 2 and Priority 3 Projects have not been completed.

The age of the assets was updated to determine the new remaining useful life of each asset. This equipment list was also updated to reflect assets that have been rehabilitated since the 2010 Master Plan or will be replaced as part of a capital improvement project included in this Facility Plan CIP.

The R&R summary table (Table 2 included in Appendix H) from the 2010 Master Plan indicates the existing plant assets that would be rehabilitated or replaced with the Priority 1, 2, and 3 projects. The Priority 4 R&R project includes the assets (excluding the Priority 1, 2, and 3 projects) that require rehabilitation or replacement between the years of 2016 and 2025.

The costs for these projects are from the 2010 Master Plan and have been escalated to account for inflation that has occurred since then. A plant-wide condition assessment should be conducted as part of the next Master Plan to develop updated recommendations for R&R improvements.

10.3.5.2 Long-Term R&R Projects

As part of the 2010 Master Plan, for the long-term planning horizon, assets were grouped into two main categories: Anticipated R&R Projects from 2014 to 2030 and Anticipated R&R Projects from 2030 to 2040. These projects would be required to replace and rehabilitate existing infrastructure that will reach the end of its useful life within the planning horizon.

The long term rehabilitation and replacement needs were not reevaluated as part of the Facility Plan condition assessment. For planning purposes, the long-term R&R costs

identified in the 2010 Master Plan were grouped into two new projects: Rehabilitation and Replacement Project - FY 26/27-35/36 and - FY 36/37-45/46.

10.4 RECOMMENDED CIP

The Facility Plan CIP is presented in Appendix A and includes a detailed list of all the recommended CIP projects, along with their individual project cost, implementation schedule, and annual cash flow.

The recommended CIP projects are summarized in the sections below. For detailed project descriptions and justifications for each project, refer to Chapters 6, 7, and 8. For more information on the R&R projects, refer to Chapter 5.

10.4.1 Critical Projects

The critical projects are recommended for implementation within the next 5± years. These projects are critical because they are considered essential to improving treatment performance, improving the WWTP's ability to reliably remove BOD and TSS, and reducing health and safety impacts to plant staff. These improvements are also required to comply with the requirement to end biosolids disposal to the WCWD WPCP.

The critical projects include:

- **Screening and Grit Removal Improvements:** This project includes demolition of the existing grit basin structure and constructing a fine screening and grit removal facility including two vortex grit basins.
- **Aeration System Upgrades:** This project includes the demolition of the mechanical aerators in Aeration Basin Nos. 1 and 2 and replacing them with a diffused aeration system. A new blower building would also be provided.
- **Secondary Clarifier Improvements:** These improvements would consist of installation of flow measurement and automated flow control gates to control the flow to each secondary clarifier, replacement of the secondary clarifier mechanisms, and grouting in the corners of Clarifier Nos. 1 and 2.
- **Nitrification Optimization Study:** This study should be conducted after the Screenings and Grit Removal Improvements, Aeration System Upgrades, and Secondary Clarifier Improvements are implemented to determine what operating parameters would be required to provide nitrification and denitrification of future ammonia loads.
- **Dewatering Facility:** This project would include a dewatering building to house two centrifuges and support facilities, along with a sludge cake loading facility.

10.4.2 Near-Term Projects

The near-term projects are recommended for implementation within the next 5 to 10± years. These projects are recommended for implementation in the near-term because they are required to replace and rehabilitate aging infrastructure that is essential to reliable plant operations. In addition, some these improvements would be required to meet future regulations.

The near-term projects include:

- **Level 1 Nutrient Removal Improvements:** This project would convert Aeration Basins Nos. 1 and 2 to an MLE process by adding mixed liquor return pumps and piping within the basins.
- **Thickening Facility:** This project would include rotary drum thickeners, thickened WAS pumps, and support facilities housed on a concrete base slab with a canopy.
- **Sodium Bisulfite System Replacement:** This project would include the replacement of the three SBS storage tanks, feed pumps, and piping.
- **Digester Gas Facilities Repair:** This project would include two phases. Phase 1 would include replacing all of the above grade digester gas piping, installation of condensate and sediment traps, and repair of the three waste gas flares. Phase 2 would include replacing the flares with new enclosed flares.
- **Collection System SCADA Upgrades:** These upgrades would include two stages. Stage 1 would include replacing the troublesome antenna mounted radios at collection system lift stations with cellular radios. Stage 2 would replace the radios at the rest of the lift stations.
- **WWTP SCADA Upgrades:** These upgrades would include two phases. Phase 1 would include replacing the existing SCADA system with a new SCADA system. Phase 2 would include the replacement of PLCs that are anticipated to reach the end of their useful life within the next 10± years.
- **3-Water System Improvements:** These improvements would include replacing the entire 3W distribution system piping.
- **WWTP Lighting Improvements:** These improvements would include two phases. Phase 1 would include the replacement of light bulbs in non-functioning lights in the roadways and process areas. Phase 2 would include replacing the entire lighting system in the roadways and process areas. Phase 3 would include installing lighting around the plant perimeter.
- **WWTP Street Paving Improvements:** These improvements would consist of replacing portions of the pavement at the WWTP that are in poor condition.

- **Site Protection from Rock Slides:** This project would consist of a concrete wall to protect the west portion of the WWTP from rock slides.
- **Low-Lift Effluent Pump Station:** This pump station would provide enough capacity to pump up to 62 mgd (the combined peak wet weather discharge flow for the Richmond WWTP and WCWD WPCP) under maximum tide conditions. It would be located near the confluence structure.
- **R&R 1 - Priority 1 Rehabilitation and Replacement Projects:** This project includes the in-kind replacement of WWTP components that have reached the end of their useful life. These components were identified in the 2010 Master Plan and have not yet been replaced. A list of the components is included in Appendix H.
- **R&R 2 - Priority 2 Rehabilitation and Replacement Projects:** This project includes the in-kind replacement of WWTP components that have reached the end of their useful life. These components were identified in the 2010 Master Plan and have not yet been replaced. A list of the components is included in Appendix H. Priority 1 R&R projects should be completed prior to the implementation of Priority 2 projects.
- **R&R 3 - Priority 3 Rehabilitation and Replacement Projects:** This project includes the in-kind replacement of WWTP components that have reached the end of their useful life. These components were identified in the 2010 Master Plan and have not yet been replaced. A list of the components is included in Appendix H. Priority 3 R&R projects are the lowest priority R&R projects.
- **R&R 4 - Priority 4 Rehabilitation and Replacement Projects:** These projects include in-kind replacement of WWTP assets that are anticipated to reach the end of their useful life.

10.4.3 Long-Term Projects

The long-term projects are recommended for implementation in the next 10 to 30± years. These projects are anticipated to be required to meet future flows and loads and future regulations, specifically with respect to nutrient removal and treatment of wet weather flows.

Given the uncertainty of the timing and magnitude of these projects, the cost estimates for these projects are more high-level than the cost estimates provided for the critical and near-term projects. The long-term needs should be re-evaluated as part of future planning efforts to update the long-term project scope, timing, and costs based on actual changes in regulations and flows and loads.

Some of the long-term projects included in the CIP were evaluated at a high-level as part of the Facility Plan. These projects are discussed in Chapter 8. These projects were

developed to reflect current understanding of anticipated regulatory requirements for nutrient removal and wet weather bypassing. Those projects include:

- **Level 2 Nutrient Removal Improvements:** To meet the anticipated ammonia and total nitrogen limits, additional aeration basins would be required. The existing equalization basins would be converted into Aeration Basin Nos. 3 and 4 and Aeration Basin Nos. 5 and 6 would be constructed. One new blower would be installed in the Blower Building. To meet the anticipated phosphorus limits, a Chemically Enhanced Primary Treatment (CEPT) Facility would be added adjacent to the primary clarifiers. A methanol feed facility would be added near the aeration basins.

- **Level 3 Nutrient Removal Improvements:** To meet the anticipated total nitrogen limits, denitrification filters would be constructed. A methanol feed facility would be also be added near the denitrification filters. To meet the anticipated phosphorus limits, a metal salts feed facility would be added near the denitrification filters.

- **Wet Weather Improvements:** These improvements would include demolition of the existing secondary clarifiers and the construction of three new secondary clarifiers. It would also consist of installing gates and pipes in the aeration basins to allow for contact stabilization operation.

Other long-term projects include:

- **Digested Sludge Storage Tank:** This project would consist of demolishing the existing abandoned digested sludge storage tank and constructing a new tank in the same location.

- **Capital Replacement:** This project would consist of rehabilitation and replacement of new facilities that would be implemented with the CIP. The annual allocation for capital replacement is based on one percent of the project cost of the CIP projects that include new facilities.

- **Rehabilitation and Replacement Projects - FY 26/27-35/36:** These projects include in-kind replacement of WWTP assets that are anticipated to reach the end of their useful life.

- **Rehabilitation and Replacement Projects - FY 36/37-45-46:** These projects include in-kind replacement of WWTP assets that are anticipated to reach the end of their useful life.

APPENDIX A – CIP SUMMARY TABLE

Facility Plan CIP Summary
WWTP Facility Plan
City of Richmond and Veolia Water

Project ID	Project Title (Descriptive)	Total Const. Cost (Unescalated)	Total Project Cost (Unescalated) 18%	Total Project Cost w/ Veolia Markup (Unescalated) 46%	Years to Midpoint of Const.	Total Const. Cost (Escalated) 3%	Total Project Cost (Escalated) 18%	Total Project Cost w/ Veolia Markup (Escalated) 46%	Project Driver	Project Start Date	Fiscal Year Project Start	Planning/ Design (months)	Permitting / CEQA (months)	Const. (months)	Project Duration (months)	Project Duration (years)	Fiscal Year On-Line
	CRITICAL PROJECTS (YEARS 1 - 5)	**$ 30,900,000**	**$ 36,700,000**	**$ 45,400,000**		**$ 33,500,000**	**$ 39,800,000**	**$ 49,200,000**									
1.1	Screening and Grit Removal Improvements	$ 9,100,000	$ 10,700,000	$ 13,300,000	2	$ 9,700,000	$ 11,400,000	$ 14,100,000	Performance	6/1/2016	2016	12	6	24	36	3	2019
1.2	Aeration System Upgrades	$ 6,400,000	$ 7,600,000	$ 9,300,000	2	$ 6,800,000	$ 8,000,000	$ 9,900,000	Performance	6/1/2016	2016	12	6	24	36	3	2019
1.3	Secondary Clarifier Improvements	$ 3,900,000	$ 4,600,000	$ 5,700,000	2	$ 4,100,000	$ 4,900,000	$ 6,000,000	Performance	6/1/2016	2016	12	6	24	36	3	2019
1.4	Nitrification Optimization Study		$ 200,000	$ 300,000	4		$ 200,000	$ 300,000	Performance	6/1/2019	2019	12	0	0	12	1	2020
1.5	Dewatering Facility	$ 11,500,000	$ 13,600,000	$ 16,800,000	4	$ 12,900,000	$ 15,300,000	$ 18,900,000	Policy	6/1/2018	2018	12	6	24	36	3	2021
	NEAR-TERM PROJECTS (YEARS 6 - 10)	**$ 45,314,000**	**$ 53,500,000**	**$ 66,300,000**		**$ 55,100,000**	**$ 65,300,000**	**$ 80,700,000**									
2.1	Level 1 Nutrient Removal Improvements	$ 700,000	$ 800,000	$ 1,000,000	7	$ 800,000	$ 1,000,000	$ 1,200,000	Regulatory	6/1/2021	2021	12	6	12	24	2	2023
2.2	Thickening Facility	$ 3,200,000	$ 3,800,000	$ 4,700,000	7	$ 3,900,000	$ 4,600,000	$ 5,700,000	Performance	6/1/2021	2021	12	6	21	33	3	2024
2.3	Sodium Bisulfite System Replacement	$ 1,200,000	$ 1,400,000	$ 1,800,000	8	$ 1,500,000	$ 1,800,000	$ 2,200,000	R&R	6/1/2023	2023	6	6	9	15	2	2025
2.4	Digester Gas Facilities Repair	$ 500,000	$ 600,000	$ 700,000	6	$ 600,000	$ 700,000	$ 900,000	R&R	6/1/2021	2021	6	6	9	15	2	2023
2.5	Collection System SCADA Upgrades	$ 410,000	$ 500,000	$ 600,000	7	$ 500,000	$ 600,000	$ 700,000	R&R	6/1/2021	2021	12	6	24	36	3	2024
2.6	WWTP SCADA Upgrades - Phase 1	$ 3,000,000	$ 3,500,000	$ 4,400,000	7	$ 3,600,000	$ 4,300,000	$ 5,300,000	R&R	6/1/2021	2021	12	6	12	24	2	2023
2.7	3-Water System Improvements	$ 580,000	$ 700,000	$ 800,000	8	$ 700,000	$ 900,000	$ 1,100,000	R&R	6/1/2023	2023	6	6	9	15	2	2025
2.8	WWTP Lighting Improvements - Phase 1	$ 74,000	$ 100,000	$ 100,000	8	$ 100,000	$ 100,000	$ 100,000	R&R	6/1/2023	2023	6	6	9	15	2	2025
2.9	WWTP Street Paving Improvements	$ 150,000	$ 200,000	$ 200,000	10	$ 200,000	$ 200,000	$ 300,000	R&R	6/1/2025	2025	6	6	9	15	2	2027
2.10	Site Protection from Rock Slides	$ 800,000	$ 900,000	$ 1,200,000	8	$ 1,000,000	$ 1,200,000	$ 1,500,000	Performance	6/1/2023	2023	6	6	9	15	2	2025
2.11	Low-Lift Effluent Pump Station	$ 2,800,000	$ 3,300,000	$ 4,100,000	10	$ 3,700,000	$ 4,400,000	$ 5,500,000	Performance	6/1/2024	2024	12	6	18	30	3	2027
2.12	Priority 1 Rehabilitation and Replacement Projects	$ 1,000,000	$ 1,200,000	$ 1,500,000	5	$ 1,200,000	$ 1,400,000	$ 1,700,000	R&R	6/1/2021	2021				12	1	2022
2.13	Priority 2 Rehabilitation and Replacement Projects	$ 2,100,000	$ 2,500,000	$ 3,100,000	5	$ 2,400,000	$ 2,900,000	$ 3,600,000	R&R	6/1/2021	2021				24	2	2023
2.14	Priority 3 Rehabilitation and Replacement Projects	$ 7,500,000	$ 8,900,000	$ 11,000,000	5	$ 8,700,000	$ 10,300,000	$ 12,700,000	R&R	6/1/2021	2021				24	2	2023
2.15	Priority 4 Rehabilitation and Replacement Projects	$ 21,300,000	$ 25,100,000	$ 31,100,000	7	$ 26,200,000	$ 30,900,000	$ 38,200,000	R&R	6/1/2023	2023				48	4	2027
	LONG-TERM PROJECTS (YEARS 11 - 30±)	**$ 176,200,000**	**$ 207,900,000**	**$ 257,400,000**		**$ 328,500,000**	**$ 387,700,000**	**$ 479,500,000**									
3.1	Level 2 Nutrient Removal Improvements	$ 53,600,000	$ 63,200,000	$ 78,300,000	19	$ 94,000,000	$ 110,900,000	$ 137,200,000	Regulatory	6/1/2032	2032	18	6	36	54	5	2037
3.2	Level 3 Nutrient Removal Improvements	$ 24,500,000	$ 28,900,000	$ 35,800,000	29	$ 57,700,000	$ 68,100,000	$ 84,300,000	Regulatory	6/1/2043	2043	12	6	24	36	3	2046
3.3	Wet Weather Improvements	$ 45,600,000	$ 53,800,000	$ 66,600,000	24	$ 92,700,000	$ 109,400,000	$ 135,300,000	Regulatory	6/1/2037	2037	18	6	36	54	5	2042
3.4	Digested Sludge Storage (to support dewatering)	$ 2,900,000	$ 3,400,000	$ 4,200,000	13	$ 4,200,000	$ 5,000,000	$ 6,100,000	Performance	6/1/2027	2027	12	6	12	24	2	2029
3.5	Biosolids Post-Processing (Dryer Facility)	$ 13,900,000	$ 16,400,000	$ 20,300,000	13	$ 20,400,000	$ 24,100,000	$ 29,800,000	Regulatory	6/1/2027	2027	12	6	24	36	3	2030
3.6	Waste Gas Flare Replacement	$ 3,100,000	$ 3,700,000	$ 4,500,000	12	$ 4,400,000	$ 5,100,000	$ 6,400,000	R&R	6/1/2026	2026	12	6	12	24	2	2028
3.7	WWTP SCADA Upgrades - Phase 2	$ 2,500,000	$ 3,000,000	$ 3,700,000	12	$ 3,500,000	$ 4,100,000	$ 5,100,000	R&R	6/1/2026	2026	12	6	12	24	2	2028
3.8	WWTP Lighting Improvements - Phase 2	$ 2,700,000	$ 3,200,000	$ 3,900,000	11	$ 3,700,000	$ 4,400,000	$ 5,500,000	R&R	6/1/2026	2026	6	6	12	18	2	2028
3.9	WWTP Lighting Improvements - Phase 3	$ 1,300,000	$ 1,500,000	$ 1,900,000	21	$ 2,400,000	$ 2,900,000	$ 3,500,000	R&R	6/1/2036	2036	6	6	12	18	2	2038
3.10	Rehabilitation and Replacement Projects - FY 26/27-35/36	$ 6,700,000	$ 7,900,000	$ 9,800,000	10	$ 9,000,000	$ 10,600,000	$ 13,100,000	R&R	6/1/2026	2026				120	10	2036
3.11	Rehabilitation and Replacement Projects - FY 36/37-45/46	$ 7,300,000	$ 8,600,000	$ 10,700,000	20	$ 13,200,000	$ 15,600,000	$ 19,200,000	R&R	6/1/2036	2036				120	10	2046
3.12	Capital Replacement (1% of All New Construction)	$ 12,100,000	$ 14,300,000	$ 17,700,000		$ 23,300,000	$ 27,500,000	$ 34,000,000	R&R	6/1/2026	2026				240	20	2046
	10-YEAR CIP TOTAL							**$ 117,700,000**									
	ANNUAL/5-YEAR PERIOD TOTAL																
	CUMULATIVE TOTAL	**$ 252,414,000**	**$ 298,100,000**	**$ 369,100,000**		**$ 417,100,000**	**$ 492,800,000**	**$ 609,400,000**									

Annual Rate of Escalation	
ENR Construction Cost Index for Unescalated Costs (20-Cities, February 2016)	10182
Annual Rate of Escalation	3%

Program Factor	
Engineering Design	10%
Environmental mitigation	1.5%
CEQA/permitting	1.5%
Engineering Services During Construction	5%
Project Delivery Fees[(1)]	28%
Total Program Cost Factor	**46%**

(1) Includes third-party project management, legal and administrative costs and fees, construction management, construction testing and inspection provided by Veolia.

Facility Plan CIP Summary
WWTP Facility Plan
City of Richmond and Veolia Water

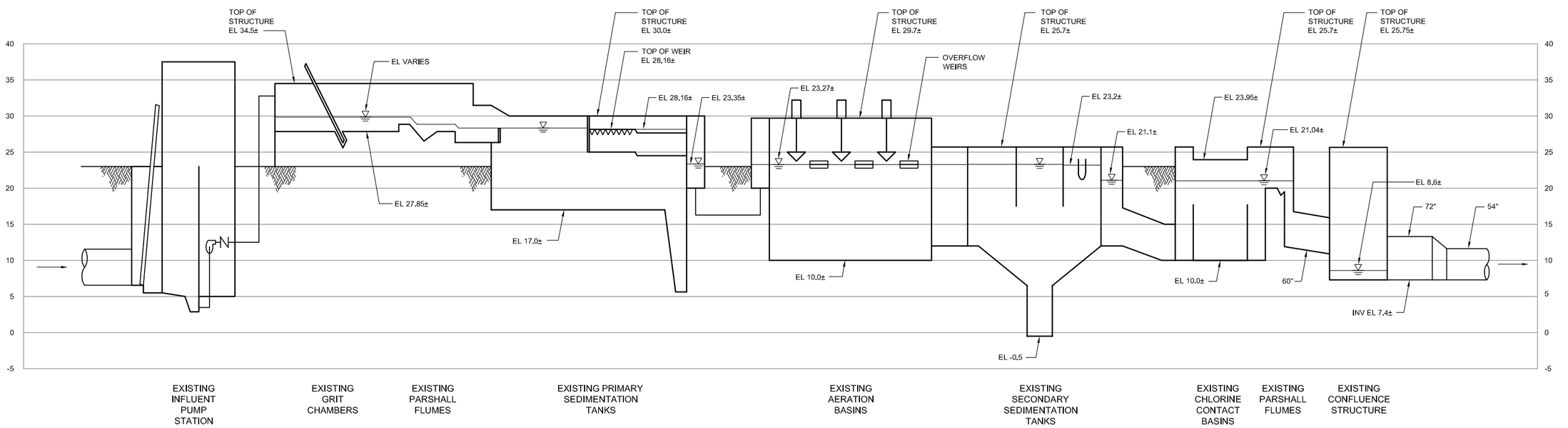
Project ID	Project Title (Descriptive)	2016 FY 16/17	2017 FY 17/18	2018 FY 18/19	2019 FY 19/20	2020 FY 20/21	2021 - 2025 FY 21/22 - FY 25/26	2026 - 2030 FY 26/27 - FY 30/31	2031 - 2035 FY 31/32 - FY 35/36	2036 - 2045 FY 36/37 - FY 40/45	Total
	CRITICAL PROJECTS (YEARS 1 - 5)	**$ 3,000,000**	**$ 13,500,000**	**$ 15,390,000**	**$ 8,805,000**	**$ 8,505,000**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 49,200,000**
1.1	Screening and Grit Removal Improvements	$ 1,410,000	$ 6,345,000	$ 6,345,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 14,100,000
1.2	Aeration System Upgrades	$ 990,000	$ 4,455,000	$ 4,455,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,900,000
1.3	Secondary Clarifier Improvements	$ 600,000	$ 2,700,000	$ 2,700,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,000,000
1.4	Nitrification Optimization Study	$ -	$ -	$ -	$ 300,000	$ -	$ -	$ -	$ -	$ -	$ 300,000
1.5	Dewatering Facility	$ -	$ -	$ 1,890,000	$ 8,505,000	$ 8,505,000	$ -	$ -	$ -	$ -	$ 18,900,000
	NEAR-TERM PROJECTS (YEARS 6 - 10)	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 68,465,000**	**$ 12,235,000**	**$ -**	**$ -**	**$ 80,700,000**
2.1	Level 1 Nutrient Removal Improvements	$ -	$ -	$ -	$ -	$ -	$ 1,200,000	$ -	$ -	$ -	$ 1,200,000
2.2	Thickening Facility	$ -	$ -	$ -	$ -	$ -	$ 5,700,000	$ -	$ -	$ -	$ 5,700,000
2.3	Sodium Bisulfite System Replacement	$ -	$ -	$ -	$ -	$ -	$ 2,200,000	$ -	$ -	$ -	$ 2,200,000
2.4	Digester Gas Facilities Repair	$ -	$ -	$ -	$ -	$ -	$ 900,000	$ -	$ -	$ -	$ 900,000
2.5	Collection System SCADA Upgrades	$ -	$ -	$ -	$ -	$ -	$ 700,000	$ -	$ -	$ -	$ 700,000
2.6	WWTP SCADA Upgrades - Phase 1	$ -	$ -	$ -	$ -	$ -	$ 5,300,000	$ -	$ -	$ -	$ 5,300,000
2.7	3-Water System Improvements	$ -	$ -	$ -	$ -	$ -	$ 1,100,000	$ -	$ -	$ -	$ 1,100,000
2.8	WWTP Lighting Improvements - Phase 1	$ -	$ -	$ -	$ -	$ -	$ 100,000	$ -	$ -	$ -	$ 100,000
2.9	WWTP Street Paving Improvements	$ -	$ -	$ -	$ -	$ -	$ 90,000	$ 210,000	$ -	$ -	$ 300,000
2.10	Site Protection from Rock Slides	$ -	$ -	$ -	$ -	$ -	$ 1,500,000	$ -	$ -	$ -	$ 1,500,000
2.11	Low-Lift Effluent Pump Station	$ -	$ -	$ -	$ -	$ -	$ 3,025,000	$ 2,475,000	$ -	$ -	$ 5,500,000
2.12	Priority 1 Rehabilitation and Replacement Projects	$ -	$ -	$ -	$ -	$ -	$ 1,700,000	$ -	$ -	$ -	$ 1,700,000
2.13	Priority 2 Rehabilitation and Replacement Projects	$ -	$ -	$ -	$ -	$ -	$ 3,600,000	$ -	$ -	$ -	$ 3,600,000
2.14	Priority 3 Rehabilitation and Replacement Projects	$ -	$ -	$ -	$ -	$ -	$ 12,700,000	$ -	$ -	$ -	$ 12,700,000
2.15	Priority 4 Rehabilitation and Replacement Projects	$ -	$ -	$ -	$ -	$ -	$ 28,650,000	$ 9,550,000	$ -	$ -	$ 38,200,000
	LONG-TERM PROJECTS (YEARS 11 - 30±)	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 62,450,000**	**$ 122,810,000**	**$ 294,240,000**	**$ 479,500,000**
3.1	Level 2 Nutrient Removal Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 109,760,000	$ 27,440,000	$ 137,200,000
3.2	Level 3 Nutrient Removal Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 84,300,000	$ 84,300,000
3.3	Wet Weather Improvements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 135,300,000	$ 135,300,000
3.4	Digested Sludge Storage (to support dewatering)	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,100,000	$ -	$ -	$ 6,100,000
3.5	Biosolids Post-Processing (Dryer Facility)	$ -	$ -	$ -	$ -	$ -	$ -	$ 29,800,000	$ -	$ -	$ 29,800,000
3.6	Waste Gas Flare Replacement	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,400,000	$ -	$ -	$ 6,400,000
3.7	WWTP SCADA Upgrades - Phase 2	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,100,000	$ -	$ -	$ 5,100,000
3.8	WWTP Lighting Improvements - Phase 2	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,500,000	$ -	$ -	$ 5,500,000
3.9	WWTP Lighting Improvements - Phase 3	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,500,000	$ 3,500,000
3.10	Rehabilitation and Replacement Projects - FY 26/27-35/36	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,550,000	$ 6,550,000	$ -	$ 13,100,000
3.11	Rehabilitation and Replacement Projects - FY 36/37-45/46	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 19,200,000	$ 19,200,000
3.12	Capital Replacement (1% of All New Construction)	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,000,000	$ 6,500,000	$ 24,500,000	$ 34,000,000
	10-YEAR CIP TOTAL	**$ 3,000,000**	**$ 13,500,000**	**$ 15,390,000**	**$ 8,805,000**	**$ 8,505,000**	**$ 68,465,000**				
	ANNUAL/5-YEAR PERIOD TOTAL	**$ 3,000,000**	**$ 13,500,000**	**$ 15,390,000**	**$ 8,805,000**	**$ 8,505,000**	**$ 68,465,000**	**$ 74,685,000**	**$ 122,810,000**	**$ 294,240,000**	**$ 609,400,000**
	CUMULATIVE TOTAL	**$ 3,000,000**	**$ 16,500,000**	**$ 31,890,000**	**$ 40,695,000**	**$ 49,200,000**	**$ 117,665,000**	**$ 192,350,000**	**$ 315,160,000**	**$ 609,400,000**	**$ 609,400,000**

Annual Rate of Escalation	
ENR Construction Cost Index for Unescalated Costs (20-Cities, February 2016)	10182
Annual Rate of Escalation	3%

Program Factor	
Engineering Design	10%
Environmental mitigation	1.5%
CEQA/permitting	1.5%
Engineering Services During Construction	5%
Project Delivery Fees[(1)]	28%
Total Program Cost Factor	**46%**

(1) Includes third-party project management, legal and administrative costs and fees, construction management, construction testing and inspection provided by Veolia.

APPENDIX B – WWTP HYDRAULIC PROFILE AT 7 MGD



NOTES:

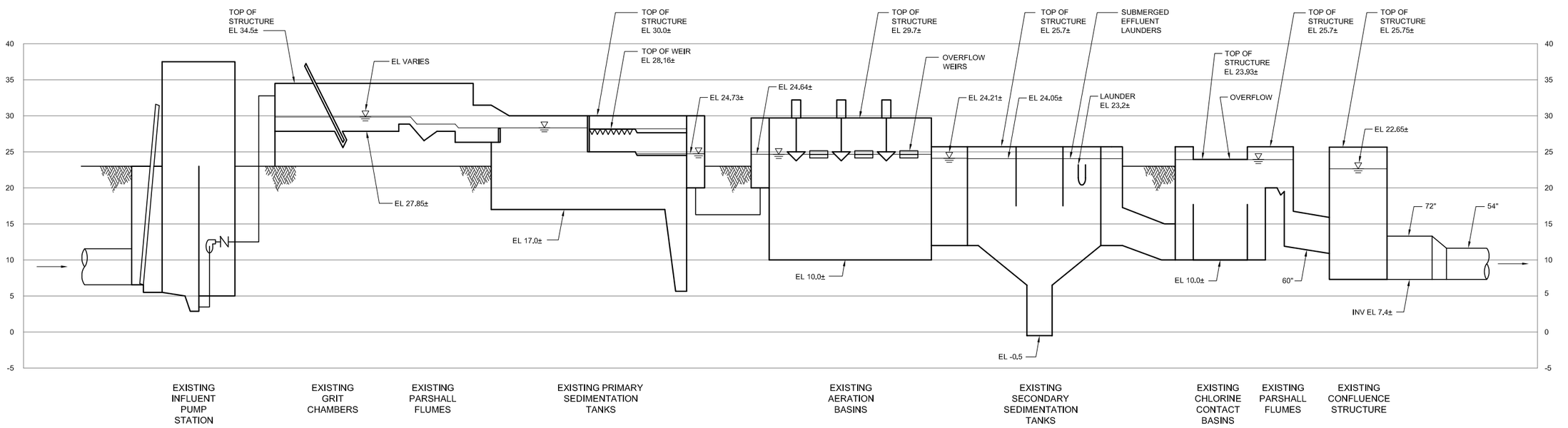
1. WATER SURFACE SHOWN AT A FLOW OF 7 MGD.
2. TIDE LEVEL ASSUMED TO BE AT MAX TIDE (ie. 8.5 FT + MLLW).

A HYDRAULIC PROFILE AT A FLOW OF 7 MGD

SCALE: HORIZ: NTS; VERT: 1" = 15'
FILE: HYDRAULIC PROFILE.DWG

Figure No. 2.31
HYDRAULIC PROFILE
RICHMOND WPCP MASTER PLAN

APPENDIX C – WWTP HYDRAULIC PROFILE AT 55 MGD



NOTES:

1. WATER SURFACE SHOWN AT FLOW OF 55 MGD AND WCWD FLOW OF 7 MGD (TOTAL = 62 MGD)
2. TIDE LEVEL ASSUMED TO BE AT MAX TIDE (ie. 8.5 FT + MLLW).

A HYDRAULIC PROFILE
SCALE: HORIZ: NTS; VERT: 1" = 15'
FILE: HYDRAULIC PROFILE.DWG

Figure No. 2.30
HYDRAULIC PROFILE
RICHMOND WPCP MASTER PLAN

APPENDIX D – NPDES PERMIT

ORDER No. R2-2013-0016
NPDES No. CA0038539

The following dischargers and discharge points are subject to waste discharge requirements set forth in this Order.

Table 1. Discharger Information

WDID	2 071037001		
Dischargers	1. West County Agency 2. West County Wastewater District 3. City of Richmond 4. Richmond Municipal Sewer District No. 1		
Facility Names	1. West County Agency Common Outfall	2. West County Wastewater District Treatment Plant and its Wastewater Collection System	3. Richmond Municipal Sewer District Water Pollution Control Plant and its Wastewater Collection System
Facility Addresses	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County	2377 Garden Tract Road Richmond, CA 94801 Contra Costa County	601 Canal Boulevard Richmond, CA 94804 Contra Costa County
CIWQS Place Numbers	215234	272082	252657
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.			

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Secondary Treated Municipal Wastewater	37º 54′ 47″ N	122º 25′ 06″ W	Central San Francisco Bay

Table 3. Administrative Information

This Order was adopted by the Regional Water Quality Control Board on:	May 8, 2013
This Order shall become effective on:	July 1, 2013
This Order shall expire on:	June 30, 2018
The Dischargers shall file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, as application for re-issuance of waste discharge requirements no later than:	December 31, 2017

I, Bruce H. Wolfe, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on the date indicated above.

_____

Bruce H. Wolfe**,** Executive Officer

Contents

I. Facility Information 4
II. Findings 4
III. Discharge Prohibitions 10
IV. Effluent Limitations and Discharge Specifications 11
A. Effluent Limitations for Conventional and Non-Conventional Pollutants 11
B. Toxic Substances Effluent Limitations 12
C. Whole Effluent Toxicity 12
V. Receiving Water Limitations 13
VI. Provisions 14
A. Standard Provisions 14
B. MRP Requirements 14
C. Special Provisions 14
1. Reopener Provisions 14
2. Effluent Characterization Study and Report 15
3. Best Management Practices and Pollutant Minimization Program 16
4. Special Provisions for POTWs 19
5. Other Special Provisions 21
VII.Compliance Determination 25

Tables

Table 1. Discharger Information 1
Table 2. Discharge Location 1
Table 3. Administrative Information 1
Table 4. Facility Information 4
Table 5. Basin Plan Beneficial Uses 8
Table 6. Conventional and Non-Conventional Pollutant Effluent Limitations 11
Table 7. Toxic Pollutant Effluent Limitations 12
Table 8. Specific Tasks to Reduce Blending 22
Table 9. Copper Action Plan 23
Table 10. Cyanide Action Plan 24

Attachments

Attachment A – Definitions A-1
Attachment B – Facility Map B-1
Attachment C – Process Flow Diagram C-1
Attachment D – Federal Standard Provisions D-1
Attachment E – Monitoring and Reporting Program (MRP) E-1
Attachment F – Fact Sheet F-1
Attachment G – Regional Standard Provisions and Monitoring and Reporting Program G-1
Attachment H – Pretreatment Requirements H-1

I. FACILITY INFORMATION

The following facilities are subject to the waste discharge requirements set forth in this Order:

Table 4. Facility Information

Dischargers	1. West County Agency 2. West County Wastewater District 3. City of Richmond 4. Richmond Municipal Sewer District No. 1		
Facility Names	1. West County Agency Common Outfall	2. West County Wastewater District Treatment Plant and its Wastewater Collection System	3. Richmond Municipal Sewer District Water Pollution Control Plant and its Wastewater Collection System
Facility Addresses	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County	2377 Garden Tract Road Richmond, CA 94801 Contra Costa County	601 Canal Boulevard Richmond, CA 94804 Contra Costa County
CIWQS Place Numbers	215234	272082	252657
CIWQS Party Numbers	300074	300074	537589
Facility Contacts, Titles, and Phone Numbers	Eddy J. Shalaby Agency Manager (510) 222 – 6700	Eddy J. Shalaby General Manager (510) 222 – 6700	Alan Wolken Interim Engineering Services Director (510) 307-8140
Mailing Addresses	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County	450 Civic Center Plaza Richmond, CA 94804 Contra Costa County
Facility Types	Publicly Owned Treatment Works (POTW)		
Permitted Flows	--	12.5 MGD	16.0 MGD
Design Flows	--	12.5 MGD dry weather capacity 21 MGD wet weather capacity	16 MGD dry weather capacity 20 MGD wet weather capacity
Service Areas	--	Parts of the City of Richmond, City of San Pablo, and adjacent unincorporated areas	Incorporated area of Richmond
Service Populations	--	93,976	68,285

II. FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Regional Water Board), finds:

A. Background. The West County Agency, a Joint Powers Agency whose members are (1) the West County Wastewater District, (2) the City of Richmond, and (3) the Richmond Municipal Sewer District No.1, is currently discharging under Order No. R2-2008-0003 (hereinafter previous order) (CIWQS Regulatory Measure No. 349718), National Pollutant Discharge Elimination System (NPDES) Permit No. CA0038539. Together, the West County Agency, the West County Wastewater District, the City of Richmond, and the Richmond Municipal Sewer District are hereinafter referred to as the Dischargers. These Dischargers submitted a Report of Waste Discharge dated October 2, 2012, and applied for NPDES permit reissuance to discharge treated wastewater to Central San Francisco Bay, a water of the United States, via a submerged diffuser.

The discharge is also regulated under Order No. R2-2012-0096 (NPDES Permit No. CA0038849), which establishes requirements on mercury and polychlorinated biphenyls (PCBs) from wastewater discharges in the region. This Order does not affect the mercury and PCBs permit. Furthermore, the Dischargers are subject to Cease and Desist Order No. R2-2008-0004, which addresses the Discharger's inability to immediately comply with certain effluent limits established in the previous order.

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 Dischargers herein.

B. Facility Description and Discharge Location

1. **Facility Description.** This permit regulates two separate wastewater treatment plants and their wastewater collection systems that combine their treated wastewater prior to discharge. The locations of the treatment plants and the common outfall are shown in Attachment B. The West County Wastewater District owns and operates the West County Wastewater District Water Pollution Control Plant (West County Plant). The West County Plant serves a population of approximately 94,000 from parts of the City of Richmond; the City of San Pablo; the communities of Tara Hills, Rollingwood, Bayview, and El Sobrante; the Crestview portion of Pinole; and some unincorporated portions of Contra Costa County. It has a design capacity of 12.5 million gallons per day (MGD) for dry weather and a hydraulic capacity of 21 MGD for wet weather conditions. The annual average daily flow in 2011 was approximately 8.8 MGD.

   The City of Richmond and the Richmond Municipal Sewer District own the Richmond Municipal Sewer District Water Pollution Control Plant (Richmond Plant). The Richmond Municipal Sewer District facilitates the allocation of sewer use fees paid by City of Richmond residents. The City handles administrative, management, and source control responsibilities and contracts out the operations and maintenance of the Richmond Plant and the sewer collection system. A private operations firm, Veolia Water West Operating Services, Inc., operates the Richmond Plant and the collection system under contract and direction of the City of Richmond. The Richmond Plant serves a population of approximately 68,000 covering most of the incorporated area of Richmond. It has a design capacity of 16 MGD for dry weather and a hydraulic capacity of 20 MGD for wet weather conditions. The annual average daily flow in 2011 was about 8.1 MGD. Chlorinated effluents from the West County Plant and the Richmond Plant are combined and dechlorinated prior to discharge from the West County Agency Common Outfall into San Francisco Bay.

2. **Collection System.** The West County Wastewater District and the City of Richmond independently own and operate their treatment plants and the sanitary sewer collection systems within their separate service areas. The West County Wastewater District has about 249 miles of gravity sewer and 11 miles of force main with 17 pump stations. The City of Richmond has about 187 miles of sewer line with 11 pump stations. Both collection systems are separately covered by the State Water Resources Control Board's (State Water Board) General Waste Discharge Requirements for Sanitary Sewer Systems (Order No. 2006-0003-DWQ).

3. **Treatment Description.** The wastewater treatment processes at the West County Plant consist of bar screens, an aerated grit chamber, primary clarifiers, a roughing filter (high-rate trickling filter), an activated sludge unit, secondary clarifiers, and chlorine contact basins. The

wastewater treatment processes at the Richmond Plant consist of bar screens, grit removal chambers, primary clarifiers, activated sludge basins, secondary clarifiers, and chlorine contact basins. Flow diagrams for the West County Plant and the Richmond Plant are shown in Attachment C. Treated wastewater from the West County Plant is transported to the Richmond Plant where it is combined with the Richmond Plant effluent, dechlorinated, and then discharged through the West County Agency's common deep-water outfall into Central San Francisco Bay.

Wet weather conditions sometime exceed the secondary treatment capacity at the Richmond Plant due to infiltration into the collection system. Under these conditions, when wet weather inflows exceed 20 MGD, excess primary-treated flows are diverted around the biological treatment units to two equalization basins with a total volume of 2 million gallons (wet weather storage). Once storage is at capacity, excess primary-treated flows are blended with the secondary-treated wastewater in the chlorine contact basin for disinfection. The combined flow is disinfected and dechlorinated prior to discharge to Central San Francisco Bay. After the wet weather event concludes, the stored wastewater in the equalization basins is drained back to the headworks and treated through the secondary treatment units.

4. **Discharge Point.** The treated wastewaters from the West County Plant and the Richmond Plant are combined, dechlorinated, and discharged through Discharge Point No. 001 about 8,200 feet offshore in Central San Francisco Bay at a depth varying from 24 to 32 feet below mean sea level. The outfall is equipped with a multi-port diffuser. The diffuser is a 6-foot diameter, 1,112-foot long reinforced concrete pipe embedded into the channel bottom and aligned in an east-west orientation. The first port is located 8,166 feet from shore. The diffuser has 140 ports spaced 8-feet apart discharging horizontally in alternating directions.

5. **Biosolids Management.** Biosolids from the Richmond Plant are thickened by dissolved air floatation, anaerobically digested, and pumped to the West County Plant for drying and disposal. At the West County Plant, primary clarifier sludge is combined with secondary clarifier sludge that has been thickened using dissolved air floatation, anaerobically digested, and dewatered in drying beds. Dried sludge from both plants is hauled offsite for disposal at Keller Canyon Landfill, West Contra Costa Landfill, or Vasco Road Landfill.

6. **Stormwater Discharge.** All stormwater in contact with equipment or wastewater at each plant is collected and directed back to the headworks for treatment. The Dischargers are not covered under the statewide general NPDES permit for stormwater discharges associated with industrial activities (NPDES General Permit No. CAS000001) because the plants do not discharge stormwater associated with industrial activity separate from that covered by this Order.

7. **Water Recycling.** About 2 to 3 MGD of treated wastewater from the West County Plant is recycled at the Chevron refinery. This involves pumping about 2 to 3 MGD of nitrified (<1 mg/L N) secondary-treated wastewater to the East Bay Municipal Utility District's Richmond Advanced Recycled Expansion (RARE) facility where the treated wastewater receives additional treatment. The RARE facility consists of microfiltration and reverse osmosis to generate high quality water for the Chevron refinery's boilers. The RARE facility generates approximately 0.36 to 0.5 MGD of microfiltration reject that is returned back to the West County Plant. The West County Plant also has the potential to recycle treated wastewater at the Richmond Country Club for golf course irrigation. There is no wastewater recycling at the Richmond Plant.

C. Legal Authorities. This Order is issued pursuant to Clean Water Act (CWA) section 402 and implementing regulations adopted by USEPA, and California Water Code (CWC) chapter 5.5, division 7, commencing with section 13370. It serves as an NPDES permit for point source discharges from the treatment plants to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to CWC article 4, chapter 4, division 7, commencing with section 13260.

D. Background and Rationale for Requirements. This Order is 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 requirements of this Order, is hereby incorporated into this Order and constitutes part of the findings for this Order. Attachments A through E and G and H are also incorporated into this Order.

E. California Environmental Quality Act (CEQA). Under CWC section 13389, this action to adopt an NPDES permit is exempt from CEQA chapter 3.

F. Technology-Based Effluent Limitations. CWA section 301(b) and NPDES regulations at Title 40 of the Code of Federal Regulations section 122.44 (40 CFR 122.44) require that permits include conditions meeting applicable technology-based requirements, at 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 CFR 133. Further discussion of the technology-based effluent limitations is included in the Fact Sheet.

G. Water Quality-Based Effluent Limitations (WQBELs). CWA section 301(b) and 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. NPDES regulations at 40 CFR 122.44(d)(1)(i) mandate 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, WQBELs must be established using (1) USEPA 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 40 CFR 122.44(d)(1)(vi).

H. Water Quality Control Plan. The *Water Quality Control Plan for the San Francisco Bay Basin* (hereinafter Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface and groundwater. It also includes implementation programs to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Board, Office of Administrative Law, and USEPA. Requirements of this Order implement the Basin Plan. Basin Plan beneficial uses for Central San Francisco Bay are listed in the table below.

Table 5. Basin Plan Beneficial Uses

Receiving Water Name	Beneficial Uses
Central San Francisco Bay	Industrial Service Supply (IND) Industrial Process Supply (PROC) Commercial, and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

The State Water Board's *Water Quality Control Plan for Enclosed Bays and Estuaries—Part 1, Sediment Quality* became effective on August 25, 2009. This plan supersedes other narrative sediment quality objectives and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

I. National Toxics Rule (NTR) and California Toxics Rule (CTR). USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995, and November 9, 1999. About 40 criteria in the NTR apply in California. On May 18, 2000, USEPA adopted the CTR, promulgating new toxics criteria for California and, in addition, incorporating the previously adopted NTR criteria that applied in the State. USEPA amended the CTR on February 13, 2001. These rules contain Water Quality Criteria for priority pollutants.

J. State Implementation Policy. On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (hereinafter State Implementation Policy [SIP]). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated through the NTR and to the priority pollutant water quality objectives established in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria USEPA promulgated through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

K. Alaska Rule. On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards become effective for CWA purposes (65 Fed. Reg. 24641 [April 27, 2000], codified at 40 CFR 131.21). Under the revised regulation (also known as the Alaska Rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

L. Stringency of Requirements for Individual Pollutants. This Order contains both technology-based and WQBELs for individual pollutants. The technology-based effluent limitations consist of restrictions on biochemical oxygen demand (5-day @ 20°C) (BOD), total suspended solids

(TSS), pH, total residual chlorine, and oil and grease. These technology-based limitations are discussed further in the Fact Sheet. This Order's technology-based pollutant restrictions implement the minimum applicable federal technology-based requirements and are more stringent than the minimum federal technology-based requirements only as necessary to meet water quality standards.

In this Order, WQBELs 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. To the extent that toxic pollutant WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. On May 18, 2000, USEPA approved the procedures for calculating individual WQBELs for priority pollutants based on the SIP. Most beneficial uses and water quality objectives contained in the Basin Plan were approved under State law and submitted to USEPA. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for the purposes of the CWA" pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the CWA.

M. Antidegradation Policy. NPDES regulations at 40 CFR 131.12 require that 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 No. 68-16, which incorporates the federal antidegradation policy where the federal policy applies under federal law and requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

N. Anti-Backsliding Requirements. CWA sections 402(o)(2) and 303(d)(4) and 40 CFR 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 order, with some exceptions where limitations may be relaxed. As discussed in the Fact Sheet, the permitted discharge is consistent with the anti-backsliding requirements of the CWA and federal regulations.

O. Endangered Species Act. 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 sections 2050 to 2097) or the federal Endangered Species Act (16 U.S.C.A. sections 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. The Dischargers are responsible for meeting all requirements of applicable State and federal law pertaining to threatened and endangered species.

P. Monitoring and Reporting. NPDES regulations at 40 CFR 122.48 require that all NPDES permits specify requirements for recording and reporting monitoring results. CWC sections 13267 and 13383 authorize the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (MRP, Attachment E) establishes monitoring and reporting requirements to implement federal and State requirements.

Q. Standard and Special Provisions. Attachment D contains Federal Standard Provisions that apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42. The Dischargers must comply

with all standard provisions and with those additional conditions that apply under 40 CFR 122.42. The Dischargers must also comply with the Regional Standard Provisions provided in Attachment G. The Regional Water Board has also included in this Order special provisions applicable to the Dischargers. The Fact Sheet provides rationales for the special provisions.

R. Provisions and Requirements Implementing State Law. None of the requirements in this Order are included to implement State law only.

S. Notification of Interested Parties. The Regional Water Board notified the Dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharge and provided them with an opportunity to submit written comments and recommendations. The Fact Sheet provides details regarding the notification.

T. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. The Fact Sheet provides details regarding the public hearing.

IT IS HEREBY ORDERED, that this Order supersedes Order No. R2-2008-0003, except for enforcement purposes, and, in order to meet the provisions contained in CWC Division 7 (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act (CWA) and regulations and guidelines adopted thereunder, the Dischargers shall comply with the requirements in this Order. This Order also rescinds Cease and Desist Order No. R2-2008-0004, except for enforcement purposes.

III. DISCHARGE PROHIBITIONS

A. Discharge of treated wastewater at a location or in a manner different from that described in this Order is prohibited.

B. Discharge at any point at which the treated wastewater does not receive an initial dilution of at least 25:1 (nominal) is prohibited. Compliance shall be achieved by proper operation and maintenance of the discharge outfall to ensure that it (or its replacement, in whole or in part) is in good working order, and is consistent with or can achieve better mixing than that described in the Fact Sheet . The Dischargers shall address measures taken to ensure this in their application for permit reissuance.

C. The bypass of untreated or partially treated wastewater to waters of the United States is prohibited, except as provided for in the conditions stated in Attachment D section I.G.

Blended wastewater is biologically-treated wastewater blended with wastewater diverted around biological treatment units or advanced treatment units. Such discharges are approved under the bypass conditions stated in 40 CFR 122.41(m)(4) when (1) the peak wet weather influent flow volume at the Richmond Plant exceeds the wet weather capacity of 20.0 MGD, (2) the discharge complies with the effluent and receiving water limitations contained in this Order, and (3) the City of Richmond and the Richmond Municipal Sewer District comply with Provision VI.C.5.a. Furthermore, the City of Richmond and the Richmond Municipal Sewer District shall operate the Richmond Plant as designed and in accordance with the Operation and Maintenance Manual developed for the Richmond Plant. This means they shall optimize storage and use of equalization units and shall fully use the biological treatment units and advanced treatment units. The City of Richmond and the Richmond Municipal Sewer District shall report incidents of blended effluent

discharges in routine monitoring reports and shall monitor their discharge as specified in the MRP. Blended wastewater discharges are prohibited at the West County Plant.

D. The average dry weather flow for the West County Plant, as measured at Monitoring Location INF-003, shall not exceed 12.5 MGD. The average dry weather flow for the Richmond Plant, as measured at Monitoring Location INF-002, shall not exceed 16 MGD. Average dry weather flow shall be determined for compliance with this prohibition over three consecutive dry weather months each year.

E. Any sanitary sewer overflow that results in a discharge of untreated or partially-treated wastewater to waters of the United States is prohibited.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations for Conventional and Non-Conventional Pollutants

1. The Dischargers shall maintain compliance with the following effluent limitations, with compliance measured at each treatment facility (Monitoring Locations EFF-002, EFF-002B, and EFF-003) as indicated below:

Table 6. Conventional and Non-Conventional Pollutant Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
BOD 5-day @ 20°C (BOD_5)	mg/L	30	45	---	---	---
Total Suspended Solids (TSS)	mg/L	30	45	---	---	---
BOD_5 and TSS percent removal [1]	%	85 minimum	---	---	---	---
Oil and Grease	mg/L	10	---	20	---	---
pH [2]	s.u.	---	---	---	6.0	9.0

Unit Abbreviations:

mg/L = milligrams per liter
s.u. = standard units

[1] 85 Percent Removal. The arithmetic mean of BOD_5 at 20°C and TSS, by concentration, for effluent samples collected at EFF-002 and EFF-003 as described in the MRP in each calendar month shall not exceed 15 percent of the arithmetic mean of the respective values, by concentration, for influent samples collected at INF-002 and INF-003, as described in the MRP, at approximately the same times during the same period.

[2] pH. If the Dischargers monitors pH continuously, pursuant to 40 CFR 401.17, the Dischargers shall be in compliance with the pH limitation specified herein provided that both of the following conditions are satisfied: (i) the total 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 (ii) no individual excursion from the range of pH values shall exceed 60 minutes.

2. Chlorine Residual: The instantaneous maximum total chlorine residual at Discharge Point No. 001 (Monitoring Location EFF-001) shall not exceed 0.0 mg/L. The Dischargers may elect to use a continuous online monitoring systems for measuring flow, chlorine residual and sodium bisulfite (or other dechlorinating chemical) dosage (including a safety factor) and concentration to prove that chlorine residual exceedances are false positives. If convincing evidence is provided, Regional Water Board staff may conclude that these false positive chlorine residual exceedances are not violations of this permit limitation.

3. **Enterococcus Bacteria:** The geometric mean of the enterococcus bacteria concentration of all samples in a calendar month shall not exceed 35 most probably number (MPN)/100 mL, with compliance measured at Monitoring Locations EFF-002, EFF-002B, and EFF-003.

4. **Total Coliform Bacteria:** The median total coliform density of all samples in a calendar month shall not exceed 240 MPN/100 mL and the daily maximum value shall not exceed 10,000 MPN/100mL, with compliance measured at Monitoring Locations EFF-002, EFF-002B, and EFF-003.

B. Toxic Substances Effluent Limitations

Discharges at Discharge Point No. 001 shall comply with the following limitations with compliance measured at Monitoring Location EFF-001 and EFF-001B:

Table 7. Toxic Pollutant Effluent Limitations

Constituent	Units	Effluent Limitations[1,2]	
		Average Monthly	Maximum Daily
Copper	µg/L	44	76
Nickel	µg/L	34	59
Cyanide	µg/L	19	41
Dioxin-TEQ	µg/L	1.4×10^{-8}	2.8×10^{-8}
Bis(2-Ethylhexyl)Phthalate	µg/L	55	150
Endrin	µg/L	0.019	0.037
Heptachlor	µg/L	0.0019	0.0039
Total Ammonia, as N	mg/L	32	59

Unit Abbreviations:

µg/L = micrograms per liter
mg/L = milligrams per liter

[1] Limitations apply to the average concentration of all samples collected during the averaging period (daily = 24-hour period; monthly = calendar month).

[2] All limitations for metals are expressed as total recoverable metals.

C. Whole Effluent Toxicity

1. Whole Effluent Acute Toxicity

a. Discharges at Discharge Point No. 001 shall meet the following acute toxicity limits. Bioassays shall be conducted in compliance with MRP section V.A with compliance measured at Monitoring Location EFF-001 as described in the MRP:

(1) An eleven (11) – sample median value of not less than 90 percent survival; and
(2) An eleven (11) – sample 90^{th} percentile value of not less than 70 percent survival.

b. These acute toxicity limitations are further defined as follows:

(1) **11-sample median**. A bioassay test showing survival of less than 90 percent represents a violation of this effluent limit, if five or more of the past ten or less bioassay tests show less than 90 percent survival.

(2) **11-sample 90th percentile**. A bioassay test showing survival of less than 70 percent represents a violation of this effluent limit, if one or more of the past ten or less bioassay tests show less than 70 percent survival.

If the Dischargers can demonstrate to the satisfaction of the Executive Officer that toxicity exceeding the levels cited above is caused by ammonia and that the ammonia in the discharge complies with the ammonia effluent limits, then such toxicity shall not constitute a violation of this effluent limitation.

c. Bioassays shall be performed using the most up-to-date USEPA protocols and species as specified in MRP section V.A. Bioassays shall be conducted in compliance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, currently 5th Edition (EPA-821-R-02-012). If these protocols prove unworkable, the Executive Officer and the Environmental Laboratory Accreditation Program may grant exceptions in writing upon the Discharger's request with justification.

d. If the Discharger can demonstrate that toxicity exceeding the levels cited above is caused by ammonia and that the ammonia in the discharge complies with ammonia effluent limits, then such toxicity does not constitute a violation of this effluent limitation.

2. Whole Effluent Chronic Toxicity

The discharge shall not contain chronic toxicity at a level that would cause or contribute to toxicity in the receiving water. Chronic toxicity is a detrimental biological effect of growth rate, reproduction, fertilization success, larval development, or any other relevant measure of the health of an organism population or community. Compliance with this limit shall be determined by analysis of indicator organisms and toxicity tests. Compliance shall be measured at Discharge Point 001, Monitoring Location EFF-001.

V. RECEIVING WATER LIMITATIONS

A. The discharge of waste shall not cause the following conditions to exist in waters of the State:

1. Floating, suspended, or deposited macroscopic particulate matter or foams;

2. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

3. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

4. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and

5. Toxic or other deleterious substances to be present in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

B. The discharge of waste shall not cause the following limits to be exceeded in waters of the State within 1 foot of the water surface:

1.	Dissolved Oxygen	5.0 mg/L, minimum Furthermore, the median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, the discharge shall not cause further reduction in ambient dissolved oxygen concentrations.
2.	Dissolved Sulfide	Natural background levels
3.	pH	The pH shall not be depressed below 6.5 or raised above 8.5. The discharge shall not cause changes greater than 0.5 pH units in normal ambient pH levels.
4.	Nutrients	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

C. The discharge shall not cause a violation of any particular water quality standard for receiving waters adopted by the Regional Water Board or the State Water Board as required by the CWA and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to CWA section 303, or amendments thereto, the Regional Water Board may revise and modify this Order in accordance with such more stringent standards.

VI. PROVISIONS

A. Standard Provisions

1. Federal Standard Provisions. The Dischargers shall comply with the Federal Standard Provisions in Attachment D of this Order.

2. Regional Standard Provisions. The Dischargers shall comply with all applicable items of the Regional Standard Provisions, and Monitoring and Reporting Requirements (Supplement to Attachment D) for NPDES Wastewater Discharge Permits (Attachment G).

B. MRP Requirements

The Dischargers shall comply with the MRP and future revisions thereto, including applicable sampling and reporting requirements in the standard provisions listed in Provision VI.A above.

C. Special Provisions

1. Reopener Provisions

The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law:

a. If present or future investigations demonstrate that the discharges governed by this Order have or will have a reasonable potential to cause or contribute to, or will cease to have, adverse impacts on water quality or beneficial uses of the receiving waters.

b. If new or revised water quality objectives or total maximum daily loads (TMDLs) come into effect for the San Francisco Bay Estuary and contiguous water bodies (whether Statewide, regional, or site-specific). In such cases, effluent limitations in this Order will be modified as necessary to reflect updated water quality objectives and waste load allocations in TMDLs. Adoption of effluent limitations contained in this Order is not intended to restrict in any way future modifications based on legally adopted water quality objectives or TMDLs, or as otherwise permitted under federal regulations governing NPDES permit modifications.

c. If translator, dilution, or other water quality studies provide a basis for determining that a permit condition should be modified.

d. If State Water Board precedential decisions, new policies, new laws, or new regulations on chronic toxicity or total chlorine residual become available.

e. If an administrative or judicial decision on a separate NPDES permit or WDRs addresses requirements similar to this discharge.

f. If the Dischargers request adjustments in effluent limits due to the implementation of a stormwater diversion pursuant to the Municipal Regional Stormwater Permit (No. CA0038593), for redirecting dry weather and first flush discharges from the storm drain system to the sanitary sewer system as a stormwater pollutant control strategy.

g. If the Dischargers submit additional information indicating that ammonia effluent concentrations will increase as a result of additional water recycling or water conservation measures.

h. Or as otherwise authorized by law.

The Dischargers may request permit modification based on any of the circumstances described above. With any such request, the Dischargers shall include antidegradation and anti-backsliding analyses.

With the consent of the Dischargers, the Executive Officer may make minor modifications to this Order for the purposes set forth in 40 CFR 122.63.

2. Effluent Characterization Study and Report

a. Study Elements

The Dischargers shall continue to characterize and evaluate discharge from the following discharge points to verify that the "no" or "cannot determine" reasonable potential analysis conclusions of this Order remain valid and to inform the next permit reissuance. The Dischargers shall collect representative samples of the discharge at Discharge Point 001 (measured at Monitoring Location EFF-001) once per calendar year.

The samples shall be analyzed for the priority pollutants listed in Attachment G, Table C, except for those priority pollutants with effluent limitations where the MRP already requires monitoring. Compliance with this requirement shall be achieved in accordance with the specifications of Attachment G, sections III.A.1 and III.A.2.

The Dischargers shall evaluate on an annual basis if concentrations of any of these priority pollutants significantly increase over past performance. The Dischargers shall investigate the cause of such increase. The investigation may include, but need not be limited to, an increase in monitoring frequency, monitoring of internal process streams, and monitoring of influent sources. The Dischargers shall establish remedial measures addressing any increase resulting in reasonable potential to cause or contribute to an excursion above applicable water quality objectives. This requirement may be satisfied through identification of the constituent as a "pollutant of concern" in the Dischargers' Pollutant Minimization Program, described in Provision VI.C.3.

b. Reporting Requirements

i. Routine Reporting

The Dischargers shall, within 30 days of receipt of analytical results, report in the transmittal letter for the appropriate monthly self-monitoring report the following:

a. Indication that a sample or samples for this characterization study was or were collected; and

b. Identity of priority pollutants detected at or above applicable Water Quality Criteria (see Fact Sheet Table F-10 for the criteria), together with the detected concentrations of those pollutants.

ii. Annual Reporting

The Dischargers shall provide a summary of the annual data evaluation and source investigation in the annual self-monitoring report.

iii. Final Report

The Dischargers shall submit a final report that presents all these data to the Regional Water Board no later than December 31, 2017. The final report shall be submitted with the application for permit reissuance.

3. Best Management Practices and Pollutant Minimization Program

a. The West County Wastewater District and the City of Richmond shall continue to improve their existing Pollutant Minimization Programs to promote minimization of pollutant loadings to the treatment plants and therefore to the receiving waters.

b. The Dischargers shall submit an annual report no later than February 28 of each calendar year. Each annual report shall include at least the following information:

(1) *A brief description of each treatment plant, treatment plant processes and service area*.

(2) *A discussion of the current pollutants of concern.* Periodically, the Dischargers shall analyze their own situation to determine which pollutants are currently a problem and which pollutants may be potential future problems. This discussion shall include the reasons for choosing the pollutants.

(3) *Identification of sources of pollutants of concern*. This discussion shall include how the Dischargers intend to estimate and identify sources of pollutants of concern. The Dischargers shall also identify sources or potential sources not directly within the ability or authority of the Dischargers to control, such as pollutants in the potable water supply and air deposition.

(4) *Identification of tasks to reduce sources of pollutants of concern.* This discussion shall identify and prioritize tasks to address the Dischargers' pollutants of concern. The Dischargers may implement the tasks by itself or participate in group, regional, or national tasks that will address its pollutants of concern. The Dischargers are strongly encouraged to participate in group, regional, or national tasks that will address its pollutants of concern whenever it is efficient and appropriate to do so. A time line shall be included for the implementation of each task.

(5) *Outreach to employees.* The Dischargers shall inform employees about the pollutants of concern, potential sources, and how they might be able to help reduce the discharge of these pollutants of concern into the treatment facilities. The Dischargers may provide a forum for employees to provide input.

(6) *Continuation of Public Outreach Program.* The Dischargers shall prepare public outreach programs to communicate pollution prevention messages to its service area. Outreach may include participation in existing community events such as county fairs, initiating new community events such as displays and contests during Pollution Prevention Week, conducting school outreach programs, conducting plant tours, and providing public information in newspaper articles or advertisements, radio or television stories or spots, newsletters, utility bill inserts, and web sites. Information shall be specific to target audiences. The Dischargers shall coordinate with other agencies as appropriate.

(7) *Discussion of criteria used to measure Pollutant Minimization Program and task effectiveness*. The Dischargers shall establish criteria to evaluate the effectiveness of their Pollutant Minimization Program. This section shall discuss the specific criteria used to

measure the effectiveness of each of the tasks in sections VI.C.3.b(3), (4), (5), and (6).

(8) *Documentation of efforts and progress.* This discussion shall detail all of the Dischargers' Pollutant Minimization Program activities during the reporting year.

(9) *Evaluation of Pollutant Minimization Program and task effectiveness.* The Dischargers shall use the criteria established in section VI.C.3.b.(7) to evaluate the Program's and tasks' effectiveness.

(10) *Identification of specific tasks and time schedules for future efforts.* Based on the evaluation, the Dischargers shall detail how they intend to continue or change their tasks in order to more effectively reduce the amount of pollutants to the treatment plant, and subsequently in its effluent.

c. Pollutant Minimization Program for Pollutants with Effluent Limitations

The Dischargers shall develop and conduct a Pollutant Minimization Program as further described below when there is evidence that a priority pollutant is present in the effluent above an effluent limitation (e.g., sample results reported as DNQ when the effluent limitation is less than the MDL, 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) and either:

(1) A sample result is reported as DNQ and the effluent limitation is less than the RL; or

(2) A sample result is reported as ND and the effluent limitation is less than the MDL, using SIP definitions.

d. Pollutant Minimization Program Submittals for Pollutants with Effluent Limitations

If triggered by the reasons in section VI.C.3.c, above, the Discharger's Pollutant Minimization Program shall include, but not be limited to, the following actions and submittals:

i. Annual review and semi-annual monitoring of potential sources of the reportable priority pollutants. The Executive Officer may approve alternate measures, such as fish tissue monitoring or other bio-uptake sampling when it is demonstrated that source monitoring is unlikely to produce useful analytical data;

ii. Quarterly monitoring for the reportable priority pollutants in the influent to the wastewater treatment system. The Executive Officer may approve alternative measures when it is demonstrated that influent monitoring is unlikely to produce useful analytical data;

iii. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable priority pollutants in the effluent at or below effluent limitations;

iv. Implementation of appropriate cost-effective control measures for the reportable priority pollutants, consistent with the control strategy; and

v. Annual report required by section VI.C.3.b, above, which shall specifically include the following items:

1. All Pollutant Minimization Program monitoring results for the previous year;

2. List of potential sources of the reportable priority pollutants;

3. Summary of all actions undertaken pursuant to the control strategy; and

4. Description of actions to be taken in the following year.

4. Special Provisions for POTWs

a. Pretreatment Program Requirements

(1) The West County Wastewater District and the City of Richmond shall implement and enforce their respective approved pretreatment programs in accordance with Federal Pretreatment Regulations (40 CFR 403); pretreatment standards promulgated under CWA Sections 307(b), 307(c), and 307(d); pretreatment requirements specified at 40 CFR 122.44(j) and the requirements in Attachment H, "Pretreatment Requirements." The Discharger's responsibilities include, but are not limited to, the following:

(a) Enforcement of National Pretreatment Standards of 40 CFR 403.5 and 403.6;

(b) Implementation of its pretreatment program in accordance with legal authorities, policies, procedures, and financial provisions described in the General Pretreatment regulations (40 CFR 403) and its approved pretreatment program;

(c) Submission of reports to USEPA, the State Water Board, and the Regional Water Board, as described in Attachment H;

(d) Evaluation of the need to revise local limits under 40 CFR 403.5(c)(1), and within 180 days after the effective date of this Order, submit a report describing a plan and schedule for implementation. If deemed unnecessary, the report shall indicate that the Dischargers evaluated local limits, but no changes were needed.

(2) The Dischargers shall implement an approved pretreatment program and the program shall be an enforceable condition of this Order. If the Dischargers fail to perform the pretreatment functions, the Regional Water Board, the State Water Board, or the USEPA may take enforcement actions against the Dischargers as authorized by the CWA.

b. Biosolids Management Practices

(1) All biosolids generated by the Dischargers shall be disposed of, managed or reused in a municipal solid waste landfill, through land application, as a Class A compost, through a waste to energy facility, or other recognized and approved technology, disposed of in a sludge-only landfill or fired in a sewage sludge incinerator in accordance with 40 CFR Part 503. If the Dischargers desire to dispose of biosolids by a different method, a request for permit modification must be submitted to USEPA 180 days before start-up of the alternative disposal practice. All the requirements in 40 CFR 503 are enforceable by USEPA whether or not they are stated in an NPDES permit or other permit issued to the Dischargers. The Regional Water Board should be copied on relevant correspondence and reports forwarded to USEPA regarding biosolids management practices.

(2) Biosolids treatment, storage and disposal or reuse shall not create a nuisance, such as objectionable odors or flies, or result in groundwater contamination.

(3) The Dischargers shall take all reasonable steps to prevent or minimize any biosolids use or disposal which has a likelihood of adversely affecting human health or the environment.

(4) The discharge of biosolids shall not cause waste material to be in a position where it is or can be carried from the sludge treatment and storage site and deposited in waters of the State.

(5) The biosolids treatment and storage site shall have facilities adequate to divert surface runoff from adjacent areas, to protect boundaries of the site from erosion, and to prevent any conditions that would cause drainage from the materials in the temporary storage site. Adequate protection is defined as protection from at least a 100-year storm and protection from the highest possible tidal stage that may occur.

(6) For biosolids that are applied to the land, placed on a surface disposal site, or fired in a sludge incinerator as defined in 40 CFR 503, the Dischargers shall submit an annual report to USEPA and the Regional Water Board containing monitoring results and pathogen and vector attraction reduction requirements as specified by 40 CFR 503, postmarked February 15 of each year, for the period covering the previous calendar year.

(7) Biosolids disposed of in a municipal solid waste landfill shall meet the requirements of 40 CFR Part 258. In the annual Self-Monitoring Report, the Dischargers shall include the amount of biosolids disposed and the landfill to which it was sent.

(8) This Order does not authorize permanent onsite biosolids storage or disposal. A Report of Waste Discharge shall be filed and the site brought into compliance with all applicable regulations prior to commencement of any such activity.

(9) Biosolids Monitoring and Reporting Provisions of this Regional Water Board's Standard Provisions, apply to sludge handling, disposal, and reporting practices.

(10) The Regional Water Board may amend this Order prior to expiration if changes occur in applicable State and federal biosolids regulations.

c. Sanitary Sewer Overflows and Sewer System Management Plan

The Dischargers' conveyance and collection systems are part of the facilities subject to this Order. As such, the Dischargers shall properly operate and maintain their collection systems (Attachment D, section I.D). The West County Wastewater District and the City of Richmond shall each separately report any noncompliance (Attachment D, sections V.E.1 and V.E.2) and mitigate any discharge from the Discharger's collection systems in violation of this Order (Attachment D, section I.C).

The General Waste Discharge Requirements for Collection System Agencies (General Collection System WDRs), Order No. 2006-0003-DWQ, has requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows. While the West County Wastewater District and the City of Richmond must each comply independently with both the General Collection System WDRs and this Order, the General Collection System WDRs more clearly and specifically stipulate requirements for operation and maintenance, and for reporting and mitigating sanitary sewer overflows.

Implementation of the General Collection System WDRs for proper operation and maintenance and mitigation of sanitary sewer overflows will satisfy the corresponding federal NPDES requirements specified in Attachment D (as supplemented by Attachment G). Following notification and reporting requirements in the General Collection System WDRs will satisfy NPDES reporting requirements specified in Attachment D (as supplemented by Attachment G) for sanitary sewer overflows from the collection system upstream of the treatment plant boundaries. Attachments D and G specify reporting requirements for unauthorized discharges from anywhere within the plant downstream of the plant boundaries.

5. Other Special Provisions

a. Specific Tasks to Reduce Blending

The City of Richmond and the Richmond Municipal Sewer District shall implement all feasible alternatives to reduce blending resulting from inflow and infiltration into the collection system. At minimum, the City of Richmond and the Richmond Municipal Sewer District shall complete the following tasks. The City of Richmond may request, and the Regional Water Board authorizes the Executive Officer to approve, changes to Tasks 1-8 and the associated deadlines specified below. The request and any approvals must be in writing. The basis for the request may include allowing the City of Richmond and the Richmond Municipal Sewer District time to consider a change in strategy for achieving compliance with the collection system and plant upgrades to reduce blending. The Executive Officer may modify the tasks and deadlines as long as there is reasonable

progress toward development of an alternative strategy and reasonable assurance that the alternative strategy will achieve equal or better results.

Table 8. Specific Tasks to Reduce Blending

Task	Compliance Date
1. 2014/2015 Sewer Projects Workplan The City of Richmond and the Richmond Municipal Sewer District shall submit a workplan identifying specific sewer rehabilitation projects to be done between July 2014 and June 2015. The workplan shall include repair and/or replacement of at least two miles of sewer lines.	August 1, 2013
2. 2014/2015 Sewer Projects Completion Report The City of Richmond and the Richmond Municipal Sewer District shall submit a report verifying completion of the 2014/2015 sewer projects identified in Task 1.	December 1, 2015
3. Third Street Stormwater Abatement Project Investigation Report and Workplan The City of Richmond and the Richmond Municipal Sewer District shall submit the results of an investigation to identify potential stormwater outfall locations that are submerged during high tides and submit a work plan to install check valves or flapgates on the outfall discharge pipes.	September 1, 2013
4. Third Street Stormwater Abatement Project Completion Report The City of Richmond and the Richmond Municipal Sewer District shall submit a report verifying implementation of the work identified in the workplan described in Task 3.	September 1, 2014
5. 13th Street Sewer Project The City of Richmond and the Richmond Municipal Sewer District shall submit a report verifying completion of the 13th Street sewer project to complete repair and/or replacement of at least one mile of sewer lines.	November 1, 2014
6. 2015/2016 Sewer Project Workplan The City of Richmond and the Richmond Municipal Sewer District shall submit a workplan identifying specific sewer rehabilitation projects to be done between July 2015 and June 2016. The workplan shall include repair and/or replacement of at least two miles of sewer lines.	August 1, 2014
7. 2015/2016 Sewer Projects Completion Report The City of Richmond and the Richmond Municipal Sewer District shall submit a report verifying completion of the 2015/2016 sewer projects identified in Task 6.	November 1, 2016
8. Wet Weather Storage Project The City of Richmond and the Richmond Municipal Sewer District shall install and put into service new wet weather pumping and storage facilities at the Richmond Plant, including a storage tank designed to provide wet weather storage at the Plant for at least 3 million gallons. The tank shall be designed to contain influent from a 10-year, 24-hour storm.	September 1, 2014
9. 2016/2017 Sewer Project Workplan The City of Richmond and the Richmond Municipal Sewer District shall submit a workplan identifying specific sewer rehabilitation projects to be done between July 2016 and June 2017. The workplan shall include repair and/or replacement of at least two miles of sewer lines.	August 1, 2015
10. 2016/2017 Sewer Projects Completion Report The City of Richmond and the Richmond Municipal Sewer District shall submit a report verifying completion of the 2016/2017 sewer projects identified in Task 9.	December 1, 2017

Task	Compliance Date
11. Report Progress on Implementing the Wet Weather Improvement Plan. The Dischargers shall evaluate and report on the implementation and effectiveness of their Wet Weather Improvement Plan.	Annually, with Annual Self-Monitoring Report due Feb 1 of each year
12. No Feasible Alternatives Analysis (Utility Analysis). If the City of Richmond and the Richmond Municipal Sewer District seek to continue to bypass peak wet weather flows around the secondary treatment units at the Richmond Plant based on 40 CFR 122.41(m)(4)(i)(A)-(C), they shall conduct a Utility Analysis that contains all elements described in USEPA's proposed guidance *NPDES Permit Requirements for Peak Wet Weather Discharges from Publicly Owned Treatment Works Treatment Plants Serving Separate Sanitary Sewer Collection Systems* (December 2005, or the most recent version). In addressing these elements, the Utility Analysis shall specifically contain an alternatives analysis for blending reduction to evaluate strategies to further reduce blending through capital improvements. The analysis shall identify all feasible alternatives and explain why infeasible alternatives are infeasible. The Dischargers shall select feasible actions based on factors including, but not limited to, the need to blend (considering the effectiveness of the collection system and treatment plant improvement projects), the alternative's foreseeable impact on the need to blend, and the alternative's estimated cost relative to the Dischargers' ability to finance the cost. (One means to assess a community's ability to fund wet weather improvements is to consult USEPA's CSO Guidance for Financial Capability Assessment and Schedule Development, EPA Publication Number 832-B-97-004.) The Utility Analysis shall include a timeline for implementation of feasible actions. The primary purposes of the Utility Analysis are to demonstrate that there are currently no feasible alternatives to blending (i.e., all feasible actions that could have been implemented have been implemented) and to identify all feasible actions that can be implemented within the next permit reissuance cycle.	With Report of Waste Discharge due December 31, 2017
13. The City of Richmond shall develop a protocol to alert the public of any bypass, including blending. The protocol shall provide a mechanism to notify the public within 24 hours of the start of a blending incident and provide an approximate duration and volume for the incident within 48 hours of it ending. The mechanism could involve, for example, Website posting or emailing a list of parties who have expressed interest in this information. The Dischargers shall submit the protocol to the Regional Water Board.	October 1, 2013

b. Copper Action Plan

The Dischargers shall implement pretreatment, source control, and pollution prevention for copper in accordance with the following tasks and time schedule:

Table 9. Copper Action Plan

Task	Compliance Date
1. Review Potential Copper Sources The Dischargers shall submit an inventory of potential copper sources to the treatment plants.	Completed May 2009

2. Implement Copper Control Program The Dischargers shall submit a plan for and begin implementation of a program to reduce copper sources identified in Task 1. For publicly owned treatment works, the plan shall consist, at a minimum, of the following elements: a. Provide education and outreach to the public (e.g., focus on proper pool and spa maintenance and plumbers' roles in reducing corrosion). b. If corrosion is determined to be a significant copper source, work cooperatively with local water purveyors to reduce and control water corrosivity, as appropriate, and ensure that local plumbing contractors implement best management practices to reduce corrosion in pipes. c. Educate plumbers, designers, and maintenance contractors for pools and spas to encourage best management practices that minimize copper discharges.	Completed February 2010
3. Implement Additional Measures If the Regional Water Board notifies the Dischargers that the three-year rolling mean dissolved copper concentration of the receiving water exceeds 2.2 µg/L, then within 90 days of the notification, the Dischargers shall evaluate their effluent copper concentration trend, and if it is increasing, develop and begin implementation of additional measures to control copper discharges. The Dischargers shall report on the progress and effectiveness of actions taken, together with a schedule for actions to be taken in the next 12 months.	With annual pollution prevention report due February 28 following 90 days after notification
4. Undertake Studies to Reduce Copper Pollutant Impact Uncertainties The Dischargers shall submit an updated study plan and schedule to conduct, or cause to be conducted, technical studies to investigate possible copper sediment toxicity and technical studies to investigate sublethal effects on salmonids. Specifically, the Dischargers shall include the manner in which the above will be accomplished and describe the studies to be performed with an implementation schedule. To satisfy this requirement, the Dischargers may collaborate and conduct these studies as a group.	Completed January 2011
5. Report Status of Copper Control Program The Dischargers shall submit an annual report documenting copper control program implementation and addressing the effectiveness of the actions taken, including any additional copper controls required by Task 3, above, together with a schedule for actions to be taken in the next 12 months. Additionally, the Dischargers shall report the findings and results of the studies completed, planned, or in progress under Task 4. Regarding the Task 4 studies, dischargers may collaborate and provide this information in a single report to satisfy this requirement for an entire group.	With annual pollution prevention report due February 28 each year.

c. Cyanide Action Plan

The Dischargers shall implement monitoring and surveillance, pretreatment, source control and pollution prevention for cyanide in accordance with the following tasks and time schedule:

Table 10. Cyanide Action Plan

Task	Compliance Date
1. Review Potential Cyanide Sources The Dischargers shall submit an inventory of potential cyanide sources to the treatment plants. If no cyanide sources are identified, tasks 2 and 3 are not required, unless the Dischargers receive a request to discharge detectable levels of cyanide to the sewer. If so, the Dischargers shall notify the Executive Officer and implement tasks 2 and 3.	Completed February 26, 2010
2. Implement Cyanide Control Program The Dischargers shall submit a plan and begin implementation of a program to minimize cyanide discharges to its treatment plant consisting, at a minimum, of	With annual pollution prevention report due February 28 each year

Task	Compliance Date
the following elements: a. Inspect each potential source to assess the need to include that contributing source in the control program. b. Inspect contributing sources included in the control program annually. Inspection elements may be based on USEPA guidance, such as Industrial User Inspection and Sampling Manual for POTWs (EPA 831-B-94-01). c. Develop and distribute educational materials to contributing sources and potential contributing sources regarding the need to prevent cyanide discharges. d. Prepare an emergency monitoring and response plan to be implemented if a significant cyanide discharge occurs. For purposes of this Order, a "significant cyanide discharge" is occurring if cyanide is found in the influent of either treatment plant above 70 µg/L.	
3. Implement Additional Cyanide Control Measures If the Regional Water Board notifies the Dischargers that ambient monitoring shows cyanide concentrations are 1 µg/L or higher in the main body of San Francisco Bay, then within 90 days of the notification, the Dischargers shall commence actions to identify and abate cyanide sources responsible for the elevated ambient concentrations, and shall report on the progress and effectiveness of actions taken, together with a schedule for actions to be taken in the next 12 months.	With next annual pollution prevention report due February 28 (at least 90 days following notification)
4. Report Status of Cyanide Control Program The Dischargers shall submit an annual report documenting cyanide control program implementation and addressing the effectiveness of actions taken, including any additional cyanide controls required by Task 3, above, together with a schedule for actions to be taken in the next 12 months.	With annual pollution prevention report due February 28 each year

VII.COMPLIANCE DETERMINATION

Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined in Attachment A—Definitions, the MRP, Fact Sheet section VI, and the Regional Standard Provisions. For purposes of reporting and administrative enforcement by the Regional and State Water Boards, the Dischargers shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reporting level (RL).

ATTACHMENT A – DEFINITIONS

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:

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.

Bioaccumulative
Those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic
Carcinogenic pollutants are substances that are known to cause cancer in living organisms.

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.

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 this Order), 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.

Detected, but Not Quantified (DNQ)
DNQ are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

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.

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 waste load allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays
Enclosed Bays means 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 the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of San Francisco Bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

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
Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters include, but are not limited to, the Sacramento-San Joaquin Delta, as defined in California Water Code section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters
All surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

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).

Maximum Daily Effluent Limitation (MDEL)
The highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median
The middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL)
MDL is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations (40 CFR), Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML)
ML is 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.

Not Detected (ND)
Sample results less than the laboratory's MDL.

Persistent Pollutants
Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

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 a priority pollutant(s) 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 California 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 California 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 or Regional Water Board.

Reporting Level (RL)
RL is the ML (and its associated analytical method) chosen by the Dischargers for reporting and compliance determination from the MLs included in this Order. 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 4 of the SIP in accordance with section 2.4.2 of the SIP or established in accordance with section 2.4.3 of the SIP. 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 RL.

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.

Source of Drinking Water
Any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

Standard Deviation (σ)
Standard Deviation is a measure of variability that is calculated as follows:

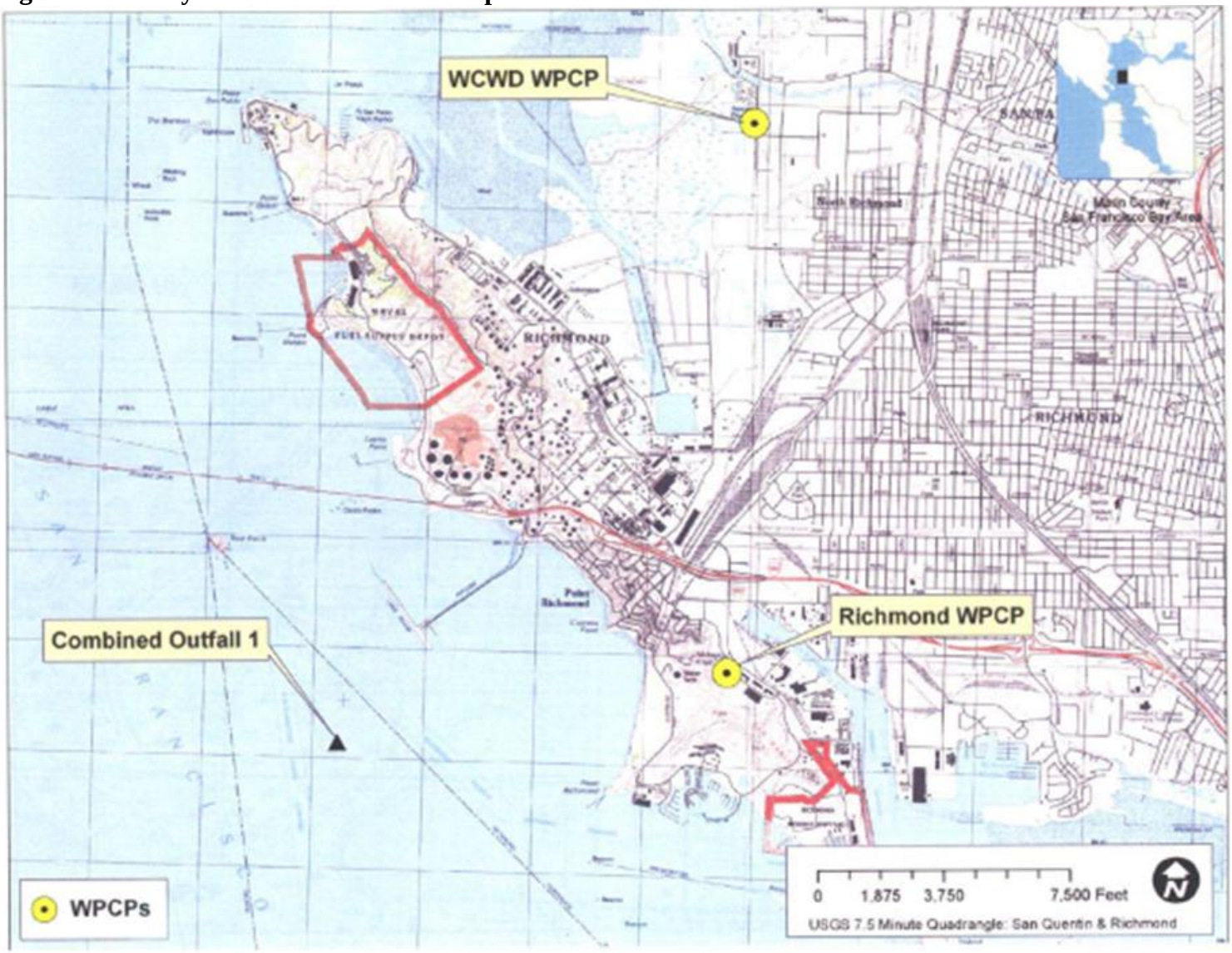
$$\sigma = (\sum[(x - \mu)^2]/(n - 1))^{0.5}$$

where:
x is the observed value;
μ is the arithmetic mean of the observed values; and
n is the number of samples.

Toxicity Reduction Evaluation (TRE)
TRE is 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.)

ATTACHMENT B – FACILITY MAP

Figure B. Facility and Outfall Location Map



ATTACHMENT C – PROCESS FLOW DIAGRAM

Figure C-1. West County Wastewater District Treatment Plant Flow Schematic

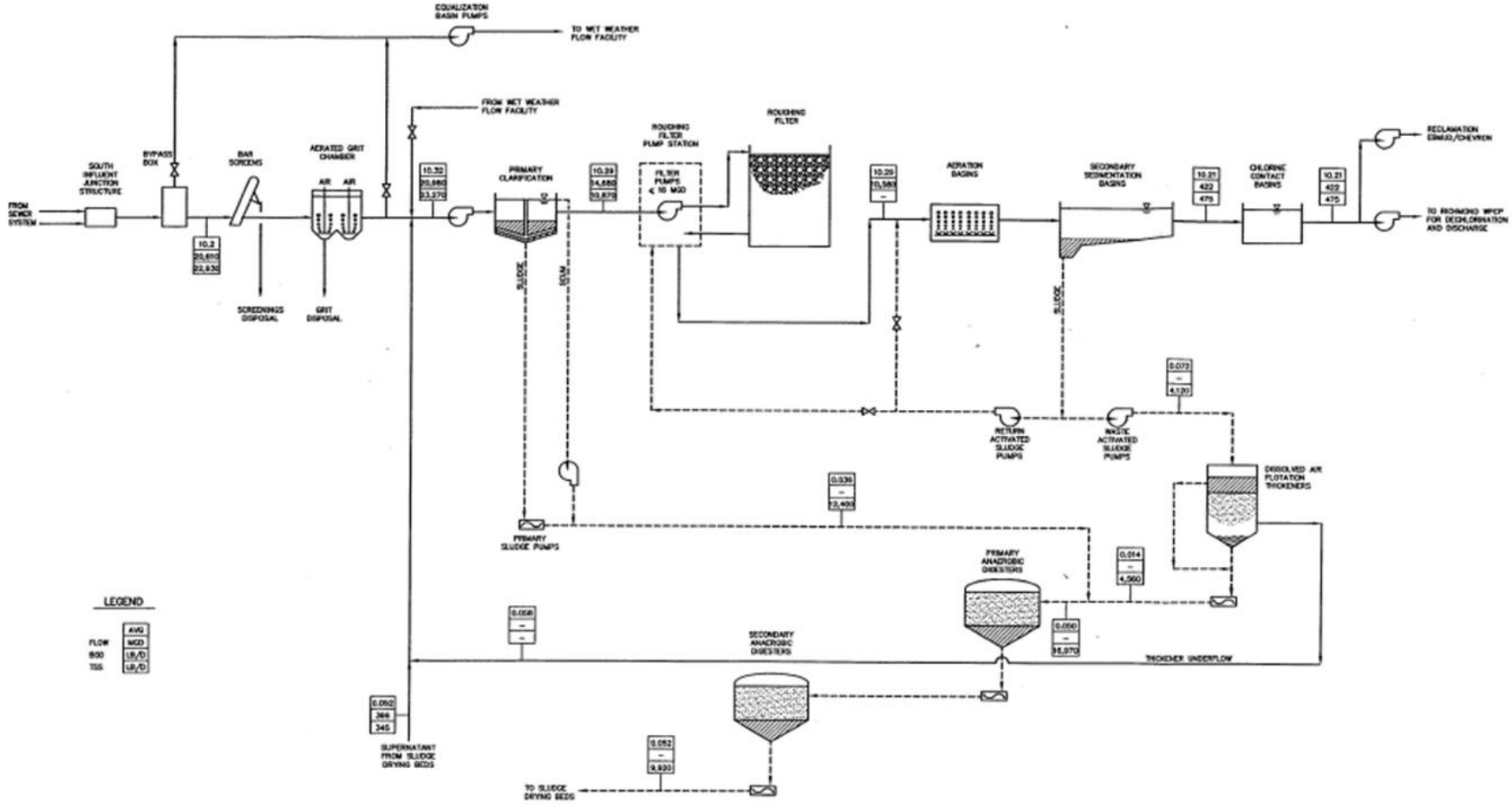
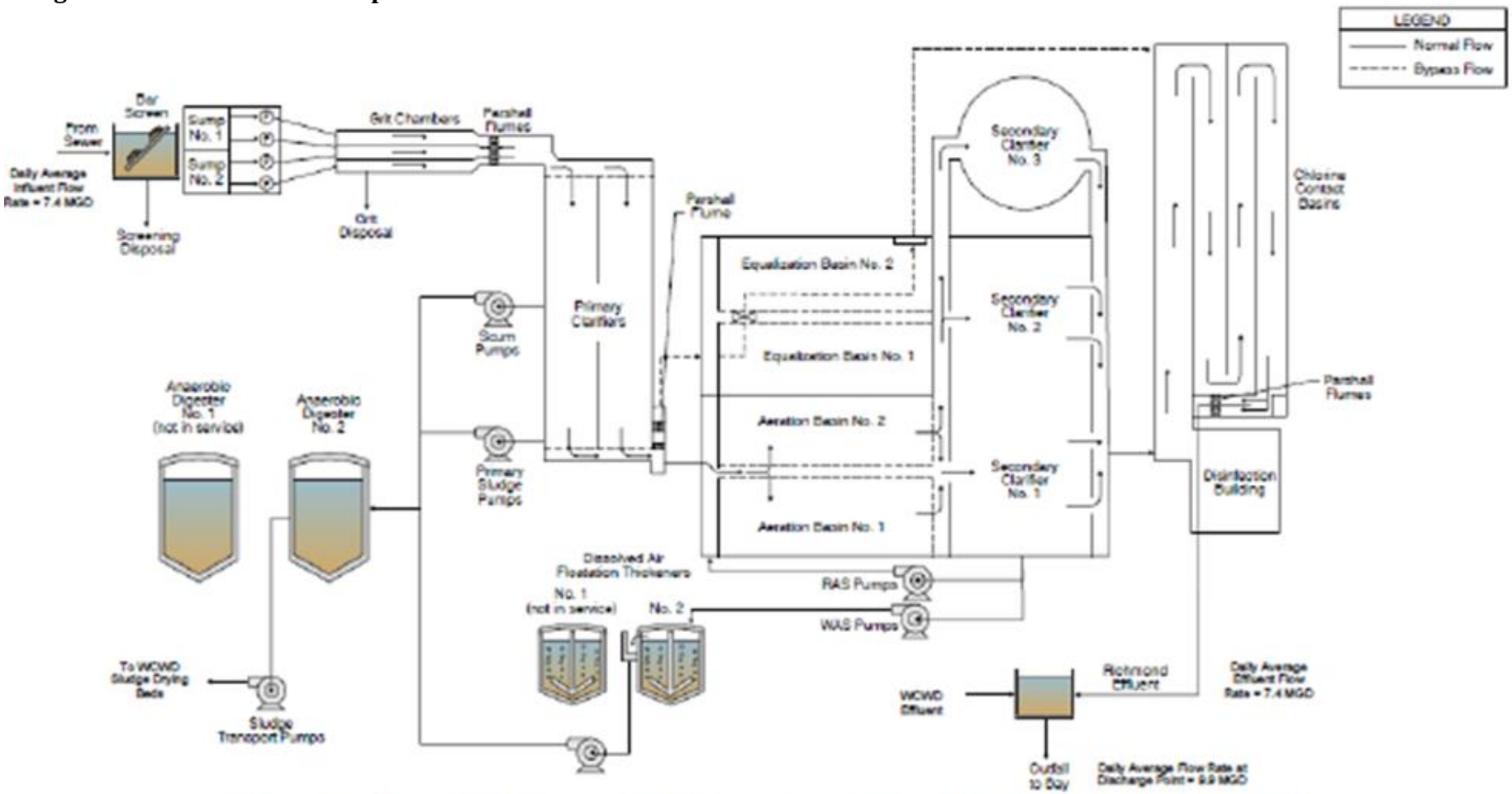


FIGURE 3.8
PROCESS/MASS BALANCE FLOW CHART
WEST COUNTY WASTEWATER DISTRICT

Figure C-2. Richmond Municipal Sewer District Water Pollution Control Plant Flow Schematic



ATTACHMENT D –STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Dischargers must comply with all of the 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, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 CFR 122.41(a)).

2. The Dischargers shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA 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 CFR 122.41(a)(1)).

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Dischargers 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 CFR 122.41(c).)

C. Duty to Mitigate

The Dischargers shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR 122.41(d).)

D. Proper Operation and Maintenance

The Dischargers 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 Dischargers 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 the Dischargers only when necessary to achieve compliance with the conditions of this Order (40 CFR 122.41(e)).

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 CFR 122.41(g).)

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 CFR 122.5(c).)

F. Inspection and Entry

The Dischargers shall allow the Regional Water Board, State Water Board, USEPA, 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 (40 CFR 122.41(i); Wat. Code, § 13383):

1. Enter upon the Dischargers' premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 CFR 122.41(i)(1));

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 CFR 122.41(i)(2));

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 CFR 122.41(i)(3)); and

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. (40 CFR 122.41(i)(4).)

G. Bypass

1. Definitions

   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR 122.41(m)(1)(i).)

   b. "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 CFR 122.41(m)(1)(ii).)

2. Bypass not exceeding limitations. The Dischargers 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 I.G.3, I.G.4, and I.G.5 below. (40 CFR 122.41(m)(2).)

3. Prohibition of bypass. Bypass is prohibited, and the Regional Water Board may take enforcement action against a Dischargers for bypass, unless (40 CFR 122.41(m)(4)(i)):

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 CFR 122.41(m)(4)(i)(A));

   b. 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 CFR 122.41(m)(4)(i)(B)); and

c. The Dischargers submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 CFR 122.41(m)(4)(i)(C).)

4. 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 I.G.3 above. (40 CFR 122.41(m)(4)(ii).)

5. Notice

a. Anticipated bypass. If the Dischargers knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass. (40 CFR 122.41(m)(3)(i).)

b. Unanticipated bypass. The Dischargers shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 CFR 122.41(m)(3)(ii).)

H. 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 Dischargers. 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 CFR 122.41(n)(1).)

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 I.H.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 CFR 122.41(n)(2).).

2. Conditions necessary for a demonstration of upset. A Dischargers who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 CFR 122.41(n)(3)):

a. An upset occurred and that the Dischargers can identify the cause(s) of the upset (40 CFR 122.41(n)(3)(i));

b. The permitted facility was, at the time, being properly operated (40 CFR 122.41(n)(3)(ii));

c. The Dischargers submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 CFR 122.41(n)(3)(iii)); and

d. The Dischargers complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 CFR 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Dischargers seeking to establish the occurrence of an upset has the burden of proof. (40 CFR 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Dischargers for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 CFR 122.41(f).)

B. Duty to Reapply

If the Discharges wishes to continue an activity regulated by this Order after the expiration date of this Order, the Dischargers must apply for and obtain a new permit. (40 CFR 122.41(b).)

C. 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 this Order to change the name of the Dischargers and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 CFR 122.41(l)(3); 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 CFR 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503 unless other test procedures have been specified in this Order. (40 CFR 122.41(j)(4); 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Dischargers' sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by Part 503), the Dischargers 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 CFR 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 CFR 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 CFR 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 CFR 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 CFR 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 CFR 122.41(j)(3)(v)); and

6. The results of such analyses. (40 CFR 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 CFR 122.7(b)):

1. The name and address of any permit applicant or Dischargers (40 CFR 122.7(b)(1)); and

2. Permit applications and attachments, permits and effluent data. (40 CFR 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Dischargers shall furnish to the Regional Water Board, State Water Board, or USEPA within a reasonable time, any information which the Regional Water Board, State Water Board, or USEPA 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 Dischargers shall also furnish to the Regional Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 CFR 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below. (40 CFR 122.41(k).)

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 USEPA). (40 CFR 122.22(a)(3).).

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 CFR 122.22(b)(1));

   b. 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 CFR 122.22(b)(2)); and

c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 CFR 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.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 V.B.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 CFR 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.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 CFR 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program in this Order. (40 CFR 122.22(l)(4).)

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 for reporting results of monitoring of sludge use or disposal practices. (40 CFR 122.41(l)(4)(i).)

3. If the Dischargers monitors any pollutant more frequently than required by this Order using test procedures approved under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Water Board. (40 CFR 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 CFR 122.41(l)(4)(iii).)

D. 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 CFR 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Dischargers shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Dischargers become aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Dischargers become aware of the circumstances. The written submission 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. (40 CFR 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 CFR 122.41(l)(6)(ii)):

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 CFR 122.41(l)(6)(ii)(A).)

   b. Any upset that exceeds any effluent limitation in this Order. (40 CFR 122.41(l)(6)(ii)(B).)

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 CFR 122.41(l)(6)(iii).)

F. Planned Changes

The Dischargers 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 CFR 122.41(l)(1)):

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 CFR 122.41(l)(1)(i)); or

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 CFR 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Dischargers' sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. (40 CFR 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Dischargers shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements. (40 CFR 122.41(l)(2).)

H. Other Noncompliance

The Dischargers shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. (40 CFR 122.41(l)(7).)

I. Other Information

When the Dischargers 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 USEPA, the Dischargers shall promptly submit such facts or information. (40 CFR 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Regional Water Board is authorized to enforce the terms of this Order under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Publicly-Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Regional Water Board of the following (40 CFR 122.42(b)):

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 CFR 122.42(b)(1)); and

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 this Order. (40 CFR 122.42(b)(2).)

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 CFR 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Contents

I. General Monitoring Provisions E-2
II. Monitoring Locations E-2
III. Influent Monitoring Requirements E-3
IV. Effluent Monitoring Requirements E-3
A. Monitoring Location EFF-001 ..... E-3
B. Monitoring Location EFF-001B (Blending) E-4
C. Monitoring Locations EFF-002 and EFF-003 ..... E-5
D. Monitoring Location EFF-002B (Blending) E-6
V. Whole Effluent Toxicity Testing Requirements E-6
A. Whole Effluent Acute Toxicity E-6
B. Whole Effluent Chronic Toxicity E-7
VI. Receiving Water Monitoring Requirements E-10
VII. Pretreatment and Biosolids Monitoring Requirements E-10
VIII. Reporting Requirements E-11
A. General Monitoring and Reporting Requirements E-11
B. Self Monitoring Reports (SMRs) E-11
C. Discharge Monitoring Reports E-14
D. Modifications to Attachment G E-14
E. Modifications to Attachment H E-17

Tables

Table E-1. Monitoring Locations E-2
Table E-2. Influent Monitoring E-3
Table E-3. Effluent Monitoring at EFF-001 ..... E-3
Table E-4. Effluent Monitoring at EFF-001B E-4
Table E-5. Effluent Monitoring at EFF-002 and EFF-003 ..... E-5
Table E-6. Effluent Monitoring at EFF-002B E-6
Table E-7. Pretreatment and Biosolids Monitoring Requirements E-10
Table E-8. SMR Reporting for CIWQS E-12
Table E-9. Monitoring Periods and Reporting Schedule E-13

ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

National Pollutant Discharge Elimination System (NPDES) regulations at 40 CFR 122.48 require that all NPDES permits specify monitoring and reporting requirements. California Water Code (CWC) sections 13267 and 13383 also authorize the Regional Water Quality Control Board (hereinafter Regional Water Board) to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements that implement the federal and State regulations.

I. GENERAL MONITORING PROVISIONS

A. The Dischargers shall comply with this MRP. The Executive Officer may amend this MRP pursuant to 40 CFR 122.62, 122.63, and 124.5. If any discrepancies exist between this MRP and the Regional Standard Provisions, this MRP prevails.

B. The Dischargers shall conduct all monitoring in accordance with Attachment D, section III, as supplemented by Attachment G of this Order. Equivalent test methods must be more sensitive than those specified in 40 CFR 136 and specified in the permit.

II. MONITORING LOCATIONS

The Dischargers 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 Locations

Type of Monitoring Location	Monitoring Location Name	Monitoring Location Description
Influent (Richmond Plant)	INF-002 (formerly A-002)	At any point in the Richmond Plant headworks at which all waste tributary to the treatment system is present and preceding any phase of treatment.
Influent (West County Plant)	INF-003 (formerly A-001)	At any point in the West County Plant headworks at which all waste tributary to the treatment system is present and preceding any phase of treatment.
Combined Effluent	EFF-001 (formerly E-001 and E-001-DC)	At any point in the common outfall between the point of discharge and the point at which all flow tributary to the outfall is present following dechlorination.
Combined Effluent	EFF-001B	At any point in the common outfall between the point of discharge and the point at which all blended fully treated and primary-treated waste tributary to the outfall is present following dechlorination (may be the same location as EFF-001).
Effluent (Richmond Plant)	EFF-002 (formerly E-001-D2)	At any point in the Richmond Plant outfall following chlorination, but prior to combining with West County Plant effluent.
Blended Effluent (Richmond Plant)	EFF-002B	At any point in the Richmond Plant at which all blended fully treated and primary-treated waste tributary to the Richmond Plant outfall is present (may be the same location as EFF-002).
Effluent (West County Plant)	EFF-003 (formerly E-001-D1)	At any point in the West County Plant outfall following chlorination, but prior to combining with Richmond Plant effluent.
Biosolids (Richmond Plant)	BIO-002 (formerly B-002)	Biosolids monitoring at the Richmond Plant.
Biosolids (West County Plant)	BIO-003 (formerly B-001)	Biosolids monitoring at the West County Plant.

III. INFLUENT MONITORING REQUIREMENTS

The Dischargers shall monitor the influent to the individual treatment plants at Monitoring Locations INF-002 and INF-003 as follows:

Table E-2. Influent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency
Flow[1]	MGD	Continuous	1/Day
Biochemical Oxygen Demand 5-day @ 20°C ($CBOD_5$)	mg/L	C-24	3/Week
Total Suspended Solids (TSS)	mg/L	C-24	3/Week
Cyanide	µg/L	Grab	2/Year

Unit Abbreviations:
mg/L = milligrams per liter
µg/L = micrograms per liter
Sample Type:
C-24 = 24-hour composite
Sampling Frequency:
Continuous/D = measured continuously, and recorded and reported daily
1/Day = Once per day
1/Week = Once per week

[1] Flows shall be monitored continuously and the following shall be reported in the monthly self-monitoring reports: Average, maximum and minimum daily flows.

IV. EFFLUENT MONITORING REQUIREMENTS

A. Monitoring Location EFF-001

The Dischargers shall monitor the discharge to the common outfall at Monitoring Location EFF-001 as follows:

Table E-3. Effluent Monitoring at EFF-001

Parameter	Units	Sample Type	Minimum Sampling Frequency
Flow[1]	MGD	Continuous	Continuous/D
Total Ammonia, as N	mg/L	Grab or C-24	1/Month
Chlorine, Total Residual[2]	mg/L	Continuous	1 / 2 Hours
Acute Toxicity[3]	% Survival	C-24	1/Month
Chronic Toxicity[4]	TU_c	C-24	1/Quarter
Copper	µg/L	C-24	1/Month
Nickel	µg/L	C-24	1/Month
Cyanide	µg/L	Grab or C-24	1/Month
Bis(2-Ethylhexyl)Phthalate	µg/L	Grab	2/Year
Endrin	µg/L	Grab	2/Year
Heptachlor	µg/L	C-24	2/Year
Dioxin-TEQ[5]	µg/L	Grab	2/Year (1/Wet, 1/Dry Season)

Unit Abbreviations:
MGD = million gallons per day
mg/L = milligrams per liter
TUc = chronic toxicity units
µg/L = micrograms per liter
C-24 = 24-hour composite

Sampling Frequency:
Continuous/D = measured continuously, and recorded and reported daily
1 / 2 Hours = Once every two hours
1/Month = Once per month
1/Quarter = Once per quarter
2/Year = Twice per year

[1] For effluent flows, the following information shall be reported monthly:
- Daily average flow (MGD)
- Monthly average flow (MGD)
- Maximum daily flow (MGD)
- Minimum daily flow (MGD)

[2] Effluent chlorine residual concentrations shall be monitored continuously or, at a minimum, every hour. The Dischargers shall report for each day the maximum residual chlorine concentration observed following dechlorination. However, if monitoring continuously, the Dischargers shall report for each day the maximum residual chlorine concentration based only on discrete readings from the continuous monitoring taken every hour on the hour. The Dischargers shall retain continuous monitoring readings for at least three years. The Regional Water Board reserves the right to use other continuous monitoring data for discretionary enforcement.

[3] Acute bioassay tests shall be performed in accordance with MRP section V.A.

[4] Critical life stage toxicity tests shall be performed and reported in accordance with the Chronic Toxicity Requirements specified in MRP section V.B.

[5] Chlorinated dibenzodioxins and chlorinated dibenzofurans shall be analyzed using the latest version of USEPA Method 1613.

B. Monitoring Location EFF-001B (Blending)

During blending events, the Dischargers shall monitor the discharge of treated wastewater at Monitoring Location EFF-001B as follows:

Table E-4. Effluent Monitoring at EFF-001B

Parameter	Units	Sample Type	Minimum Sampling Frequency
Flow[1]	MGD	Continuous	Continuous/D
Total Ammonia, as N	mg/L	Grab	1/Year[2]
Copper[3]	µg/L	C-24	1/Year[2]
Nickel[3]	µg/L	C-24	1/Year[2]
Cyanide[3]	µg/L	Grab	1/Year[2]
Bis(2-Ethylhexyl)Phthalate	µg/L	Grab	1/Year[2]
Endrin	µg/L	Grab	1/Year[2]
Heptachlor	µg/L	C-24	1/Year[2]

Unit Abbreviations:
MGD = million gallons per day
MG = million gallons
mg/L = milligrams per liter
µg/L = micrograms per liter
°C = degrees Celsius
C-24 = 24-hour composite
MPN/100 mL = most probable number per 100 milliliters

Sampling Frequency:
Continuous/D = measured continuously, and recorded and reported daily
1/Day = Once per day
1/Year = Once per year

1/Blending Event = Once per blending event

[1] For effluent flows, the following information shall be reported monthly:
- Daily average flow (MGD)
- Maximum daily flow (MGD)

[2] If a TSS sample collected on the same day exceeds 45 mg/L, the frequency shall be once per day.

[3] As total recoverable metal.

C. Monitoring Locations EFF-002 and EFF-003

The Dischargers shall monitor the individual treatment plants' effluent at Monitoring Locations EFF-002 and EFF-003 as follows:

Table E-5. Effluent Monitoring at EFF-002 and EFF-003

Parameter	Units	Sample Type	Minimum Sampling Frequency
Flow[1]	MGD	Continuous	Continuous/D
pH	Standard Units	Grab	3/Week
BOD (5-day @ 20ºC)[2]	mg/L	C-24	3/Week
Total Suspended Solids[2]	mg/L	C-24	1/Day
Total Coliform[3]	MPN/100 mL	Grab	5/Week
Enterococcus[3][4]	MPN/100 mL	Grab	5/Month
Oil and Grease[5]	mg/L	Grab	1/Month

Unit Abbreviations:
MGD = million gallons per day
mg/L = milligrams per liter
°C = degrees Celsius
C-24 = 24-hour composite
MPN/100 mL = most probable number per 100 milliliters
Sampling Frequency:
Continuous/D = measured continuously, and recorded and reported daily
3/Week = Three times per week
5/Month = Five times per month
1/Month = Once per month

[1] For effluent flows, the following information shall be reported monthly:
- Daily average flow (MGD)
- Monthly average flow (MGD)
- Maximum daily flow (MGD)
- Minimum daily flow (MGD)

[2] The BOD and TSS percent removal shall be reported for each calendar month in accordance with Effluent Limitation IV.A.1. BOD and TSS samples shall be collected simultaneously with influent samples.

[3] When replicate analyses are made of an enterococcus or total coliform sample on the same day, the reported result shall be the geometric mean of the replicate sample.

[4] If after three months the Dischargers have demonstrated full compliance with the enterococcus limitation, the minimum monitoring frequency shall be reduced to four times per year. The four samples shall be collected in different calendar months during the higher recreational water contact season (June to October). If the enterococcus effluent limitation is later exceeded, the Dischargers shall conduct 5/Month accelerated sampling for at least three consecutive months. If full compliance is demonstrated after the three-month period, the Dischargers may return to the 4/Year sampling frequency.

[5] Each oil and grease sampling and analysis event shall be conducted in accordance with USEPA Method 1664.

D. Monitoring Location EFF-002B (Blending)

During blending events, the City of Richmond and the Richmond Municipal Sewer District shall monitor the discharge of treated wastewater from the Richmond Plant at Monitoring Location EFF-002B as follows:

Table E-6. Effluent Monitoring at EFF-002B

Parameter	Units	Sample Type	Minimum Sampling Frequency
Flow[1],[2]	MGD	Continuous	Continuous/D
Volume of Partially-Treated Wastewater[2]	MG	Calculated	1/Blending Event
Duration of Blending Event[3]	Hours	Calculated	1/Blending Event
pH	Standard Units	Grab	1/Year[4]
BOD (5-day @ 20ºC)	mg/L	C-24	1/Year[4]
Total Suspended Solids[4]	mg/L	C-24	1/Day
Total Coliform	MPN/100 mL	Grab	1/Day
Enterococcus	MPN/100 mL	Grab	1/Year[4]

Unit Abbreviations:
MGD = million gallons per day
MG = million gallons
mg/L = milligrams per liter
µg/L = micrograms per liter
°C = degrees Celsius
C-24 = 24-hour composite
MPN/100 mL = most probable number per 100 milliliters

Sampling Frequency:
Continuous/D = measured continuously, and recorded and reported daily
1/Day = Once per day
1/Year = Once per year
1/Blending Event = Once per blending event

[1] For effluent flows, the following information shall be reported monthly:
- Daily average flow (MGD)
- Maximum daily flow (MGD)

[2] "Flow" means the total volume of blended water discharged. "Volume of partially-treated wastewater" means the total volume of wastewater that bypassed secondary treatment.

[3] For each blending event, report the date and time each event starts and ends.

[4] If a TSS sample collected on the same day exceeds 45 mg/L, the frequency shall be once per day.

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

The Dischargers shall monitor whole effluent acute and chronic toxicity at Monitoring Location EFF-001 as follows:

A. Whole Effluent Acute Toxicity

1. Compliance with the acute toxicity effluent limitations of this Order shall be evaluated by measuring survival of test organisms exposed to 96-hour static renewal bioassays.

2. Test organisms shall be fathead minnow (*Pimephales promelas*). The Executive Officer may specify a more sensitive organism or, if testing a particular organism proves unworkable, the most sensitive organism available.

3. All bioassays shall be performed according to the most up-to-date protocols in 40 CFR 136, currently *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, 5th Edition.

4. If specific identifiable substances in the discharge can be demonstrated by the Dischargers as being rapidly rendered harmless upon discharge to the receiving water, compliance with the acute toxicity limit may be determined after the test samples are adjusted to remove the influence of those substances. Written approval from the Executive Officer must be obtained to authorize such an adjustment.

5. The sample may be taken from final secondary effluent prior to disinfection. Monitoring of the bioassay water shall include, on a daily basis, the following parameters: pH, dissolved oxygen, ammonia (if toxicity is observed), temperature, hardness, and alkalinity. These results shall be reported. If a violation of acute toxicity requirements occurs, the bioassay test shall be repeated with new fish as soon as practical and shall be repeated until a test fish survival rate of 90 percent or greater is observed. If the control fish survival rate is less than 90 percent, the bioassay test shall be restarted with new fish and shall continue as soon as practical until an acceptable test is completed (i.e., control fish survival rate is 90 percent or greater).

B. Whole Effluent Chronic Toxicity

1. Chronic Toxicity Monitoring Requirements

a. Sampling. The Dischargers shall collect 24-hour composite samples of the effluent for critical life stage toxicity testing as indicated below. For toxicity tests requiring renewals, 24-hour composite samples collected on consecutive days are required.

b. Test Species. The test species shall be *Americamysis bahia* (mysid shrimp). The Discharger shall conduct a screening chronic toxicity test as described in Appendix E-1 following any significant change in the nature of the effluent. If there is no significant change, the Discharger shall conduct a screening test prior to application for permit reissuance.

c. Frequency. The frequency of routine and accelerated chronic toxicity monitoring shall be as specified below:

(1) Monitor routinely once per quarter.

(2) Accelerate monitoring to monthly after exceeding a three-sample median of 10 TU_c[1] or a single sample maximum of 20 TUc. The Executive Officer may specify a different frequency for accelerated monitoring based on the TU_c results.

(3) Return to routine monitoring if accelerated monitoring does not exceed either "trigger" in (2), above.

[1] A TU_c equals 100 divided by the no observable effect level (NOEL). The NOEL is determined from IC_{25}, EC_{25}, or NOEC values. The MRP defines these terms, their usage, and other chronic toxicity monitoring program requirements.

(4) If accelerated monitoring confirms consistent toxicity in excess of either "trigger" in (2), above, continue accelerated monitoring and initiate toxicity reduction evaluation (TRE) procedures in accordance with section B.3, below.

(5) Return to routine monitoring after implementing appropriate elements of the TRE, and either the toxicity drops below both "triggers" in (2), above, or, based on the TRE results, the Executive Officer authorizes a return to routine monitoring.

Monitoring conducted pursuant to a TRE effort shall satisfy the requirements for routine and accelerated monitoring while the TRE investigation is underway.

d. Methodology. Sample collection, handling, and preservation shall be in accordance with USEPA protocols. In addition, bioassays shall be conducted in compliance with the most recently promulgated test methods, as shown in Appendix E-1. These are *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms,* currently fourth Edition (EPA-821-R-02-013), with exceptions granted the Dischargers in writing by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP). If specific identifiable substances in the discharge can be demonstrated by the Dischargers as being rapidly rendered harmless upon discharge to the receiving water, compliance with the chronic toxicity limit may be determined after the test samples are adjusted to remove the influence of those substances. For example, the Dischargers may manually adjust the pH. Written acknowledgement that the Executive Officer concurs with the Discharger's demonstration and that the adjustment will not remove the influence of other substances must be obtained prior to any other such adjustment."

e. Dilution Series. The Dischargers shall conduct tests at 40%, 20%, 10%, 5%, and 2.5%. The "%" represents percent effluent as discharged. The Dischargers may use the biological buffer MOPS (3-[N-morpholino]propanesulfonic acid) to control pH drift and ammonia toxicity caused by increasing pH during the test.

2. Chronic Toxicity Reporting Requirements

a. Toxicity test results for the current reporting period shall be provided in the self-monitoring report and shall include, at a minimum, for each test:

(1) Sample date

(2) Test initiation date

(3) Test species

(4) End point values for each dilution (e.g., number of young, growth rate, percent survival)

(5) No Observable Effect Level (NOEL) values in percent effluent. The NOEL shall equal to the IC_{25} or EC_{25} (see MRP Appendix E-1). If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall equal to the No Observable Effect Concentration (NOEC) derived using hypothesis testing. The NOEC is the

maximum percent effluent concentration that causes no observable effect on test organisms based on a critical life stage toxicity test.

(6) IC_{15}, IC_{25}, IC_{40}, and IC_{50} values (or EC_{15}, EC_{25} ... etc.) as percent effluent

(7) TU_c values (100/NOEL, where NOEL = IC_{25}, EC_{25}, or NOEC as discussed in Appendix E-1)

(8) Mean percent mortality (±s.d.) after 96 hours in 100% effluent (if applicable)

(9) IC_{50} or EC_{50} values for reference toxicant tests

(10) Available water quality measurements for each test (pH, dissolved oxygen, temperature, conductivity, hardness, salinity, ammonia)

b. The results of the most recent three chronic toxicity tests and the 3-sample median shall be provided in the self-monitoring report as TUc's.

3. Chronic Toxicity Reduction Evaluation (TRE)

a. The Dischargers shall prepare a generic TRE work plan within 90 days of the effective date of this Order to be ready to respond to toxicity events. The Dischargers shall review and update the work plan as necessary so that it remains current and applicable to the discharge and discharge facilities.

b. Within 30 days of exceeding either chronic toxicity trigger, the Dischargers shall submit to the Regional Water Board a TRE work plan, which shall be the generic work plan revised as appropriate for this toxicity event after consideration of available discharge data.

c. Within 30 days of the date of completion of the accelerated monitoring tests observed to exceed either trigger, the Dischargers shall initiate a TRE in accordance with a TRE work plan that incorporates any and all comments from the Executive Officer.

d. The TRE shall be specific to the discharge and be in accordance with current technical guidance and reference materials, including USEPA guidance materials. The TRE shall be conducted as a tiered evaluation process, such as summarized below:

(1) Tier 1 consists of basic data collection (routine and accelerated monitoring).

(2) Tier 2 consists of evaluation of optimization of the treatment process, including operation practices and in-plant process chemicals.

(3) Tier 3 consists of a toxicity identification evaluation (TIE).

(4) Tier 4 consists of evaluation of options for additional effluent treatment processes.

(5) Tier 5 consists of evaluation of options for modifications of in-plant treatment processes.

(6) Tier 6 consists of implementation of selected toxicity control measures, and follow-up monitoring and confirmation of implementation success.

e. The TRE may be ended at any stage if monitoring finds there is no longer consistent toxicity (complying with requirements of Provision IV.C.2 of the Order).

f. The objective of the TIE shall be to identify the substance or combination of substances causing the observed toxicity. All reasonable efforts using currently available TIE methodologies shall be employed.

g. As toxic substances are identified or characterized, the Dischargers 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 chronic toxicity evaluation parameters.

h. Many recommended TRE elements parallel required or recommended efforts of source control, pollution prevention, and stormwater control programs. TRE efforts should be coordinated with such efforts. To prevent duplication of efforts, evidence of complying with requirements or recommended efforts of such programs may be acceptable to comply with TRE requirements.

i. The Regional Water Board recognizes that chronic toxicity may be episodic and identification of causes of and reduction of sources of chronic toxicity may not be successful in all cases. Consideration of enforcement action by the Regional Water Board will be based in part on the Dischargers' actions and efforts to identify and control or reduce sources of consistent toxicity.

VI. RECEIVING WATER MONITORING REQUIREMENTS

The Dischargers shall continue to participate in the Regional Monitoring Program (RMP), which involves collecting data on pollutants and toxicity in San Francisco Bay water, sediment, and biota.

VII. PRETREATMENT AND BIOSOLIDS MONITORING REQUIREMENTS

The Dischargers shall comply with the pretreatment requirements specified below for Monitoring Locations INF-002, INF-003, EFF-002, EFF-003, BIO-002 and BIO-003. The Dischargers shall report summaries of analytical results in annual and semi-annual pretreatment reports in accordance with Attachment H. At its option, the Dischargers may also report biosolids analytical results in their eSMR by manual entry, by EDF/CDF, or as an attached file.

Table E-7. Pretreatment and Biosolids Monitoring Requirements

Parameter	Sample Locations and Frequencies[1]			Sample Type	
	INF-002 and INF-003	EFF-002 and EFF-003	BIO-002 and BIO-003	Influent & Effluent	Biosolids[5]
Volatile Organic Compounds (VOC's)[2]	2/Year	2/Year	2/Year	Grab	Grab
Base/neutrals and acids extractable organic compounds (BNA) [2]	1/Year	1/Year	2/Year	Grab	Grab
Hexavalent Chromium[3]	1/Month	1/Month	2/Year	Grab	Grab

Parameter	Sample Locations and Frequencies[1]			Sample Type	
	INF-002 and INF-003	EFF-002 and EFF-003	BIO-002 and BIO-003	Influent & Effluent	Biosolids[5]
Metals[4]	1/Month	1/Month	2/Year	24-hour Composite[6]	Grab
Mercury	1/Month	1/Month	2/Year	Grab or 24-hour Composite[6,7]	Grab
Cyanide	1/Month	1/Month	2/Year	Grab	Grab

Sampling Frequency:
2/Year = each calendar year (at about 6 month intervals, once in the dry season, once in the wet season)
1/Year = once each calendar year
1/Month = once each month

[1] The Dischargers may elect to use the influent, and effluent monitoring conducted in accordance with Tables E-2, E-3, and E-4 and Provision VI.C.2 to satisfy these pretreatment requirements.

[2] GC/MS methods used must be able to quantify to an equivalent level as applicable GC methods (EPA 601, 602, 603, 604, 606).

[3] Total chromium may be substituted for hexavalent chromium at the Dischargers' discretion.

[4] The parameters are arsenic, cadmium, copper, lead, nickel, silver, zinc, and selenium.

[5] The biosolids sample shall be a composite of the biosolids to be disposed. Biosolids collection and monitoring shall comply with the requirements specified in Attachment H, Appendix H-C. If land application is used for disposal, the Dischargers shall also comply with the biosolids monitoring requirements of 40 CFR 503.

[6] If an automatic compositor is used, the Dischargers shall obtain 24-hour composite samples through flow-proportioned composite sampling. Alternatively, 24-hour composite samples may consist of discrete grab samples combined (volumetrically flow-weighted) prior to analysis or mathematically flow-weighted.

[7] The Dischargers may use automatic compositors for mercury if either (1) the compositing equipment (hoses and containers) comply with ultraclean specifications, or (2) appropriate equipment blank samples demonstrate that the compositing equipment has not contaminated the sample.

VIII. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Dischargers shall comply with all Federal Standard Provisions and Regional Standard Provisions related to monitoring, reporting, and recordkeeping in Attachments D and G, with modifications shown in section VIII.D below.

B. Self Monitoring Reports (SMRs)

1. **SMR Format.** The Dischargers shall electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). The CIWQS website will provide additional directions for SMR submittals in the event of a service interruption for electronic submittal.

2. **SMR Due Dates and Contents.** The Dischargers shall submit SMRs by the due dates, and with the contents, specified below:

   a. **Monthly SMRs —** Monthly SMRs shall be due 30 days after the end of each calendar month, covering that calendar month. The monthly SMR shall contain the applicable items described in sections V.B and V.C of both Attachments D and G of this Order. See Provision VI.C.2.a (Effluent Characterization Study and Report) of this Order for information that must also be reported with the monthly SMR.

b. Annual SMR — Annual SMRs shall be due February 1 each year, covering the previous calendar year. The annual SMR shall contain the items described in Attachment G section V.C.1.f. See Provision VI.C.2 of the Order (Effluent Characterization Study and Report) for requirements to submit reports with the annual SMR.

c. Additional Specifications for Submitting SMRs to CIWQS — If the Dischargers submit SMRs to CIWQS, they shall submit analytical results and other information using one of the following methods:

Table E-8. SMR Reporting for CIWQS

Parameter	Method of Reporting	
	EDF/CDF data upload or manual entry	Attached File
All parameters identified in influent, effluent, and receiving water monitoring tables (except Dissolved Oxygen and Temperature)	Required for All Results	
Dissolved Oxygen Temperature	Required for Monthly Maximum and Minimum Results Only[1]	Dischargers may use this method for all results or keep records
Cyanide Arsenic Cadmium Chromium Copper Lead Mercury Nickel Selenium Silver Zinc Dioxins and Furans (by U.S. EPA Method 1613)	Required for All Results[2]	
Antimony Beryllium Thallium Pollutants by U.S. EPA methods 601, 602, 608, 610, 614, 624, and 625	Not Required (unless identified in influent, effluent, or receiving water monitoring tables), But Encouraged [1]	Dischargers may use this method and submit results with application for permit reissuance, unless data submitted by CDF/EDF upload
Volume and Duration of Blended Discharge[3]	Required for all Blended Effluent Discharges	
Analytical Method	Not Required (Dischargers may select "data unavailable")[1]	
Collection Time Analysis Time	Not Required (Dischargers may select "0:00")[1]	

[1] The Dischargers shall continue to monitor at the minimum frequency specified in the monitoring tables, keep records of the measurements, and make the records available upon request.

[2] These parameters require EDF/CDF data upload or manual entry regardless of whether monitoring is required by this MRP or other provisions of this Order (except for biosolids, sludge, or ash provisions).

[3] The requirement for volume and duration of blended discharge applies only if this Order authorizes the Dischargers to discharge blended effluent.

3. **Monitoring Periods.** Monitoring periods for all required monitoring shall be completed as set forth in the table below:

Table E-9. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Continuous	Day after permit effective date	All
1/Day	Day after permit effective date	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling.
1/Week 2/Week 3/Week 5/Week	Sunday following permit effective date or on permit effective date if on a Sunday	Sunday through Saturday
1/Month	First day of calendar month following permit effective date or on permit effective date if that date is first day of the month	First day of calendar month through last day of calendar month
1/Quarter	Permit effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
1/Year	January 1 following (or on) permit effective date	January 1through December 31
2/Year	Closest of May 1 or November 1 following (or on) permit effective date	Once during the wet season (typically November 1 – April 30) and once during the dry season (typically May 1 through October 31)
Per Discharge Event	Anytime during the discharge event or as soon as possible after aware of the event	At a time when sampling can characterize the discharge event
1/5 years	Permit effective date	Once during the permit term within 12 months prior to applying for permit reissuance.

4. **RL and MDL Reporting.** The Dischargers shall report with each sample result the Reporting Level (RL) and Method Detection Limit (MDL) as determined by the procedure in 40 CFR 136. The Dischargers shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

   a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

   b. Sample results less than the RL, 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 purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ. 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 the laboratory considers appropriate.

   c. Sample results less than the laboratory's MDL shall be reported as "Not Detected" or ND.

d. The Dischargers shall instruct laboratories to establish calibration standards so that the minimum level (ML) value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time are the Dischargers to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

C. Discharge Monitoring Reports

1. As described in section VIII.B.1 above, at any time during the term of this permit, the State or Regional Water Board may notify the Dischargers to electronically submit SMRs that will satisfy federal requirements for submittal of Discharge Monitoring Reports (DMRs). Until such notification is given, the Dischargers shall submit DMRs in accordance with the requirements described below.

2. Once notified by the State or Regional Water Board, the Dischargers shall submit hard copy DMRs. DMRs must be signed and certified as required by the Standard Provisions. The Dischargers shall submit the original DMR and one copy of the DMR to one of the addresses listed below:

Standard Mail	FedEx/UPS/Other Private Carriers
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO 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

3. All discharge monitoring results must be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format of EPA Form 3320-1.

D. Modifications to Attachment G

1. Attachment G sections V.C.1.f and V.C.1.g are revised as follows, and section V.C.1.h (Reporting data in electronic format) is deleted.

f. Annual self-monitoring report requirements

By the date specified in the MRP, the Dischargers shall submit an annual report to the Regional Water Board covering the previous calendar year. The report shall contain the following:

1) Annual compliance summary table of treatment plant performance, including documentation of any blending events (this summary table is not required if the Dischargers have submitted the year's monitoring results to CIWQS in electronic reporting format by EDF/CDF upload or manual entry);

2) Comprehensive discussion of treatment plant performance and compliance with the permit (This discussion shall include any corrective actions taken or planned, such as

changes to facility equipment or operation practices that may be needed to achieve compliance, and any other actions taken or planned that are intended to improve performance and reliability of the Discharger's wastewater collection, treatment, or disposal practices.);

3) Both tabular and graphical summaries of the monitoring data for the previous year if parameters are monitored at a frequency of monthly or greater (this item is not required if the Dischargers have submitted the year's monitoring results to CIWQS in electronic reporting format by EDF/CDF upload or manual entry);

4) List of approved analyses, including the following:

   (i) List of analyses for which the Dischargers are certified;

   (ii) List of analyses performed for the Dischargers by a separate certified laboratory (copies of reports signed by the laboratory director of that laboratory shall not be submitted but be retained onsite); and

   (iii) List of "waived" analyses, as approved;

5) Plan view drawing or map showing the Discharger's facility, flow routing, and sampling and observation station locations;

6) Results of annual facility inspection to verify that all elements of the SWPP Plan are accurate and up to date (only required if the Dischargers do not route all stormwater to the headworks of its wastewater treatment plant); and

7) Results of facility report reviews (The Dischargers shall regularly review, revise, and update, as necessary, the O&M Manual, the Contingency Plan, the Spill Prevention Plan, and Wastewater Facilities Status Report so that these documents remain useful and relevant to current practices. At a minimum, reviews shall be conducted annually. The Dischargers shall include, in each Annual Report, a description or summary of review and evaluation procedures, recommended or planned actions, and an estimated time schedule for implementing these actions. The Dischargers shall complete changes to these documents to ensure they are up-to-date.).

g. Report submittal

The Dischargers shall submit SMRs addressed as follows, unless the Dischargers submit SMRs electronically to CIWQS:

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
Attn: NPDES Wastewater Division

h. Reporting data in electronic format – *Deleted*

2. Attachment G sections V.E.2, V.E.2.a, and V.E.2.c are revised as follows, and sections V.E.2.b (24-hour Certification) and V.E.2.d (Communication Protocol) are deleted.

2. Unauthorized Discharges from Municipal Wastewater Treatment Plants[2]

The following requirements apply to municipal wastewater treatment plants that experience an unauthorized discharge at their treatment facilities and supersede requirements imposed on the Dischargers by the Executive Officer by letter of May 1, 2008.

a. Two (2)-Hour Notification

For any unauthorized discharges that enter a drainage channel or a surface water, the Dischargers shall, as soon as possible, but not later than two (2) hours after becoming aware of the discharge, notify the California Emergency Management Agency (CalEMA, currently 800-852-7550), the local health officers or directors of environmental health with jurisdiction over the affected water bodies, and the Regional Water Board. Timely notification by the Dischargers to CalEMA also satisfies notification to the Regional Water Board. Notification shall include the following:

1) Incident description and cause;

2) Location of threatened or involved waterway(s) or storm drains;

3) Date and time the unauthorized discharge started;

4) Estimated quantity and duration of the unauthorized discharge (to the extent known), and the estimated amount recovered;

5) Level of treatment prior to discharge (e.g., raw wastewater, primary treated, undisinfected secondary treated, and so on); and

6) Identity of the person reporting the unauthorized discharge.

b. 24-hour Certification – *Deleted*

c. 5-day Written Report

Within five business days, the Dischargers shall submit a written report that includes, in addition to the information required above, the following:

1) Methods used to delineate the geographical extent of the unauthorized discharge within receiving waters;

2) Efforts implemented to minimize public exposure to the unauthorized discharge;

[2] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

3) Visual observations of the impacts (if any) noted in the receiving waters (e.g., fish kill, discoloration of water) and the extent of sampling if conducted;

4) Corrective measures taken to minimize the impact of the unauthorized discharge;

5) Measures to be taken to minimize the chances of a similar unauthorized discharge occurring in the future;

6) Summary of Spill Prevention Plan or O&M Manual modifications to be made, if necessary, to minimize the chances of future unauthorized discharges; and

7) Quantity and duration of the unauthorized discharge, and the amount recovered.

d. Communication Protocol – *Deleted*

E. Modifications to Attachment H

1. Attachment H, Appendix H-3, Signature Requirements for Pretreatment Annual and Semiannual Reports, is revised as follows.

The pretreatment annual and semiannual reports shall be signed by a principal executive officer, ranking elected official, or other duly authorized employee who is responsible for the overall operation of the Dischargers (POTW - 40 CFR 403.12[m]). Signed copies of the reports shall be submitted to the State Water Board and the Regional Water Board through the electronic self-monitoring report (eSMR) module of the California Integrated Water Quality System (CIWQS).

APPENDIX E-1
CHRONIC TOXICITY
DEFINITION OF TERMS AND SCREENING PHASE REQUIREMENTS

I. Definition of Terms

A. No observed effect level (NOEL) for compliance determination is equal to IC_{25} or EC_{25}. If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall be equal to the NOEC derived using hypothesis testing.

B. Effective concentration (EC) is a point estimate of the toxicant concentration that would cause an adverse effect on a quantal, "all or nothing," response (such as death, immobilization, or serious incapacitation) in a given percent of the test organisms. If the effect is death or immobility, the term lethal concentration (LC) may be used. EC values may be calculated using point estimation techniques such as probit, logit, and Spearman-Karber. EC_{25} is the concentration of toxicant (in percent effluent) that causes a response in 25 percent of the test organisms.

C. Inhibition concentration (IC) is a point estimate of the toxicant concentration that would cause a given percent reduction in a nonlethal, nonquantal biological measurement, such as growth. For example, an IC_{25} is the estimated concentration of toxicant that would cause a 25 percent reduction in average young per female or growth. IC values may be calculated using a linear interpolation method such as USEPA's Bootstrap Procedure.

D. No observed effect concentration (NOEC) is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. It is determined using hypothesis testing.

II. Chronic Toxicity Screening Phase Requirements

A. The Dischargers shall perform screening phase monitoring:

1. Subsequent to any significant change in the nature of the effluent discharged through changes in sources or treatment, except those changes resulting from reductions in pollutant concentrations attributable to source control efforts, or

2. Prior to permit reissuance. Screening phase monitoring data shall be included in the NPDES permit application for reissuance. The information shall be as recent as possible, but may be based on screening phase monitoring conducted within 5 years before the permit expiration date.

B. Design of the screening phase shall, at a minimum, consist of the following elements:

1. Use of test species specified in Appendix E-2, and use of the protocols referenced in those tables.

2. Two stages:

    a. Stage 1 shall consist of a minimum of one battery of tests conducted concurrently. Selection of the type of test species and minimum number of tests shall be based on Appendix E-2.

    b. Stage 2 shall consist of a minimum of two test batteries conducted at a monthly frequency using the three most sensitive species based on the Stage 1 test results.

3. Appropriate controls.

4. Concurrent reference toxicant tests.

5. Dilution series of 100%, 50%, 25%, 12.5%, 6.25%, and 0 %, where "%" is percent effluent as discharged, or as otherwise approved the Executive Officer if different dilution ratios are needed to reflect discharge conditions.

C. The Dischargers shall submit a screening phase proposal. The proposal shall address each of the elements listed above. If within 30 days, the Executive Officer does not comment, the Dischargers shall commence with screening phase monitoring.

APPENDIX E-2
SUMMARY OF TOXICITY TEST SPECIES REQUIREMENTS

Table AE-1. Critical Life Stage Toxicity Tests for Estuarine Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Alga	*(Skeletonema costatum)* *(Thalassiosira pseudonana)*	Growth rate	4 days	1
Red alga	*(Champia parvula)*	Number of cystocarps	7–9 days	3
Giant kelp	*(Macrocystis pyrifera)*	Percent germination; germ tube length	48 hours	2
Abalone	*(Haliotis rufescens)*	Abnormal shell development	48 hours	2
Oyster Mussel	*(Crassostrea gigas)* *(Mytilus edulis)*	Abnormal shell development; percent survival	48 hours	2
Echinoderms - Urchins Sand dollar	*(Strongylocentrotus purpuratus, S. franciscanus)* *(Dendraster excentricus)*	Percent fertilization	1 hour	2
Shrimp	*(Americamysis bahia)*	Percent survival; growth	7 days	3
Shrimp	*(Holmesimysis costata)*	Percent survival; growth	7 days	2
Topsmelt	*(Atherinops affinis)*	Percent survival; growth	7 days	2
Silversides	*(Menidia beryllina)*	Larval growth rate; percent survival	7 days	3

Toxicity Test References:

1. American Society for Testing Materials (ASTM). 1990. Standard Guide for Conducting Static 96-Hour Toxicity Tests with Microalgae. Procedure E 1218-90. ASTM, Philadelphia, PA.

2. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136. August 1995.

3. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Marine and Estuarine Organisms. EPA/821/R-02/014. October 2002.

Table AE-2. Critical Life Stage Toxicity Tests for Fresh Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Fathead minnow	*(Pimephales promelas)*	Survival; growth rate	7 days	4
Water flea	*(Ceriodaphnia dubia)*	Survival; number of young	7 days	4
Alga	*(Selenastrum capricornutum)*	Final cell density	4 days	4

Toxicity Test Reference:

4. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, fourth Edition Chronic manual (EPA-821-R-02-013, October 2002).

Table AE-3. Toxicity Test Requirements for Stage One Screening Phase

Requirements	Receiving Water Characteristics		
	Discharges to Coast	Discharges to San Francisco Bay[1]	
	Ocean	Marine/Estuarine	Freshwater
Taxonomic diversity	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish
Number of tests of each salinity type: Freshwater[2] Marine/Estuarine	0 4	1 or 2 3 or 4	3 0
Total number of tests	4	5	3

[1] (a) Marine refers to receiving water salinities greater than 1 part per thousand (ppt) at least 95 percent of the time during a normal water year.
(b) Freshwater refers to receiving water with salinities less than 1 ppt at least 95 percent of the time during a normal water year.
(c) Estuarine refers to receiving water salinities that fall between those of marine and freshwater, as described above.

[2] The freshwater species may be substituted with marine species if:
(a) The salinity of the effluent is above 1 ppt greater than 95 percent of the time, or
(b) The ionic strength (TDS or conductivity) of the effluent at the test concentration used to determine compliance is documented to be toxic to the test species.

ATTACHMENT F - FACT SHEET

Contents

I. Permit Information F-3
II. Facility Description F-4
A. Description of Wastewater and Biosolids Treatment F-4
B. Discharge Point and Receiving Waters F-6
C. Summary of Existing Requirements and Self-Monitoring Report Data F-6
D. Compliance Summary F-8
E. Planned Changes F-11
F. Blending Summary F-11
III. Applicable Plans, Policies, and Regulations F-12
A. Legal Authorities F-12
B. California Environmental Quality Act (CEQA) F-12
C. State and Federal Regulations, Policies, and Plans F-12
D. Impaired Water Bodies on CWA 303(d) List F-14
IV. Rationale For Effluent Limitations and Discharge Specifications F-14
A. Discharge Prohibitions F-15
B. Conventional and Non-Conventional Pollutant Limitations F-16
1. Scope and Authority F-16
2. Effluent Limitations for Conventional and Non-conventional Pollutants F-16
C. Toxic Substances Limitations F-17
1. Scope and Authority F-17
2. Beneficial Uses and Water Quality Objectives F-18
3. Determining the Need for WQBELs F-20
4. WQBEL Calculations F-24
6. Whole Effluent Acute Toxicity F-34
7. Whole Effluent Chronic Toxicity F-34
8. Antidegradation F-35
V. Rationale for Receiving Water Limitations F-36
VI. Rationale for Monitoring and Reporting Requirements F-36
A. Influent Monitoring F-36
B. Effluent Monitoring F-36
C. Whole Effluent Toxicity Testing Requirements F-37
D. Receiving Water Monitoring F-37
E. Pretreatment and Biosolids Monitoring Requirements F-37
VII. Rationale for Provisions F-37
A. Standard Provisions (Provision VI.A) F-37
B. MRP Requirements (Provision VI.B) F-38
C. Special Provisions (Provision VI.C) F-40
1. Reopener Provisions F-40
2. Effluent Characterization Study and Report F-40
3. Best Management Practices and Pollutant Minimization Program F-40
4. Special Provisions for POTWs F-40
5. Other Special Provisions F-41
VIII. Public Participation F-42

A. Notification of Interested Parties F-42
B. Written Comments F-42
C. Public Hearing F-43
D. Waste Discharge Requirements Petitions F-43
E. Information and Copying F-43
F. Register of Interested Persons F-43
G. Additional Information F-43

Tables

Table F-1. Facility Information F-3
Table F-2. Outfall Locations F-6
Table F-3. Previous Effluent Limitations and Monitoring Data for Conventional and Non-Conventional Pollutants F-7
Table F-4. Previous Effluent Limitations and Monitoring Data for Toxic Pollutants and Whole Effluent Toxicity F-8
Table F-5. Numeric Effluent Limitation Violations F-8
Table F-6. Compliance with Previous Order Provisions F-10
Table F-7. Summary of Blending Events F-12
Table F-8. Effects of Blending on Total Suspended Solids Concentrations F-12
Table F-9. Basin Plan Beneficial Uses F-13
Table F-10. Secondary Treatment Requirements F-16
Table F-11. Reasonable Potential Analysis Summary F-21
Table F-12. WQBEL Calculations F-33
Table F-13. Monitoring Requirements Summary F-39

ATTACHMENT F – FACT SHEET

As described in section II 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 specifically identified as "not applicable" have been determined not to apply to these Dischargers. Sections or subsections of this Order not specifically identified as "not applicable" fully apply to these Dischargers.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the discharge:

Table F-1. Facility Information

WDID	2 071037001		
Dischargers	1. West County Agency 2. West County Wastewater District 3. City of Richmond 4. Richmond Municipal Sewer District No. 1		
Facility Names	1. West County Agency Common Outfall	2. West County Wastewater District Treatment Plant and its Wastewater Collection System	3. Richmond Municipal Sewer District Water Pollution Control Plant and its Wastewater Collection System
Facility Addresses	2910 Hilltop Drive Richmond, CA 94806 Contra Costa County	2377 Garden Tract Road Richmond, CA 94801 Contra Costa County	601 Canal Boulevard Richmond, CA 94804 Contra Costa County
CIWQS Place Numbers	215234	272082	252657
Facility Contacts, Titles, and Phone Numbers	Eddy J. Shalaby Agency Manager (510) 222 – 6700	Eddy J. Shalaby General Manager (510) 222 – 6700	Alan Wolken Interim Engineering Services Director; (510) 307-8140
Authorized Person to Sign and Submit Reports	Same as above		
Mailing Addresses	2910 Hilltop Drive, Richmond, CA 94806	2910 Hilltop Drive, Richmond, CA 94806	450 Civic Center Plaza Richmond, CA 94804
Billing Addresses	Same as Mailing Addresses		
Facility Type	Publicly Owned Treatment Works (POTW)		
Major or Minor Facility	Major		
Threat to Water Quality	1		
Complexity	A		
Pretreatment Program	Yes		
Reclamation Requirements	Not Applicable		
Facility Permitted Flow	---	12.5 MGD	16.0 MGD
Facility Design Flow	---	12.5 MGD dry weather capacity 21 MGD wet weather capacity	16 MGD dry weather capacity 20 MGD wet weather capacity
Watershed	San Francisco Bay		
Receiving Water	Central San Francisco Bay		
Receiving Water Type	Marine		

Service Area	---	Parts of the City of Richmond, City of San Pablo, and adjacent unincorporated areas	Incorporated area of Richmond
Service Area Population	---	93,976	68,285

A. The West County Agency is a Joint Powers Agency whose members are the West County Wastewater District, the City of Richmond, and Richmond Municipal Sewer District No. 1. The West County Wastewater District owns and operates the West County Wastewater District Treatment Plant and its associated sanitary sewer collection system. The City of Richmond and Richmond Municipal Sewer District No. 1 own and operate Richmond Municipal Sewer District Water Pollution Control Plant and its associated sanitary sewer collection system. Together, the West County Agency, the West County Wastewater District, the City of Richmond, and the Richmond Municipal Sewer District are hereinafter referred to as the Dischargers.

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 Dischargers herein.

B. These facilities discharge treated wastewater from a common outfall to Central San Francisco Bay, a water of the State and the United States. They are currently regulated by Order No. R2-2008-0003 (hereinafter previous order) (NPDES Permit No. CA0038539), which was adopted on January 30, 2008; became effective on April 1, 2008; and expired on March 31, 2013. The discharge is also currently regulated under Order No. R2-2012-0096 (NPDES Permit CA 0038849), which establishes requirements on mercury and PCBs from wastewater discharges in the region. This Order does not affect the mercury and PCBs permit. Furthermore, the Dischargers are subject to Cease and Desist Order No. R2-2008-0004, which addresses the Dischargers' inability to immediately comply with certain effluent limits established in the previous order.

C. On October 3, 2012, the Dischargers filed a Report of Waste Discharge and submitted an application for reissuance of its waste discharge requirements (WDRs) and NPDES permit.

II. FACILITY DESCRIPTION

A. Description of Wastewater and Biosolids Treatment

1. **Facility Description.** This permit regulates two separate wastewater treatment plants and their wastewater collection systems that combine their treated wastewater prior to discharge. The locations of the treatment plants and the common outfall are shown in Attachment B. The West County Wastewater District owns and operates the West County Wastewater District Water Pollution Control Plant (West County Plant). The West County Plant serves a population of approximately 93,000 from parts of the City of Richmond; the City of San Pablo; the communities of Tara Hills, Rollingwood, Bayview, and El Sobrante; the Crestview portion of Pinole; and some unincorporated portions of Contra Costa County. It has a design capacity of 12.5 million gallons per day (MGD) for dry weather and a hydraulic capacity of 21 MGD for wet weather conditions. The annual average daily flow in 2011 was approximately 8.8 MGD.

   The City of Richmond and the Richmond Municipal Sewer District own the Richmond Municipal Sewer District Water Pollution Control Plant (Richmond Plant). The Richmond Municipal Sewer District facilitates the allocation of sewer use fees paid by City of Richmond

residents. The City handles administrative, management, and source control responsibilities and contracts out the operations and maintenance of the Richmond Plant and the sewer collection system. A private operations firm, Veolia Water West Operating Services, Inc., operates the Richmond Plant and collection system under contract and direction of the City of Richmond. The Richmond Plant serves a population of approximately 68,000 covering most of the incorporated area of Richmond. It has a design capacity of 16 MGD for dry weather and a hydraulic capacity of 20 MGD for wet weather conditions. The annual average daily flow in 2011 was about 8.1 MGD. Chlorinated effluents from the West County Plant and the Richmond Plant are combined and dechlorinated prior to discharge from the West County Agency Common Outfall into San Francisco Bay.

2. **Collection System.** The West County Wastewater District and the City of Richmond independently own and operate their treatment plants and the sanitary sewer collection systems within their separate service areas. West County Wastewater District has about 249 miles of gravity sewer and 11 miles of force main with 17 pump stations. The City of Richmond has about 187 miles of sewer line with 11 pump stations. Both collection systems are separately covered by the statewide General Waste Discharge Requirements for Sanitary Sewer Systems (Order No. 2006-0003-DWQ).

3. **Treatment Description.** The wastewater treatment processes at the West County Plant consist of bar screens, an aerated grit chamber, primary clarifiers, a roughing filter (high-rate trickling filter), an activated sludge unit, secondary clarifiers, and chlorine contact basins. The wastewater treatment processes at the Richmond Plant consist of bar screens, grit removal chambers, primary clarifiers, activated sludge basins, secondary clarifiers, and chlorine contact basins. Flow diagrams for the West County Plant and the Richmond Plant are shown in Attachment C. Treated wastewater from the West County Plant is transported to the Richmond Plant where it is combined with the Richmond Plant effluent, dechlorinated, and then discharged through West County Agency's common deepwater outfall into Central San Francisco Bay.

   Wet weather conditions sometime exceed the secondary treatment capacity at the Richmond Plant due to infiltration into the collection system. Under these conditions, when wet weather inflows exceed 20 MGD, excess primary-treated flows are diverted around the biological treatment units to two equalization basins with a total volume of 2 million gallons (wet weather storage). Once storage is at capacity, excess primary-treated flows are blended with the secondary-treated wastewater in the chlorine contact basin for disinfection. The combined flow is disinfected and dechlorinated prior to discharge to Central San Francisco Bay. After the wet weather event concludes, the stored wastewater in the equalization basins is drained back to the headworks and treated through the secondary treatment units.

4. **Discharge Point.** The treated wastewaters from the West County Plant and the Richmond Plant are combined, dechlorinated, and discharged through Discharge Point No. 001 about 8,200 feet offshore in Central San Francisco Bay at a depth varying from 24 to 32 feet below mean sea level. The outfall is equipped with a multi-port diffuser. The diffuser is a 6-foot diameter, 1,112-foot long reinforced concrete pipe embedded into the channel bottom and aligned in an east-west orientation. The first port is located 8,166 feet from shore. The diffuser has 140 ports spaced 8-feet apart discharging horizontally in alternating directions.

5. **Biosolids Management.** Biosolids from the Richmond Plant are thickened by dissolved air floatation, anaerobically-digested, and pumped to the West County Plant for drying and

disposal. At the West County Plant, primary clarifier sludge is combined with thickened secondary clarifier sludge that has been thickened using dissolved air floatation, anaerobically-digested, and dewatered in drying beds. Dried sludge from both plants is hauled offsite for disposal at Keller Canyon Landfill, West Contra Costa Landfill, or Vasco Road Landfill.

6. **Stormwater Discharge.** All stormwater in contact with equipment or wastewater at each plant is collected and directed back to the headworks for treatment. The Dischargers are not covered under the statewide general NPDES permit for stormwater discharges associated with industrial activities (NPDES General Permit No. CAS000001) because the plants do not discharge stormwater associated with industrial activity separate from that covered by this Order.

7. **Water Recycling.** About 2 to 3 MGD of treated wastewater from the West County Plant is recycled at the Chevron refinery. This involves pumping about 2 to 3 MGD of nitrified (<1 mg/L N) secondary-treated wastewater to the East Bay Municipal Utility District's Richmond Advanced Recycled Expansion (RARE) facility where the treated wastewater receives additional treatment. The RARE facility consists of microfiltration and reverse osmosis to generate high quality water for the Chevron refinery's boilers. The RARE facility generates approximately 0.36 to 0.5 MGD of microfiltration reject that is returned back to the West County Plant. The West County Plant also has the potential to recycle treated wastewater at the Richmond Country Club for golf course irrigation. There is no wastewater recycling at the Richmond Plant.

B. Discharge Point and Receiving Waters

The locations of the discharge point and the receiving waters are indicated below:

Table F-2. Outfall Locations

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Secondary Treated Municipal Wastewater	37º 54′ 47″ N	122º 25′ 06″ W	Central San Francisco Bay

Central San Francisco Bay is located within the San Francisco Bay watershed. Central San Francisco Bay is a tidally influenced, estuarine waterbody.

C. Summary of Existing Requirements and Self-Monitoring Report Data

1. **Conventional and Non-Conventional Pollutants.** Effluent limitations contained in the previous order and representative monitoring data from the term of the previous order, collected from April 2008 to June 2012, are presented below:

Table F-3. Previous Effluent Limitations and Monitoring Data for Conventional and Non-Conventional Pollutants

Parameter	Units	Effluent Limitations				Monitoring Data (04/08 – 06/12)	
		Monthly Average	Weekly Average	Daily Maximum	Instantaneous Maximum	Average[1]	Range
West County Plant Effluent							
5-day Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	---	---	7.3	2 – 23
Total Suspended Solids (TSS)	mg/L	30	45	---	---	10	4– 32
pH	Standard Units	---	---	---	6.0 – 9.0	6.6	6.0 – 7.8
Oil and Grease	mg/L	10	---	20	---	4.9	1.8(J) – 5.0
Total Coliform Bacteria	Colonies/ 100 mL	240	---	10,000	---	26.1	< 2 – 1,600
Richmond Plant Effluent							
5-day Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	---	---	11	2 – 102
Total Suspended Solids (TSS)	mg/L	30	45	---	---	16	3.8 – 170
pH	Standard Units	---	---	---	6.0 – 9.0	7.0	5.6 – 8.0
Oil and Grease	mg/L	10	---	20	---	3.0	1.1(J) – 14
Total Coliform Bacteria	Colonies/ 100 mL	240	---	10,000	---	26.1	< 2 – 16,000
Combined Effluent							
Total Residual Chlorine	mg/L	---	---	---	0.0	0.0	0 – 2.38

Unit Abbreviations:

mg/L = milligrams per liter
s.u. = standard units
mL = milliliters

[1] Some of the values used to calculate the average were below the minimum detection level. In those cases, the minimum detection level was used to calculate the average.
[2] < indicates that levels were below the method detection limit.
[3] J indicates that levels were detectable, but not quantifiable.

2. **Toxic Pollutants.** Effluent limitations contained in the previous order for the common outfall and representative monitoring data from the term of the previous order, collected from April 2008 to June 2012, are presented below:

Table F-4. Previous Effluent Limitations and Monitoring Data for Toxic Pollutants and Whole Effluent Toxicity

Parameter	Units	Effluent Limitations		Monitoring Data (04/08 – 06/12)	
		Monthly Average	Daily Maximum	Average[1]	Range[4],[5]
Copper[2]	µg/L	53	76	8.4	2.5 – 22
Nickel	µg/L	34	59	5.5	2.7 – 20
Selenium	µg/L	3.8	8.9	0.55	0.038(J) – 2.4
Cyanide[3]	µg/L	21	41	2.3	<0.6 – 17
Bis(2-ethylhexyl)phthalate	µg/L	55	150	1.8	<0.72 – 15.8
Dioxin-TEQ	µg/L	$1.4x10^{-8}$	$2.8x10^{-8}$	$8.5x10^{-8}$	$7.5x10^{-12}$ – $1.5x10^{-6}$
4,4-DDD	µg/L	0.00084	0.0017	<0.004	<0.003 – <0.0053
Heptachlor	µg/L	0.0020	0.0041	0.0043	<0.0030 – 0.0099(J)
Total Ammonia (as N)	mg/L	32	59	14	2.2 – 31
Acute whole effluent toxicity	% survival	[6]	[6]	89	0-100

Unit Abbreviations:

mg/L = milligrams per liter
µg/L= micrograms per liter

[1] Some of the values used to calculate the average were below the minimum detection level. In those cases, the minimum detection level was used to calculate the average.
[2] Site specific objectives were established for copper on June 13, 2006. The effluent limitations for copper presented in this table superseded the original effluent limitations of 71 µg/L (AMEL) and 100 µg/L (MDEL), as described in the previous order.
[3] Site specific objectives were established for cyanide on December 13, 2006. The effluent limitations for cyanide presented in this table superseded the original effluent limitations of 7.8 µg/L (AMEL) and 15 µg/L (MDEL), as described in the previous order.
[4] < indicates that levels were below the method detection limit.
[5] J indicates that levels were detectable, but not quantifiable.
[6] 11-sample median greater than 90. 11-sample 90^{th} percentile greater than 70.

D. Compliance Summary

1. **Previous Order Violations.** Sixteen permit violations occurred during the previous order term as summarized below:

Table F-5. Numeric Effluent Limitation Violations

Date of Violation	Exceeded Parameter	Units	Effluent Limitation	Reported Concentration
11/5/2012	Acute Toxicity	% Survival	11 sample 90^{th} percentile <70%	65
5/18-19/2012	Total Coliform	MPN/100 ml	--	Sample not taken
4/4/2012	BOD Influent Analysis	mg/L	--	Sample not analyzed
1/20/2012	Total Coliform Daily Maximum	MPN/100 ml	10,000	16,000
1/20/2012	Dioxin-TEQ Monthly Average	pg/L	0.014	0.031
1/20/2012	Dioxin-TEQ Daily Maximum	pg/L	0.028	0.031
11/22/2011	Total Residual Chlorine Instantaneous Maximum	mg/L	0.0	2.72
11/29/2010	Total Residual Chlorine	mg/L	0.0	0.75

	Instantaneous Maximum			
11/28/2010	Total Residual Chlorine Instantaneous Maximum	mg/L	0.0	0.63
7/31/2010	BOD_5 Monthly Average	mg/L	30	32.48
7/24/2010	BOD_5 Weekly Average	mg/L	45	59.84
7/24/2010	Total Suspended Solids Weekly Average	mg/L	45	51.86
4/8/2010	Total Chlorine Residual Instantaneous Maximum	mg/L	0.0	0.79
10/19/2009	Total Chlorine Residual Instantaneous Maximum	mg/L	0.0	2.38
10/13/2009	Total Coliform Daily Maximum	MPN/100 ml	10,000	16,000
9/17/2008	Acute Toxicity	% Survival	11 sample median <90%	0%

The Dischargers' 16 violations were for a variety of reasons: 2 for acute toxicity, 3 for BOD/TSS, 2 for samples not taken, 2 for total coliform, 5 for chlorine residual, and 2 for dioxin-TEQ. Except for the chlorine residual violations, these violations were sporadic and were corrected by the Dischargers very soon after the violations were discovered. The Regional Water Board assessed a total of $21,000 in mandatory minimum penalties for those violations where such penalties were required.

The acute toxicity violations occurred in 2008 and 2012. In both cases, the cause of the toxicity was not discovered and the toxicity went away upon retesting.

In July 2010, the Richmond Plant had a mechanical failure in one of its aeration basins. The plant operators did not discover the problem right away and this resulted in the basin going septic and 3 violations of BOD/TSS limits. The problem was resolved after the equipment was repaired and the beneficial bacteria population in the basin recovered.

In April and May 2012, operators at the Richmond Plant failed to collect samples for BOD and total coliform or collected the samples improperly. The contractor that operates the Richmond Plant changed its operational procedures and trained its Richmond Plant operators to correct the problem.

The two coliform violations occurred at the Richmond Plant in 2009 and 2012 during wet weather blending events. The City of Richmond believes both of these violations were related to high TSS concentrations that are typical at the beginning of a blending event. The Dischargers have not proposed any corrective measures to prevent future occurrences.

The Dischargers' five residual chlorine violations occurred between 2009 and 2011. They were mostly related failures in the system that feeds sodium bisulfate, a dechlorinating agent, to the combined effluent prior to discharge. The Dischargers fixed the responsible delivery system components.

2. **Cease and Desist Order No. R2-2008-0004.** The Regional Water Board issued Cease and Desist Order No. R2-2008-0004 concurrently with the previous order to address compliance problems with cyanide, selenium, dioxin-TEQ, heptachlor, and 4,4-DDD. With one

exception, the Dischargers have completed all prescribed actions in Order No. R2-2008-0004.

Table 2, task h of Order No. R2-2008-0004 requires the Dischargers to develop more aggressive actions if there are exceedances of final effluent limits before February 28, 2012. Effluent monitoring indicates that all limits for these pollutants have been met except for one instance. On January 20, 2012, there was a sample that caused two exceedances of the dioxin-TEQ limits (a daily and a monthly limit). This happened during a wet weather blending event when the TSS concentration was also high. TSS concentrations are typically high during blending events and dioxin-TEQ is a contaminant that binds well to solids, so the high dioxin-TEQ result was probably associated with the high TSS concentrations at the time. The other 10 dioxin-TEQ samples taken during the term of the permit were below effluent limits.

The Dischargers did not develop additional actions for dioxin-TEQ as required by Order No. R2-2008-0004 because the one incident was related to a wet weather event. Any proposed actions to upgrade the treatment plants to reduce dioxin-TEQ concentrations would likely be expensive and ineffective during most conditions. Instead, the City of Richmond is focusing its efforts on fixing its collection system to reduce the need for blending. This should reduce the TSS concentrations and potential for dioxin-TEQ violations.

3. **Compliance with Previous Order Provisions.** The table below presents a list of special activities the previous order required and the status of those requirements.

Table F-6. Compliance with Previous Order Provisions

Provision Number	Requirement	Status of Completion
VI.C.5.c – Utility Analysis	Utility Analysis for wet weather bypasses	Submitted with Report of Waste Discharge, October 2012.
VI.C.6 – Corrective Measures to Minimize Blending	Task 1 – Wet Weather Improvements	Completed July 2009. [1]
	Task 2 - Prepare workplan to implement measures in Feasibility Study	Completed July 2009. [1]
	Task 3 – Implement workplan	Updates provided in annual self-monitoring reports.
	Task 4 – Annual Status Report	Updates provided in annual self-monitoring reports.
	Task 5 – Completion Report	Specified time has not yet concluded; report due April 1, 2015.
VI.C.7 – 4,4-DDD, Heptachlor and Dioxin-TEQ Compliance Schedules	Task a. - Investigate quality assurance and quality control practices.	Completed.
	Task b. Evaluate previous 2 years of discharge data.	Completed by West County Wastewater District on October 31, 2008. Completed by the City of Richmond on November 6, 2008.
	Task c. through Task g. Implementation of Additional Tasks	No action required
	Task i. Compliance	All non-qualified effluent monitoring data complied with interim limits for 4,4'-DDD and heptachlor.

VI.C.8 – Action Plan for Cyanide	Task 1. Review Potential Cyanide Sources.	Completed by West County Wastewater District on February 26, 2010. Completed by the City of Richmond on November 3, 2008.
	Task 2. Implement Cyanide Control Program	Updates provided in annual pollution prevention reports.
	Task 3. Implement Additional Measures	Updates provided in annual pollution prevention reports.
	Task 4. Report on Status of Cyanide Control Program	Updates provided in annual pollution prevention reports.
VI.C.9 – Action Plan for Copper	Task 1. Review Potential Copper Sources.	Completed by West County Wastewater District on May 29, 2009. Completed by the City of Richmond on May 9, 2009.
	Task 2. Implement Copper Control Program	Updates provided in annual pollution prevention reports.
	Task 3. Implement Additional Measures	Updates provided in annual pollution prevention reports.
	Task 4. Studies to Reduce Copper Pollutant Impact Uncertainties	Completion through participation in Bay Area Clean Water Agencies' effort.
	Task 5. Report on Status of Copper Control Program	Updates provided in annual pollution prevention reports.

[1] *Corrective Measures to Minimize Blending at the Richmond Municipal Sewer District Water Pollution Control Plant* (July 2009).

E. Planned Changes

The Dischargers currently plan no significant changes for either treatment plant during this permit term. To address blending and sanitary sewer overflows, the City of Richmond will construct a storage tank at the Richmond Plant and repair and replace sewer lines. Provision VI.C.5.a requires these projects as explained in Fact Sheet section VII.C.5.a.

Contra Costa County is proposing a pilot project to send dry weather urban runoff and first flush stormwater for treatment at the West County Plant pursuant to the Municipal Regional Stormwater Permit (NPDES Permit No. CA0038593). The volume, rate, and chemical composition of the water to be treated are not yet known.

F. Blending Summary

The previous order allowed the City of Richmond to bypass secondary treatment for the portion of the flow above 20 MGD at the Richmond Plant when effluent flows exceeded 20 MGD. With flow exceeding secondary treatment capacity, excess primary-treated flows were diverted around the biological treatment units to wet weather storage. Once storage was at capacity, excess primary-treated flows were blended with the secondary-treated wastewater. The blended wastewater from the Richmond Plant was disinfected prior to combining with the effluent from the West County Plant, where both are dechlorinated and discharged to Central San Francisco Bay through the common outfall. From January 2008 through March 2012, the Richmond Plant blended in this manner about five times per year for about 25.5 hours per event, resulting in about 11.8 million gallons per event of effluent that did not receive secondary treatment. The annual average volume of blended effluent was about 63.7 million gallons, representing approximately 0.02% of annual plant flow. The table below provides a summary of recent blending events.

Table F-7. Summary of Blending Events

Wet Weather Years	Number of Events	Duration (hours/year)	Volume of Blended Effluent (million gallons/year)
2007-2008	6	126.4	67.0
2008-2009	8	206.4	87.0
2009-2010	3	109.0	36.5
2010-2011	6	126.0	68.4
2011-2012	4	121.9	59.6
Average	**5.4**	**138.0**	**63.7**

Total suspended solids concentrations were higher during blending events than when not blending. However, blending events were rare and were typically of short duration and small volume, so the overall effects of increased pollutant loads to San Francisco Bay were small. The effects of blending on total suspended solids concentrations are summarized in the table below.

Table F-8. Effects of Blending on Total Suspended Solids Concentrations

	Range (mg/L)	**Average** (mg/L)
During blending events	5.2 – 173	35.1
Months when blending occurs, blending data included (monthly average)	13.1 – 27.4	18.7
Months when blending occurs, blending data excluded (monthly average)	11.1 – 22.5	16.0
All months (April 2008 through June 2012) (daily maximum)	3.8 – 173	15.7

The City of Richmond plans to upgrade its facilities to reduce blending as described in Section VII.C.5.a below.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

This Order's requirements are based on the requirements and authorities described in this section:

A. Legal Authorities

This Order is issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by the USEPA and California Water Code (CWC) chapter 5.5, division 7, commencing with section 13370. It serves as an NPDES permit for point source discharges from the plant to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to CWC article 4, chapter 4, division 7, commencing with section 13260.

B. California Environmental Quality Act (CEQA)

Under CWC section 13389, this action to issue an NPDES permit is exempt from CEQA Chapter 3.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plan.** The *Water Quality Control Plan for the San Francisco Bay Basin* (hereinafter Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface and groundwater. It also includes implementation programs to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Board, the Office of Administrative Law, and USEPA. Requirements of this Order implement the Basin Plan.

The Basin Plan beneficial uses of Central San Francisco Bay are listed below. State Water Board Resolution No. 88-63 establishes State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply (MUN). Because of the marine influence on Central San Francisco Bay, total dissolved solids levels exceed 3,000 mg/L and thereby meet an exception to State Water Board Resolution No. 88-63. The MUN designation therefore does not apply to the receiving water.

Table F-9. Basin Plan Beneficial Uses

Receiving Water Name	Beneficial Uses
Central San Francisco Bay	Industrial Service Supply (IND) Industrial Process Supply (PROC) Commercial, and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

The State Water Board's *Water Quality Control Plan for Enclosed Bays and Estuaries—Part 1, Sediment Quality* became effective on August 25, 2009. This plan supersedes other narrative sediment quality objectives and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995, and November 9, 1999. About 40 criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR, promulgating new toxics criteria for California and, in addition, incorporating the previously adopted NTR criteria that applied in the State. USEPA amended the CTR on February 13, 2001. These rules contain water quality criteria (WQC) for priority toxic pollutants.

3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (hereinafter State Implementation Policy [SIP]). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated through the NTR and to the water quality objectives established in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria promulgated through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

4. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes (65 Fed. Reg. 24641 [April 27, 2000], codified at 40 CFR 131.21). Under the revised

regulation (also known as the Alaska Rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

5. **Antidegradation Policy.** NPDES regulations at 40 CFR 131.12 require that state WQS include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16, which incorporates the federal antidegradation policy where the federal policy applies under federal law and requires that existing quality of waters 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.

6. **Anti-Backsliding Requirements.** CWA sections 402(o)(2) and 303(d)(4) and 40 CFR 122.44(l) prohibit 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 order, with some exceptions in which limitations may be relaxed.

D. Impaired Water Bodies on CWA 303(d) List

In October 2011, pursuant to CWA section 303(d), USEPA approved a revised list of impaired water bodies prepared pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Regional Water Board plans to adopt TMDLs for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for non-point sources to achieve the water quality standards for the impaired water bodies.

Central San Francisco Bay is listed as an impaired waterbody. The pollutants impairing Central San Francisco Bay are chlordane, DDT, dieldrin, invasive species, dioxins and furans, mercury, PCBs, and selenium. On February 12, 2008, USEPA approved a TMDL for San Francisco Bay mercury. On March 29, 2010, USEPA approved a TMDL for San Francisco Bay PCBs. The discharge is regulated under Order No. R2-2012-0096 (NPDES Permit CA 0038849), which establishes requirements on mercury and PCBs from wastewater discharges in the region, thus implementing the mercury and PCBs TMDLs.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into 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 NPDES regulations: 40 CFR 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR 122.44(d) requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality objectives to protect the beneficial uses of the receiving water.

Several specific factors affecting the development of limitations and requirements in this Order are discussed below.

A. Discharge Prohibitions

1. **Discharge Prohibition III.A (No discharge other than as described):** This prohibition is based on 40 CFR 122.21(a), "Duty to Apply," and CWC section 13260, which requires filing an application and Report of Waste Discharge before a discharge can occur. Discharges not described in the permit application and Report of Waste Discharge, and subsequently in this Order, are prohibited.

2. **Discharge Prohibition III.B (Minimum initial dilution of 25:1):** The Order allows a dilution credit of 25:1 in the calculation of one or more WQBELs based on information regarding the dilution achieved by the Dischargers' outfall. Therefore, this prohibition is necessary to ensure that the assumptions used to derive the dilution credit remain substantially the same so the limitations are protective of water quality.

3. **Discharge Prohibition III.C (Bypass is prohibited, with exceptions):** This prohibition is based on 40 CFR 122.41(m) (see Federal Standard Provisions, Attachment D, section G). Bypasses are prohibited when influent flows are below 20.0 MGD (the secondary treatment capacity of the Richmond Plant). When inflows are above 20.0 MGD, the City of Richmond may bypass secondary treatment at the Richmond Plant for the portion above 20.0 MGD and blend the bypassed flows with the secondary-treated flow prior to disinfection and discharge to San Francisco Bay. As discussed below, the City of Richmond has shown that it meets the criteria (40 CFR 122.41[m][4][i][A]-[C]) required to allow blending:

   (A) Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. In its October 2012 Utility Analysis, the City of Richmond demonstrated that bypasses remain unavoidable to prevent backups and overflow of raw sewage in basements or on city streets, which could result in severe property damage or personal injury. In very large events, the Richmond Plant has reached, or very nearly reached, its maximum hydraulic capacity. High peak flows can overwhelm certain parts of the wastewater treatment process and may cause damage or failure of the system.

   (B) There are no feasible alternatives to the bypass. In its October 2012 Utility Analysis, the City of Richmond completed a No Feasible Alternatives Analysis using the criteria identified in USEPA's draft guidance on *NPDES Permit Requirements for Peak Wet Weather Discharges from Publicly Owned Treatment Works Treatment Plant Serving Separate Sanitary Sewer Collection Systems* (December 2005). While the City of Richmond spent about $20 million repairing and replacing sewer lines over the past permit cycle, the analysis indicates that blending will still be necessary over this next permit cycle. Rather than increasing its treatment plant capacity, the City of Richmond is focusing its resources on reducing inflow and infiltration in its collection system, which in turn reduces the need to blend. The decision to take this approach was made primarily because repairing sewer lines will also reduce sanitary sewer overflows, which are a chronic problem in the City of Richmond. The City of Richmond plans to do additional pipe repair and replacement projects to reduce inflow and infiltration, and it also plans to build a wet weather storage tank at the Richmond Plant to reduce blending events. The tank capacity will be designed for expected inflows from a 10-year, 24-hour storm. The new storage tank will provide at least 3 million gallons of influent storage. These projects will cost about $98.5 million. Provision VI.C.5.a. of the Order requires specific actions

for the City of Richmond to take within this coming permit cycle to reduce further the need to blend.

(C) The Dischargers provided notice at least ten days before the date of the bypass. The City of Richmond provided notice of its ongoing need to blend during wet weather with its Report of Waste Discharge and Utility Analysis. The notice was submitted more than ten days before any bypass subject to this Order.

4. **Discharge Prohibition III.D (Average dry weather flow not to exceed design capacity):** This prohibition is based on the historic and tested reliable treatment capacity of the individual treatment plants. Exceedance of the average dry weather flow capacity could result in lowering the reliability of achieving compliance with water quality requirements.

5. **Discharge Prohibition III.E (No sanitary sewer overflows):** Basin Plan Discharge Prohibition 15 (Table 4-1) and the CWA prohibit the discharge of wastewater to surface waters except as authorized under an NPDES permit. Publicly owned treatment works must achieve secondary treatment at a minimum and any more stringent limitations necessary to meet water quality standards (33 U.S.C. § 1311[b][1][B and C]). A sanitary sewer overflow that results in the discharge of raw sewage, or wastewater not meeting this Order's effluent limitations, to surface waters is therefore prohibited under the CWA and the Basin Plan.

B. Conventional and Non-Conventional Pollutant Limitations

1. Scope and Authority

CWA section 301(b) and 40 CFR 122.44 require that permits include conditions meeting 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 the minimum federal technology-based requirements based on secondary treatment standards at 40 CFR 133, which are summarized below. The 30-day average percent removal for BOD_5 and TSS, by concentration, is not to be less than 85 percent. The Basin Plan contains additional requirements for certain pollutants.

Table F-10. Secondary Treatment Requirements

Parameters	Monthly Average	Weekly Average
BOD_5 [1]	30 mg/L	45 mg/L
TSS	30 mg/L	45 mg/L
pH	6.0 – 9.0 standard units	

[1] At the option of the permitting authority, $CBOD_5$ effluent limitations may be substituted for BOD_5 limitations.

2. Effluent Limitations for Conventional and Non-conventional Pollutants

a. BOD_5 and TSS. The secondary treatment standards require the BOD_5 and TSS effluent limitations, including the 85 percent removal requirement. Compliance will be determined at each individual treatment plant, at Monitoring Locations EFF-002 and EFF-003, because these technology-based requirements apply at each plant.

b. Oil and Grease. The oil and grease limits are based on Basin Plan Table 4-2. Compliance will be determined at each individual treatment plant, at Monitoring

Locations EFF-002 and EFF-003, because these technology-based requirements apply at each plant.

c. pH. The pH limits are based on Basin Plan Table 4-2. Compliance will be determined at each individual treatment plant, at Monitoring Locations EFF-002 and EFF-003, because these technology-based requirements apply at each plant.

d. Total Chlorine Residual. The total chlorine residual effluent limitation is based on Basin Plan Table 4-2. The allowance for determining false positives using continuous devices is based on the fact that continuous instruments occasionally have anomalous spikes, and it is chemically improbable to have free chlorine present in the presence of sodium bisulfite. Compliance will be determined in combined effluent, at Monitoring Location EFF-001, because the effluent is dechlorinated only after effluent streams are combined.

e. Enterococcus Bacteria. The enterococcus effluent limitation is based on Basin Plan Table 4-2A. Compliance will be determined at each individual treatment plant, at Monitoring Locations EFF-002 and EFF-003.

f. Total Coliform Bacteria. Basin Plan Table 4-2A requires effluent limitations for total coliform for deep water discharges to inland surface waters and estuaries with the shellfish harvesting beneficial use. Compliance will be determined at each individual treatment plant, at Monitoring Locations EFF-002 and EFF-003.

C. Toxic Substances Limitations

Water quality-based effluent limitations (WQBELs) have been derived for toxic pollutants 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. The procedures for calculating individual WQBELs are based on the SIP and the Basin Plan. Most Basin Plan beneficial uses and water quality objectives were approved under State law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the Clean Water Act" pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than those required by CWA water quality standards.

1. Scope and Authority

a. NPDES regulations at 40 CFR 122.44(d)(1)(i) mandate that permits include effluent limitations for all pollutants that are or may be discharged at levels that have reasonable potential to cause or contribute to an excursion of a water quality standard, including numeric and narrative objectives within a standard. As specified in 40 CFR 122.44(d)(1)(i), permits are required to include WQBELs for all pollutants "which the Director determines 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."

The process for determining "reasonable potential" and calculating WQBELs when necessary is intended to protect the designated beneficial uses of the receiving water as specified in the Basin Plan and to achieve applicable water quality objectives contained in the CTR, NTR, and other state plans and policies.

b. NPDES regulations and the SIP provide the basis to establish Maximum Daily Effluent Limitations (MDELs) and Average Monthly Effluent Limitations (AMELs).

(1) NPDES Regulations. NPDES regulations at 40 CFR 122.45(d) state, "For continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall *unless impracticable* be stated as MDELs and AMELs for all discharges other than publicly owned treatment works."

(2) SIP. SIP section 1.4 requires WQBELs to be expressed as MDELs and AMELs.

c. MDELs are used in this Order to protect against acute water quality effects. The MDELs are necessary for preventing fish kills or mortality to aquatic organisms.

2. Beneficial Uses and Water Quality Objectives

The water quality objectives (WQOs) applicable to the receiving water for this discharge are from the Basin Plan; the CTR, established by USEPA at 40 CFR 131.38; and the NTR, established by USEPA at 40 CFR 131.36. Some pollutants have WQOs from more than one of these sources.

a. Basin Plan. The Basin Plan specifies numeric WQOs for 10 priority toxic pollutants, as well as narrative WQOs for toxicity and bioaccumulation in order to protect beneficial uses. The pollutants for which the Basin Plan specifies numeric WQOs are arsenic, cadmium, chromium (VI), copper in marine and freshwater, lead, mercury, nickel, silver, zinc, and cyanide. The narrative toxicity WQO states, "All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms." The narrative bioaccumulation WQO states, "Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered." Effluent limitations and provisions contained in this Order implement these objectives, based on available information.

b. CTR. The CTR specifies numeric aquatic life criteria for 23 priority toxic pollutants and numeric human health criteria for 57 priority toxic pollutants. These criteria apply to all inland surface waters and enclosed bays and estuaries of the San Francisco Bay Region, although Basin Plan Tables 3-3 and 3-4 include numeric objectives for certain of these priority toxic pollutants that supersede CTR criteria. Human health criteria are further identified as for "water and organisms" and for "organisms only." The CTR criteria applicable to "organisms only" apply to the receiving water because it is not a source of drinking water.

c. NTR. The NTR establishes numeric aquatic life criteria for selenium and numeric human health criteria for 33 toxic organic pollutants for waters of San Francisco Bay upstream to and including Suisun Bay and the Sacramento River-San Joaquin River Delta.

d. Sediment Quality Objectives. The *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1*, Sediment Quality contains a narrative WQO, "Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California." This WQO is to be implemented by integrating three lines of evidence: sediment toxicity, benthic community condition, and sediment chemistry. The policy requires that if the Regional Water Board determines that a discharge has reasonable potential to cause or contribute to an exceedance of this WQO, it is to impose the WQO as a receiving water limit.

e. Basin Plan Receiving Water Salinity Policy. The Basin Plan (like the CTR and NTR) states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water are to be considered in determining the applicable WQOs. Freshwater criteria apply to discharges to waters with salinities equal to or less than one part per thousand (ppt) at least 95 percent of the time. Saltwater criteria apply to discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to water with salinities between these two categories, or tidally influenced freshwaters that support estuarine beneficial uses, the WQOs are the lower of the salt or freshwater WQOs (the latter calculated based on ambient hardness) for each substance.

The receiving water for this discharge is Central San Francisco Bay, a saltwater water body based on salinity data collected by the San Francisco Estuary Institute (SFEI) Regional Monitoring Program for Trace Substances (RMP). Historically, the RMP conducted sampling at 26 locations throughout the San Francisco Bay region. In 2002, the system was redesigned to incorporate random sampling in place of the 26 established locations. Salinity data collected from the Point Isabel (BC41) and Richardson Bay (BC30) RMP stations (March 1993 to August 2001), Red Rock (BC60) RMP station (January 1994 to August 2001), Yerba Buena Island (BC10) RMP station (March 1993 to August 2009), as well as 32 samples collected throughout the Central Bay from July 2002 to August 2010 indicate that the salinity was never less than 1 ppt and was greater than 10 ppt in 97 percent of the samples. Central San Francisco Bay, in the vicinity of the facility outfall, is therefore classified as saltwater, and the reasonable potential analysis and effluent limitations in this Order are based on saltwater WQOs.

f. Site-Specific Metals Translators. NPDES regulations at 40 CFR 122.45(c) require that effluent limitations for metals be expressed as total recoverable metal. Since applicable WQOs for metals are typically expressed as dissolved metal, translators must be used to convert metals concentrations from dissolved to total recoverable and vice versa. The CTR includes default translators; however, site-specific conditions, such as water temperature, pH, suspended solids, and organic carbon greatly affect the form of metal (dissolved, non-filterable, or otherwise) present in the water and therefore available to cause toxicity. In general, the dissolved form of the metal is more available and more toxic to aquatic life than non-filterable forms. Site-specific translators can be developed to account for site-specific conditions, thereby preventing exceedingly stringent or under protective WQOs.

For this receiving water, the site-specific copper translators, 0.73 (AMEL) and 0.87 (MDEL), are based on Basin Plan Table 7.2.1-2 for deep water discharges to Central San Francisco Bay. The site-specific nickel translators, 0.65 (AMEL) and 0.85 (MDEL), are based on a study conducted by the Clean Area Partnership (*North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* [2005]). For all other metals, default translators USEPA established at 40 CFR 131.38(b)(2), Table 2, were used to determine the need for and calculating WQBELs.

3. Determining the Need for WQBELs

Assessing whether a pollutant has reasonable potential to exceed a WQO in the receiving water is the fundamental step in determining whether a WQBEL is required.

a. Reasonable Potential Methodology

For priority pollutants and other toxic pollutants, the reasonable potential analysis (RPA) identifies the observed maximum effluent concentration (MEC) for each pollutant based on effluent concentration data. There are three triggers in determining reasonable potential according to SIP section 1.3.

(1) The first trigger (Trigger 1) is activated if the MEC is greater than or equal to the lowest applicable WQO (MEC $\geq$ WQO), which has been adjusted, if appropriate, for pH, hardness, and translator data. If the MEC is greater than or equal to the adjusted WQO, then that pollutant has reasonable potential, and a WQBEL is required.

(2) The second trigger (Trigger 2) is activated if the observed maximum ambient background concentration (B) is greater than the adjusted WQO (B > WQO) and the pollutant is detected in any of the effluent samples.

(3) The third trigger (Trigger 3) is activated if a review of other information determines that a WQBEL is required to protect beneficial uses, even though both MEC and B are less than the WQO.

b. Effluent Data

The Dischargers' priority pollutant data were analyzed, along with the nature of the discharge, to determine if the discharge has reasonable potential. The RPA is based on effluent monitoring data collected from April 2008 to June 2012 for most inorganic pollutants, and from September 2008 to February 2012 for most organic pollutants.

c. Ambient Background Data

The SIP states that, for calculating WQBELs, ambient background concentrations are either the observed maximum ambient water column concentrations or, for objectives intended to protect human health from carcinogenic effects, the arithmetic mean of observed ambient water concentrations.

On May 15, 2003, a group of San Francisco Bay Region dischargers known as the Bay Area Clean Water Agencies (BACWA) submitted a collaborative receiving water study

entitled *San Francisco Bay Ambient Water Monitoring Interim Report* (2003). This study included monitoring results from sampling events in 2002 and 2003 for priority pollutants not monitored by the RMP. This study included the Yerba Buena Island RMP station. BACWA provided additional data through its Ambient Water Monitoring: Final CTR Sampling Update report, dated June 15, 2004.

For priority pollutants, the reasonable potential analysis was conducted and WQBELs were calculated using RMP data from 1993 through 2009 at the Yerba Buena Island RMP station (BC10) and additional data from the BACWA study.

For ammonia, the reasonable potential analysis was conducted and WQBELs were calculated using RMP data from the Red Rock RMP station (BC60). Although data from the Point Isabel and Richardson Bay RMP stations were used in calculating limits from ammonia in the previous order, the Red Rock RMP station is the closest station to the West County Agency outfall (approximately 0.75 mile away) and is more representative of ambient background conditions.

d. Reasonable Potential Analysis (RPA)

The MECs, most stringent applicable WQOs, and background concentrations used in the RPA are presented in the following table, along with the RPA results (yes or no) for each pollutant. Reasonable potential was not determined for all pollutants because there are not applicable WQOs for all pollutants and monitoring data are unavailable for others. Based on a review of the effluent data collected during the previous order term from April 2008 through June 2012, the pollutants that exhibit reasonable potential are copper, nickel, cyanide, dioxin-TEQ, bis(2-ethylhexyl)phthalate, endrin, heptachlor, and total ammonia by Trigger 1.

Table F-11. Reasonable Potential Analysis Summary

CTR #	Priority Pollutant	Governing WQO (µg/L)	MEC or Minimum DL [1][2] (µg/L)	Maximum Background or Minimum DL [1][2] (µg/L)	RPA Result [3]
1	Antimony	4,300	0.95	1.8	No
2	Arsenic	36	8.2	2.46	No
3	Beryllium	No Criteria	< 0.02	0.215	Ud – No Criteria
4	Cadmium	9.4	0.73	0.127	No
5a	Chromium (III)	No Criteria	4.6	NA	Ud – No Criteria
5b	Chromium (VI)	50	< 0.6	4.4	No
6	Copper	3.4	22	2.55	Yes
7	Lead	8.5	0.4	0.8	No
9	Nickel	13	20	3.7	Yes
10	Selenium (303(d) listed)	5.0	2.4	0.39	No
11	Silver	2.2	0.52	0.052	No
12	Thallium	6.3	< 0.04	0.21	No
13	Zinc	86	63	5.1	No
14	Cyanide	2.9	11	<0.4	Yes
15	Asbestos	No Criteria	No data	No data	Ud – No Criteria
16	2,3,7,8-TCDD (303(d) listed)	$1.4x10^{-8}$	$< 3.6x10^{-7}$	$8.2x10^{-9}$	No
	Dioxin TEQ (303(d) listed)	$1.4x10^{-8}$	$1.5x10^{-6}$	$7.1x10^{-8}$	Yes

CTR #	Priority Pollutant	Governing WQO (µg/L)	MEC or Minimum DL [1][2] (µg/L)	Maximum Background or Minimum DL [1][2] (µg/L)	RPA Result [3]
17	Acrolein	780	< 1.3	<0.5	No
18	Acrylonitrile	0.66	< 0.66	0.03	No
19	Benzene	71	< 0.18	<0.05	No
20	Bromoform	360	3.7	<0.5	No
21	Carbon Tetrachloride	4.4	< 0.16	0.06	No
22	Chlorobenzene	21,000	< 0.18	<0.5	No
23	Chlorodibromomethane	34	18	<0.05	No
24	Chloroethane	No Criteria	< 0.37	<0.5	Ud – No Criteria
25	2-Chloroethylvinyl ether	No Criteria	< 0.28	<0.5	Ud – No Criteria
26	Chloroform	No Criteria	23	<0.5	Ud – No Criteria
27	Dichlorobromomethane	46	22	<0.05	No
28	1,1-Dichloroethane	No Criteria	< 0.19	<0.05	Ud – No Criteria
29	1,2-Dichloroethane	99	< 0.18	0.04	No
30	1,1-Dichloroethylene	3.2	< 0.21	<0.5	No
31	1,2-Dichloropropane	39	< 0.18	<0.05	No
32	1,3-Dichloropropylene	1,700	< 0.16	<0.5	No
33	Ethylbenzene	29,000	< 0.25	<0.5	No
34	Methyl Bromide	4,000	< 0.17	<0.5	No
35	Methyl Chloride	No Criteria	< 0.22	<0.5	Ud – No Criteria
36	Methylene Chloride	1,600	0.50	22	No
37	1,1,2,2-Tetrachloroethane	11	< 0.10	<0.05	No
38	Tetrachloroethylene	8.9	0.60	<0.05	No
39	Toluene	200,000	0.50	<0.3	No
40	1,2-Trans-Dichloroethylene	140,000	< 0.22	<0.5	No
41	1,1,1-Trichloroethane	No Criteria	< 0.19	<0.5	Ud – No Criteria
42	1,1,2-Trichloroethane	42	< 0.16	<0.05	No
43	Trichloroethylene	81	0.30	<0.5	No
44	Vinyl Chloride	525	< 0.25	<0.5	No
45	2-Chlorophenol	400	< 0.20	<1.2	No
46	2,4-Dichlorophenol	790	< 0.20	<1.3	No
47	2,4-Dimethylphenol	2,300	1.6	<1.3	No
48	2-Methyl- 4,6-Dinitrophenol	765	< 0.20	<1.2	No
49	2,4-Dinitrophenol	14,000	< 0.60	<0.7	No
50	2-Nitrophenol	No Criteria	< 0.10	<1.3	Ud – No Criteria
51	4-Nitrophenol	No Criteria	< 0.70	<1.6	Ud – No Criteria
52	3-Methyl 4-Chlorophenol	No Criteria	< 0.20	<1.1	Ud – No Criteria
53	Pentachlorophenol	7.9	< 0.10	<1	No
54	Phenol	4,600,000	< 0.30	<1.3	No
55	2,4,6-Trichlorophenol	6.5	0.18	<1.3	No
56	Acenaphthene	2,700	< 0.03	0.0019	No
57	Acenaphthylene	No Criteria	< 0.02	0.0013	Ud – No Criteria
58	Anthracene	110,000	< 0.02	0.00059	No
59	Benzidine	0.00054	< 1.3	<0.0015	No
60	Benzo(a)Anthracene	0.049	< 0.02	0.0053	No
61	Benzo(a)Pyrene	0.049	< 0.02	0.0033	No
62	Benzo(b)Fluoranthene	0.049	< 0.02	0.0046	No
63	Benzo(ghi)Perylene	No Criteria	< 0.02	0.0045	Ud – No Criteria
64	Benzo(k)Fluoranthene	0.049	< 0.03	0.0018	No

CTR #	Priority Pollutant	Governing WQO (µg/L)	MEC or Minimum DL [1][2] (µg/L)	Maximum Background or Minimum DL [1][2] (µg/L)	RPA Result [3]
65	Bis(2-Chloroethoxy)Methane	No Criteria	< 0.10	<0.3	Ud – No Criteria
66	Bis(2-Chloroethyl)Ether	1.4	< 0.10	<0.00015	No
67	Bis(2-Chloroisopropyl)Ether	170,000	< 0.10	NA	No
68	Bis(2-Ethylhexyl)Phthalate	5.9	15.8	<0.5	Yes
69	4-Bromophenyl Phenyl Ether	No Criteria	< 0.10	<0.23	Ud – No Criteria
70	Butylbenzyl Phthalate	5,200	0.89	0.5	No
71	2-Chloronaphthalene	4,300	< 0.10	<0.3	No
72	4-Chlorophenyl Phenyl Ether	No Criteria	< 0.10	<0.3	Ud – No Criteria
73	Chrysene	0.049	< 0.02	0.0024	No
74	Dibenzo(a,h)Anthracene	0.049	< 0.02	0.00064	No
75	1,2-Dichlorobenzene	17,000	< 0.27	<0.8	No
76	1,3-Dichlorobenzene	2,600	0.18	<0.8	No
77	1,4-Dichlorobenzene	2,600	< 0.18	<0.8	No
78	3,3 Dichlorobenzidine	0.077	< 0.66	<0.001	No
79	Diethyl Phthalate	120,000	0.21	<0.27	No
80	Dimethyl Phthalate	2,900,000	0.97	<0.29	No
81	Di-n-Butyl Phthalate	12,000	0.31	<0.38	No
82	2,4-Dinitrotoluene	9.1	< 0.11	<0.27	No
83	2,6-Dinitrotoluene	No Criteria	< 0.10	<0.29	Ud – No Criteria
84	Di-n-Octyl Phthalate	No Criteria	< 0.10	<0.38	Ud – No Criteria
85	1,2-Diphenylhydrazine	0.54	< 0.10	0.0037	No
86	Fluoranthene	370	0.02	0.011	No
87	Fluorene	14,000	< 0.02	0.0021	No
88	Hexachlorobenzene	0.00077	< 0.10	0.00002	No
89	Hexachlorobutadiene	50	< 0.20	<0.3	No
90	Hexachlorocyclopentadiene	17,000	< 0.10	<0.31	No
91	Hexachloroethane	8.9	< 0.20	<0.2	No
92	Indeno(1,2,3-cd)Pyrene	0.049	< 0.02	0.004	No
93	Isophorone	600	< 0.10	<0.3	No
94	Naphthalene	No Criteria	< 0.02	0.0023	Ud – No Criteria
95	Nitrobenzene	1,900	< 0.10	<0.25	No
96	N-Nitrosodimethylamine	8.1	< 0.10	<0.3	No
97	N-Nitrosodi-n-Propylamine	1.4	< 0.10	<0.001	No
98	N-Nitrosodiphenylamine	16	< 0.10	<0.001	No
99	Phenanthrene	No Criteria	< 0.02	0.0061	Ud – No Criteria
100	Pyrene	11,000	< 0.02	0.0051	No
101	1,2,4-Trichlorobenzene	No Criteria	< 0.10	<0.3	Ud – No Criteria
102	Aldrin	0.00014	< 0.0016	NA	No
103	Alpha-BHC	0.013	< 0.002	0.00050	No
104	Beta-BHC	0.046	< 0.002	0.00041	No
105	Gamma-BHC	0.063	< 0.002	0.00070	No
106	Delta-BHC	No Criteria	< 0.002	0.000042	Ud – No Criteria
107	Chlordane (303(d) listed)	0.00059	< 0.005	0.00018	No
108	4,4'-DDT (303(d) listed)	0.00059	< 0.003	0.000066	No
109	4,4'-DDE (linked to DDT)	0.00059	< 0.003	0.00069	No
110	4,4'-DDD	0.00084	< 0.003	0.00031	No
111	Dieldrin (303d listed)	0.00014	< 0.0021	0.00026	No
112	Alpha-Endosulfan	0.0087	0.0048	0.000031	No

CTR #	Priority Pollutant	Governing WQO (µg/L)	MEC or Minimum DL [1][2] (µg/L)	Maximum Background or Minimum DL [1][2] (µg/L)	RPA Result [3]
113	beta-Endosulfan	0.0087	< 0.0021	0.000069	No
114	Endosulfan Sulfate	240	< 0.003	0.000082	No
115	Endrin	0.0023	0.0030	0.000036	Yes
116	Endrin Aldehyde	0.81	< 0.002	NA	No
117	Heptachlor	0.00021	0.0099	0.000019	Yes
118	Heptachlor Epoxide	0.00011	< 0.0026	0.000094	No
126	Toxaphene	0.0002	< 0.20	NA	No
	Total Ammonia	1.26	31	0.15	Yes

[1] The MEC and maximum background concentration are the actual detected concentrations unless preceded by a "<" sign, in which case the value shown is the minimum detection level (DL).
[2] The MEC or maximum background concentration is "Not Available" when there are no monitoring data for the constituent.
[3] RPA Results = Yes, if MEC > WQC, B > WQC and MEC is detected, or Trigger 3;
= No, if MEC and B are < WQC or all effluent data are undetected;
= Undetermined (Ud), if no criteria have been promulgated or there are insufficient data

e. Constituents with limited data. In some cases, reasonable potential cannot be determined because effluent data are limited or ambient background concentrations are unavailable. The Dischargers will continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available, further RPA will be conducted to determine whether numeric effluent limitations are necessary.

f. Pollutants with No Reasonable Potential. WQBELs are not included in this Order for constituents that do not demonstrate reasonable potential; however, monitoring for those pollutants is still required. If concentrations of these constituents are found to have increased significantly, the Dischargers will be required to investigate the sources of the increases. Remedial measures are required if the increases pose a threat to receiving water quality.

g. RPA for Sediment Quality Objective. Pollutants in some receiving water sediments may be present in quantities that alone or in combination are toxic to benthic communities. Efforts are underway to identify stressors causing such conditions. However, to date there is no evidence directly linking compromised sediment conditions to the discharges subject to this Order; therefore the Regional Water Board cannot draw a conclusion about reasonable potential for the discharges to cause or contribute to exceedances of the sediment quality objectives. Nevertheless, the Dischargers continue to participate in the RMP, which monitors San Francisco Bay sediment and seeks to identify stressors responsible for degraded sediment quality. Thus far, the monitoring has provided only limited information about potential stressors and sediment transport. The Regional Water Board is exploring options for obtaining additional information that may inform future RPAs.

4. WQBEL Calculations

a. Pollutants with Reasonable Potential. WQBELs were developed for the toxic and priority pollutants determined to have reasonable potential to cause or contribute to exceedances of WQOs. WQBELs were calculated based on WQOs and the procedures

specified in SIP section 1.4. WQOs used for each pollutant with reasonable potential are discussed below.

b. Dilution Credits. The SIP allows dilution credits for completely-mixed discharges and, under certain circumstances, for incompletely-mixed discharges. The Dischargers submitted a dilution study technical memorandum, *Near-Field Dilution Modeling – WCA Discharges to San Francisco Bay*, dated September 17, 2012. The report presents findings regarding the initial dilution of the discharge at the outfall. The near-field dilution was estimated using the Cornell Mixing Zone Expert System (CORMIX) following USEPA guidance. The study used the peak wet weather design flow (41 MGD), which resulted in a dilution factor of 117:1 (D=116) for acute conditions, and the dry weather design flow (28.5 MGD), which resulted in a dilution factor of 164:1 (D=163) for chronic conditions.

i. **Bioaccumulative Pollutants.** For certain bioaccumulative pollutants, dilution credit is significantly restricted or denied. Specifically, these pollutants include dioxin compounds, which appears on the CWA section 303(d) list for Central San Francisco Bay because, based on available data on concentrations of these pollutants in aquatic organisms, sediment, and the water column, they impair beneficial uses. The following factors suggest insufficient assimilative capacity in San Francisco Bay for these pollutants.

Tissue samples taken from fish in San Francisco Bay show the presence of these pollutants at concentrations greater than screening levels (*Contaminant Concentrations in Fish from San Francisco Bay*, May 1997). The results of a 1994 San Francisco Bay pilot study, presented in *Contaminated Levels in Fish Tissue from San Francisco Bay* (Regional Water Board, 1994), also showed elevated levels of chemical contaminants in fish tissues. The Office of Environmental Health and Hazard Assessment (OEHHA) completed a preliminary review of the data in the 1994 report and in December 1994 issued an interim consumption advisory covering certain fish species in San Francisco Bay due to the levels of some of these pollutants. OEHHA updated this advisory by issuing its May 2011 report Health Advisory and Safe Eating Guidelines for San Francisco Bay Fish and Shellfish, which still suggests insufficient assimilative capacity in San Francisco Bay for 303(d)-listed pollutants. Therefore, dilution credits are denied for bioaccumulative pollutants on the 303(d) list for which data are lacking on sources and significant uncertainty about how different sources of these pollutants contribute to bioaccumulation.

ii. **Non-Bioaccumulative Pollutants.** For non-bioaccumulative pollutants (except ammonia), a conservative dilution allowance of 10:1 (D = 9) has been assigned. The 10:1 dilution allowance is consistent with the previous order and is based, in part, on Basin Plan Prohibition 1 (Table 4-1), which prohibits discharges with less than 10:1 dilution. SIP section 1.4.2 allows for limiting the dilution credit. The dilution credit is limited for the following reasons:

(1) San Francisco Bay is a very complex estuarine system with highly variable and seasonal upstream freshwater inflows and diurnal tidal saltwater inputs. SIP section 1.4.3 allows background conditions to be determined on a discharge-by-discharge or water body-by-water body basis. A water body-by-water body basis

approach is taken here due to inherent uncertainties in characterizing ambient background conditions in a complex estuarine system on a discharge-by-discharge basis. The Yerba Buena Island RMP station, relative to other RMP stations, fits SIP guidance criteria for establishing background conditions. The SIP requires that background water quality data be representative of the ambient receiving water that will mix with the discharge. Water quality data from the Yerba Buena Island RMP station is representative of the water that will mix with the discharge.

(2) Because of the complex hydrology of San Francisco Bay, there are uncertainties in accurately determining an appropriate mixing zone. The models used to predict dilution do not consider the three dimensional nature of San Francisco Bay currents resulting from the interaction of tidal flushes and seasonal fresh water outflows. Being heavier and colder than fresh water, ocean salt water enters San Francisco Bay on a twice-daily tidal cycle, generally beneath the warmer fresh water that flows seaward. When these waters mix and interact, complex circulation patterns occur due to the varying densities of the fresh and ocean waters. The complex patterns occur throughout San Francisco Bay but are most prevalent in the San Pablo Bay, Carquinez Strait, and Suisun Bay areas. The locations of this mixing and interaction change depending on the strength of each tide. Additionally, sediment loads from the Central Valley change on a long-term basis, affecting the depth of different parts of San Francisco Bay, resulting in alteration of flow patterns, mixing, and dilution at the outfall.

iii. **Ammonia.** For ammonia, a conservative estimate of actual initial dilution was used to calculate the effluent limitations. This is justified because ammonia, a non-persistent pollutant, quickly disperses and degrades to a non-toxic state, and cumulative toxicity effects are unlikely. Based on the Dischargers' report, *Near-Field Dilution Modeling – WCA Discharges to San Francisco Bay*, September 17, 2012, the dilution credit of 117:1 (D=116) is appropriate for acute conditions and 164:1 (D=163) is appropriate for chronic conditions.

c. Development of WQBELs

(1) Copper

(a) Water Quality Objectives. The Basin Plan contains chronic and acute marine WQOs for copper of 6.0 micrograms per liter (µg/L) and 9.4 µg/L, expressed as dissolved metal (site-specific objectives for San Francisco Bay). These WQOs were converted to total recoverable metal using the site-specific translators of 0.73 (chronic) and 0.87 (acute). The resulting water quality criteria are 8.2 µg/L (chronic) and 11 µg/L (acute).

(b) RPA Results. This Order establishes effluent limitations for copper because the MEC (22 µg/L) exceeds the most stringent criterion (8.2 µg/L), demonstrating reasonable potential by Trigger 1. Reasonable potential is also established by Trigger 3, consistent with Basin Plan section 7.2, which requires that individual NPDES permits for municipal wastewater treatment facilities include copper WQBELs.

(c) WQBELs. WQBELs for copper, calculated according to SIP procedures with an effluent data coefficient of variation (CV) of 0.55 and a dilution credit of D = 9 (dilution ratio = 10:1), are 44 µg/L (AMEL) and 85 µg/L (MDEL).

(d) Anti-backsliding. The previous order limits were 53 µg/L (AMEL) and 76 µg/L (MDEL). To avoid backsliding, the MDEL from the previous order is retained. Anti-backsliding requirements are satisfied because the new limits are at least as stringent as those in the previous order.

(2) Nickel

(a) Water Quality Objectives. The Basin Plan contains chronic and acute marine WQOs for nickel of 8.2 µg/L and 74 µg/L, expressed as dissolved metal. These WQOs were converted to total recoverable metal using the Central San Francisco Bay site-specific translators of 0.65 (chronic) and 0.85 (acute). The resulting WQOs are 13 µg/L (chronic) and 87 µg/L (acute).

(b) RPA Results. This Order establishes effluent limitations for nickel because the MEC (20 µg/L) exceeds the most stringent criterion (13 µg/L), demonstrating reasonable potential by Trigger 1.

(c) WQBELs. WQBELs for nickel, calculated according to SIP procedures with an effluent data CV of 0.42 and a dilution credit of D = 9, are 80 µg/L (AMEL) and 140 µg/L (MDEL). However, the limits in the previous order (AMEL of 34 µg/L and MDEL of 59 µg/L) are more stringent and are retained to avoid backsliding.

(d) Anti-backsliding. Anti-backsliding requirements are satisfied because this Order retains the more stringent limits from the previous order.

(3) Cyanide

(a) Water Quality Objectives. The Basin Plan contains chronic and acute marine WQOs for cyanide of 2.9 µg/L and 9.4 µg/L.

(b) RPA Results. This Order establishes effluent limitations for cyanide because the MEC (11 µg/L) exceeds the most stringent WQO (2.9 µg/L), demonstrating reasonable potential by Trigger 1. Reasonable potential is also established by Trigger 3, consistent with Basin Plan section 4.7.2.2, which requires that individual NPDES permits for municipal wastewater treatment facilities include cyanide WQBELs.

(c) WQBELs. WQBELs for cyanide, calculated according to SIP procedures with an effluent data CV of 0.89 and a dilution credit of D = 9, are 19 µg/L (AMEL) and 46 µg/L (MDEL).

(d) Anti-backsliding. The previous order limits were 21 µg/L (AMEL) and 41 µg/L (MDEL). To avoid backsliding, the MDEL from the previous order is retained. Anti-backsliding requirements are satisfied because the new limits are at least as stringent as those in the previous order.

(4) Dioxin-TEQ

(a) Water Quality Objective. The Basin Plan narrative WQO for bioaccumulative substances states, "Many pollutants can accumulate on particulates, in sediments, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered."

Because it is the consensus of the scientific community that dioxins and furans associate with particulates, accumulate in sediments, and bioaccumulate in the fatty tissue of fish and other organisms, the Basin Plan's narrative bioaccumulation WQO is applicable to these pollutants. Elevated levels of dioxins and furans in fish tissue in San Francisco Bay demonstrate that the narrative bioaccumulation WQO is not being met. USEPA has therefore included Central San Francisco Bay as impaired by dioxin and furan compounds in the current 303(d) listing of receiving waters, where WQOs are not being met after imposition of applicable technology-based requirements.

The CTR establishes a numeric WQO for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (2,3,7,8-TCDD) of 1.4×10^{-8} µg/L for the protection of human health, when aquatic organisms are consumed. When the CTR was promulgated, USEPA stated its support of the regulation of other dioxin and dioxin-like compounds through the use of toxicity equivalencies (TEQs) in NPDES permits. For California waters, USEPA stated specifically, "if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of a narrative criterion, numeric WQBELs for dioxin or dioxin-like compounds should be included in NPDES permits and should be expressed using a TEQ scheme" (65 Fed. Reg. 31682, 31695 [2000]).

This Order uses a TEQ scheme based on a set of toxicity equivalency factors (TEFs) the World Health Organization (WHO) developed in 1998, and a set of bioaccumulation equivalency factors (BEFs) USEPA developed for the Great Lakes region (40 CFR 132, Appendix F) to convert the concentration of any congener of dioxin or furan into an equivalent concentration of 2,3,7,8-TCDD. The CTR criterion is used as a criterion for dioxin-TEQ because dioxin-TEQ represents a toxicity weighted concentration equivalent to 2,3,7,8-TCDD, thus translating the narrative bioaccumulation objective into a numeric criterion appropriate for the RPA.

To determine if the discharge of dioxin or dioxin-like compounds has reasonable potential, TEFs and BEFs were used to express the measured concentrations of 16 dioxin congeners in effluent and background samples as 2,3,7,8-TCDD. These "equivalent" concentrations were then compared to the CTR numeric criterion for 2,3,7,8-TCDD (1.4×10^{-8} µg/L). Although the 1998 WHO scheme includes TEFs for dioxin-like PCBs, they are not included in this Order's TEQ scheme. The CTR has established a specific water quality standard for PCBs, and dioxin-like PCBs are included in the analysis of total PCBs.

(b) RPA Results. This Order establishes effluent limitations for dioxin-TEQ because the MEC (1.5×10^{-6} µg/L) exceeds the translated water quality criterion (1.4×10^{-8} µg/L), demonstrating reasonable potential by Trigger 1. Reasonable potential is also established by Trigger 3, consistent with the Basin Plan's bioaccumulation WQO.

(c) WQBELs. WQBELs for dioxin TEQ, calculated according to SIP procedures using a default CV of 0.60 and no dilution credit, are 1.4×10^{-8} µg/L (AMEL) and 2.8×10^{-8} µg/L (MDEL).

(d) Anti-backsliding. Anti-backsliding requirements are satisfied because the effluent limits in this Order are the same as those in the previous order.

(5) Bis(2-Ethylhexyl)Phthalate

(a) Water Quality Objective. The CTR contains a human health WQO for bis(2-ethylhexyl)phthalate of 5.9 µg/L.

(b) RPA Results. This Order establishes effluent limitations for bis(2-ethylhexyl)phthalate because the MEC (15.8 µg/L) exceeds the WQO (5.9 µg/L), demonstrating reasonable potential by Trigger 1.

(c) WQBELs. WQBELs for bis(2-ethylhexyl)phthalate, calculated according to SIP procedures using an effluent data CV of 1.2 and a dilution credit of D = 9, are 55 µg/L (AMEL) and 150 µg/L (MDEL). These limits are the same as those in the previous order.

(d) Anti-backsliding. Anti-backsliding requirements are satisfied because the effluent limits in this Order are the same as those in the previous order.

(6) Endrin

(a) Water Quality Objectives. The CTR contains chronic and acute marine WQOs for endrin of 0.0023 µg/L and 0.037 µg/L.

(b) RPA Results. This Order establishes effluent limitations for endrin because the MEC (0.0030 µg/L) exceeds the most stringent WQO (0.0023 µg/L), demonstrating reasonable potential by Trigger 1.

(c) WQBELs. WQBELs for endrin, calculated according to SIP procedures using a default CV of 0.60 and a dilution credit of D = 9, are 0.019 µg/L (AMEL) and 0.037 µg/L (MDEL).

(d) Anti-backsliding. Anti-backsliding requirements are satisfied because the previous order did not include endrin limits.

(7) Heptachlor

(a) Water Quality Objective. The CTR contains a human health WQO for heptachlor of 0.00021 µg/L.

(b) RPA Results. This Order establishes effluent limitations for heptachlor because the MEC (0.0099 µg/L) exceeds the WQO (0.00021 µg/L), demonstrating reasonable potential by Trigger 1.

(c) WQBELs. WQBELs for heptachlor, calculated according to SIP procedures using a default CV of 0.60 and a dilution credit of D = 9, are 0.0019 µg/L (AMEL) and 0.0039 µg/L (MDEL).

(d) Anti-backsliding. Anti-backsliding requirements are satisfied because the new effluent limits are more stringent than those in the previous order.

(8) Total Ammonia

(a) Water Quality Objectives. The Basin Plan contains WQOs for un-ionized ammonia (as nitrogen) of 0.025 mg/L as an annual median and 0.16 mg/L as a maximum. These WQOs were translated from un-ionized ammonia concentrations to equivalent total ammonia concentrations (as nitrogen) since (1) sampling and laboratory methods are not available to analyze for un-ionized ammonia; and (2) the fraction of total ammonia that exists in the toxic un-ionized form depends on the pH, salinity, and temperature of the receiving water.

To translate the Basin Plan un-ionized ammonia objectives, pH, salinity, and temperature data from the Red Rock RMP station (BC60) were used. The following equations were used to determine the fraction of total ammonia that would exist in the toxic un ionized form in the marine receiving water, where the various measurements were taken from 1994-2001 (USEPA, Ambient Water Quality Criteria for Ammonia (Saltwater)–1989, EPA Publication 440/5-88-004):

For salinity > 10 ppt: fraction of $NH_3 = \frac{1}{1+10^{(pK-pH)}}$

Where:

$pK = 9.245 + 0.116(I) + 0.0324\,(298 - T) + \frac{0.0415\,(P)}{(T)}$

I = Molal ionic strength of saltwater = $\frac{19.9273\,(S)}{(1{,}000 - 1.005109\,(S))}$

S = Salinity (parts per thousand)

T = Temperature in degrees Kelvin

P = Pressure (one atmosphere)

For salinity < 1 ppt: fraction of NH3 = $\frac{1}{1+10^{(pK-pH)}}$

Where:

$pK = 0.09018 + 2729.92 / T$

T = Temperature in degrees Kelvin

The 90th percentile and median un-ionized ammonia fractions were used to express the acute and chronic un-ionized ammonia WQOs as total ammonia concentrations for both high and low saline waters. The lowest resulting acute and chronic WQOs were used in this RPA. This approach is consistent with USEPA guidance on translating dissolved metal WQOs to total recoverable metal WQOs (USEPA, *The Metals Translator: Guidance for Calculating a Total Recoverable Limit from a Dissolved Criterion*, EPA Publication 823-B-96-007, 1996).

The equivalent total ammonia acute and chronic Water Quality Criteria are 5.34 mg/L and 1.26 mg/L, respectively.

(b) RPA Results. Basin Plan section 4.5.5.2 indicates that WQBELs for toxic pollutants are to be calculated according to the SIP. Basin Plan section 3.3.20 refers to ammonia as a toxic pollutant. Therefore, the SIP methodology was used as guidance to perform the RPA and to calculate effluent limitations for ammonia. This Order establishes total ammonia effluent limitations because the MEC (31 mg/L) exceeds the translated WQO (1.26 mg/L), demonstrating reasonable potential by Trigger 1.

(c) WQBELs. WQBELs for total ammonia, calculated according to SIP procedures using a CV of 0.59 and a dilution credit of D = 163, are 210 mg/L (AMEL) and 550 mg/L (MDEL). WQBELs were calculated using factors that represent both acute and chronic conditions, and the more stringent chronic results described above were selected. For the acute condition, the WQO was 5.34 mg/L and the dilution factor was D=116. For the chronic condition, the WQO was 1.26 and the dilution factor was D=163. Statistical adjustments were made to the WQBEL calculations because of the following:

- The Basin Plan's chronic un-ionized ammonia WQO is based on an annual median instead of the typical 4-day average;

- The SIP assumes a 4-day average concentration and monthly sampling frequency of 4 days per month to calculate effluent limitations based on chronic criteria, whereas a 365-day average and a monitoring frequency of 30 days per month, reflecting the actual basis of the WQO and actual sampling frequency, were used here.

These statistical adjustments are supported by USEPA's Water Quality Criteria; Notice of Availability; 1999 Update of Ambient Water Quality Criteria for Ammonia, published on December 22, 1999, in the Federal Register.

Following the SIP methodology, the maximum ambient background total ammonia concentration was used to calculate effluent limitations based on the acute objective; and the median background total ammonia concentration was used to calculate effluent limitations based on the chronic objective. Because the Basin Plan's chronic un-ionized ammonia objective is an annual median, the

median background concentration is more representative of ambient conditions than a daily maximum.

The limits in the previous order (AMEL of 32 mg/L and MDEL of 59 mg/L) are more stringent than the newly-calculated limits and are retained to avoid backsliding and because, while the Regional Water Board pursues the San Francisco Bay Nutrient Strategy described in section IV.C.4.c.(8)(e) below, it would be inappropriate to raise the limits while the impacts of nutrients on the Bay are still unknown.

(d) Anti-backsliding. Anti-backsliding requirements are satisfied because this Order retains the limits from the previous order.

(e) Growing Regional Concern with Nutrients. As described above and in section IV.C.4.b, Dilution Credit, a translated Basin Plan un-ionized ammonia objective and a conservative estimate of actual initial dilution were used to calculate the total ammonia effluent limitations. In the future, the Regional Water Board may grant less dilution credit or change the ammonia limitations in other ways to address growing concerns about nutrients in the receiving water. Currently, a region-wide effort is underway to study and evaluate potential effects. This effort, which is referred to as the San Francisco Bay Nutrient Strategy, includes developing a nutrient assessment framework that can be used to calculate water quality-based effluent limits for nutrients. The Regional Water Board, through its Executive Officer, has also required wastewater dischargers, including the Dischargers, to monitor nutrients, including ammonia, in their influent and effluent. This information will be used to compare nutrient loads from wastewater discharges to loads from other sources, to support modeling and evaluation of load reduction scenarios, and to determine the need for additional wastewater treatment to address nutrients.

e. Effluent Limit Calculations

The following table shows the WQBEL calculations:

Table F-12. WQBEL Calculations

PRIORITY POLLUTANTS	Copper	Nickel	Cyanide	Dioxin-TEQ	Bis(2-Ethylhexyl) Phthalate	Endrin	Heptachlor	Total Ammonia (acute)	Total Ammonia (chronic)
Units	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**mg/L N**	**mg/L N**
Basis and Criteria type	Basin Plan SSO - Central San Francisco Bay	Basin Plan SSO - Central San Francisco Bay	BP SSOs	Basin Plan Narrative	CTR HH	CTR Aquatic Life	CTR HH	Basin Plan Aquatic Life	Basin Plan Aquatic Life
Criteria -Acute	-----	-----	-----	-----	-----	0.037	0.053	5.34	-----
Criteria -Chronic	-----	-----	-----	-----	-----	0.0023	0.0036	-----	1.26
SSO Criteria -Acute	3.9	74	9.4	-----	-----	-----	-----	-----	-----
SSO Criteria -Chronic	2.5	8.2	2.9	-----	-----	-----	-----	-----	-----
Water Effects ratio (WER)	2.4	1	1	1	1	1	1	1	1
Lowest WQO	3.4	13	2.9	1.4E-08	5.9	0.0023	0.00021	5.34	1.26
Site Specific Translator - MDEL	0.87	0.85	-----	-----	-----	-----	-----	-----	-----
Site Specific Translator - AMEL	0.73	0.65	-----	-----	-----	-----	-----	-----	-----
Dilution Factor (D) (if applicable)	9	9	9	0	9	9	9	116	163
No. of samples per month	4	4	4	4	4	4	4	4	30
Aquatic life criteria analysis required? (Y/N)	Y	Y	Y	N	N	Y	Y	Y	Y
HH criteria analysis required? (Y/N)	N	Y	Y	Y	Y	Y	Y	N	N
Applicable Acute WQO	11	87	9.4	-----	-----	0.037	0.053	5.34	
Applicable Chronic WQO	8.2	13	2.9	-----	-----	0.0023	0.0036		1.26
HH criteria	-----	4600	220000	1.4E-08	5.9	0.81	0.00021	-----	-----
Background (Maximum Conc for Aquatic Life ca	2.55	3.7	0.4			0.000036	0.000019	0.15	0.08
Background (Average Conc for Human Health c	-----	2.17	0.4	7.1E-08	0.5	0.000036	0.000019	-----	-----
Is the pollutant on the 303d list (Y/N)?	N	N	N	Y	N	N	N	N	N
ECA acute	85	837	90			0.37	0.53	607	
ECA chronic	59	93	25			0.023	0.036		194
ECA HH		45980	2199996	1.4E-08	55	8.1	0.0019		
No. of data points <10 or at least 80% of data reported non detect? (Y/N)	N	N	N	N	N	Y	Y	N	N
Avg of effluent data points	8.4	5.5	2.3	8.5E-08	1.8			14	14
Std Dev of effluent data points	4.6	2.3	2.0	3.4E-07	2.1			8.3	8.3
CV calculated	0.55	0.42	0.89	4.1	1.2	N/A	N/A	0.59	0.59
CV (Selected) - Final	0.55	0.42	0.89	0.6	1.2	0.60	0.60	0.59	0.59
ECA acute mult99	0.35	0.43	0.23			0.32	0.32	0.33	
ECA chronic mult99	0.55	0.63	0.41			0.53	0.53		0.9
LTA acute	29	357	21			0	0.17	199	
LTA chronic	33	58	10			0	0.019		180
minimum of LTAs	29	58	10			0	0.019	199	180
AMEL mult95	1.50	1.38	1.84	3.62	2.15	1.55	1.55	1.5	1.2
MDEL mult99	2.89	2.35	4.41	12.23	5.84	3.11	3.11	3.1	3.1
AMEL (aq life)	44	80	19			0	0.029	306	214
MDEL(aq life)	85	137	46			0	0.059	607	551
MDEL/AMEL Multiplier	1.92	1.71	2	3.38	2.71	2.01	2.01	2.0	2.6
AMEL (human hlth)		45980	2199996	1.4E-08	54.50	8.10	0.0019		
MDEL (human hlth)		78429	5278499	4.7E-08	147.87	16.25	0.0039		
minimum of AMEL for Aq. life vs HH	44	80	19	1.4E-08	55	0.019	0.0019	306	214
minimum of MDEL for Aq. Life vs HH	85	137	46	4.7E-08	148	0.037	0.0039	607	551
Current limit in permit (30-day average)	53	34	21.0	1.4E-08	55	-----	0.0020	32	32
Current limit in permit (daily)	76	59	41	2.8E-08	150	-----	0.0041	59	59
Final limit - AMEL	44	34	19.0	1.4E-08	55	0.019	0.0019	32	32
Final limit - MDEL	85	59	46	2.8E-08	148	0.037	0.0039	59	59
Max Effl Conc (MEC)	22	20	11	1.5E-06	15.8	0.0030	0.0099	31	31

6. Whole Effluent Acute Toxicity

This Order includes effluent limitations for whole effluent acute toxicity based on Basin Plan Table 4-3. All bioassays are to be performed according to the USEPA approved method in 40 CFR 136, currently *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 5th Edition. The approved test species currently specified in the Monitoring and Reporting Program is fathead minnow (*Pimephales promelas*).

As allowed by Basin Plan section 4.5.5.3.1, the Order does not consider toxicity exceeding effluent levels to be a violation if the toxicity is caused by ammonia. The ammonia limits in this Order are based on receiving water conditions are sufficient to prevent acute toxicity in the receiving water.

7. Whole Effluent Chronic Toxicity

a. Toxicity Objective. Basin Plan section 3.3.18 states, "There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community."

b. Reasonable Potential Analysis. The previous order included chronic toxicity triggers of a single-sample maximum of 20 TUc and a 3-sample median of 10 TUc, which would trigger accelerated chronic toxicity testing if exceeded. The Dischargers conducted quarterly chronic toxicity tests during the previous order term using red abalone (*Haliotis rufescens*). The maximum single-sample chronic toxicity result from June 2008 through April 2012 was 14.8 TUc. Such toxicity values indicate low reasonable potential for chronic toxicity so there is only a narrative chronic toxicity limit in this Order. A numeric limit is unwarranted.

c. Permit Requirements. Chronic toxicity requirements are based on the narrative Basin Plan toxicity objective.

d. Screening Phase Study and Monitoring Requirement. The Discharger is required to conduct a chronic toxicity screening phase study, as described in MRP Appendix E-1, prior to permit reissuance or after significant changes in the treatment system. This is necessary to ensure use of the most sensitive species in case there are changes in effluent quality or influent sources of new pollutants over time.

This Order requires use of *Americamysis bahia* based on the Discharger's September 2012 chronic toxicity screening study. While the study indicated that *Mytilus galloprovincialis* was the most sensitive, *M. galloprovincialis* is one of the most sensitive test species to ammonia—as much as an order of magnitude or more sensitive than the *A. bahia*, the test species found to be the second most sensitive.

The purpose of whole effluent toxicity testing is to determine if the discharge is toxic due to (1) pollutants for which there is no monitoring protocol, or (2) synergistic effects from

a combination of pollutants. Because the discharge has ammonia and the Order already specifies a pollutant specific limit for ammonia, the hypersensitivity of *M. galloprovincialis* to ammonia makes it an inappropriate species for routine monitoring. This is because of the potential for interference with toxicity test results. In other words, tests with *M. galloprovincialis* will more often than not show a response that is caused by ammonia in the test, but which is at a concentration safe for discharge. However, this response to a safe concentration of ammonia would mask toxicity from other potential pollutants that may be present.

In the screening, the Discharger attempted to minimize the interference caused by ammonia by manual pH adjustment. Although this method reduced the interference, it was only partially effective due to the high buffering capacity of seawater. The second most sensitive species in the screening analysis was *A. bahia*, which was only slightly less sensitive than *M. galloprovincialis*. To minimize ammonia interference, *A. bahia* is to be used for chronic toxicity tests. The accelerated monitoring triggers are consistent with the previous order and based on Basin Plan Table 4-5.

8. Antidegradation

NPDES regulations at 40 CFR 131.12 require that State water quality standards include an antidegradation policy consistent with federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, which incorporates federal policy where federal policy applies. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both State and federal antidegradation policies.

The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution 68-16 because there will be no lowering of water quality beyond the current level authorized in the previous order, which is the baseline by which to measure whether degradation will occur. This Order continues the status quo with respect to the level of discharge authorized in the previous order. It does not provide for an increase in the permitted design flow, allow for a reduced level of treatment, or increase effluent limitations. The limitations in this Order hold the Dischargers to existing performance. Thus, there will be no change in water quality beyond the level authorized in the last permit and no water quality degradation. Further analysis in this permit is unnecessary, and findings authorizing degradation are unnecessary.

The previous order contained effluent limitations for selenium and 4,4-DDD; however, the RPA shows that the discharge no longer demonstrates reasonable potential for these pollutants to cause or contribute to an exceedance of WQOs. This Order, therefore, does not retain selenium and 4,4-DDD effluent limitations. Elimination of these limitations is consistent with State Water Board Order No. WQ 2001-16.

This Order also does not retain the mercury effluent limits from the previous order because mercury discharges to San Francisco Bay are now regulated by Regional Water Board Order No. R2-2012-0096, which is a watershed permit that implements the San Francisco Bay Mercury TMDL. Order No. R2-2012-0096 complied with antidegradation requirements.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

The receiving water limitations are based on the narrative and numeric objectives contained in Basin Plan Chapter 3 and federal and State water quality standards.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The MRP is a standard requirement in almost all NPDES permits issued by the Regional Water Board, including this Order. It contains definitions of terms and sets out requirements for reporting routine monitoring data in accordance with NPDES regulations, the CWC, and State and Regional Water Board policies. The MRP also defines the sampling stations and frequency, the pollutants to be monitored, and additional reporting requirements. Pollutants to be monitored include all parameters for which effluent limitations are specified. Monitoring for additional constituents, for which no effluent limitations are established, is also required to provide data for future completion of RPAs.

The following provides the rationale for the monitoring and reporting requirements contained in the MRP for this facility.

A. Influent Monitoring

Influent monitoring for BOD_5 and TSS is required to determine compliance with this Order's 85% removal requirement. Flow monitoring is also required to evaluate compliance with Prohibition III.D (average dry weather flow). Influent cyanide monitoring is required in accordance with Basin Plan section 4.7.2.2.

B. Effluent Monitoring

The MRP retains most effluent monitoring requirements from the previous order. Changes in effluent monitoring are summarized as follows:

- New monitoring locations (EFF-001B and EFF-002B) are established to monitor effluent discharges during blending events at the Richmond Plant to evaluate water quality impacts during blending events. Monitoring at EFF-001B and EFF-002B is required consistent with Attachment G, section III.A.3.b.6.

- Monitoring for mercury has been removed because mercury is now covered under Order No. R2-2012-0096.

- Monitoring for enterococcus bacteria is established at EFF-002 and EFF-003 to determine compliance with new effluent limitations.

- The frequency of effluent monitoring for selenium and 4,4-DDD is reduced from the previous order because the discharge no longer demonstrates reasonable potential for selenium and 4,4-DDD. The Effluent Characterization Study and Report (Provision VI.C.2) requires screening for this pollutant.

- The frequency of effluent monitoring for endrin has been increased to 2/year because the discharge demonstrates reasonable potential for endrin.

Monitoring for the remaining priority pollutants is not specifically identified in the MRP, but is still required by the Effluent Characterization Study and Report (Provision VI.C.2).

C. Whole Effluent Toxicity Testing Requirements

1. **Acute Toxicity.** Monthly 96-hour bioassay testing is required to demonstrate compliance with the effluent limitation for acute toxicity.

2. **Chronic Toxicity.** Chronic toxicity testing is required four times per year to ensure that the discharge does not exceed acceptable levels of chronic toxicity. To ensure the tests are being done with the most sensitive species, the Dischargers are to re-screen in accordance with MRP Appendix E-1 after any significant change in the nature of the effluent or prior to submittal of the application for permit reissuance.

D. Receiving Water Monitoring

The Dischargers are required to continue participating in the RMP, which involves collection of data on pollutants and toxicity in San Francisco Bay water, sediment, and biota. Instead of collecting site-specific receiving water data, the RMP can more effectively collect reliable receiving data for all San Francisco Bay dischargers by pooling resources. The Dischargers' participation and support of the RMP is the basis for not including other receiving water monitoring requirements in this permit.

E. Pretreatment and Biosolids Monitoring Requirements

The pretreatment monitoring requirements for influent, effluent, and biosolids are retained from the previous order and are required to assess compliance with the Dischargers' USEPA-approved pretreatment program.

This Order specifies the sampling type for pretreatment monitoring. Specifically, it requires grab samples for VOCs, BNA, cyanide, and hexavalent chromium. Discrete grabs are necessary for these parameters to minimize potential losses during automatic compositing. VOCs are volatile, and cyanide and BNAs are also somewhat volatile. Hexavalent chromium is chemically unstable.

Biosolids monitoring requirements are unchanged from the previous order and are identified in the federal Standard Provisions and in the Regional Standard Provisions.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions (Provision VI.A)

Standard Provisions, which in accordance with 40 CFR 122.41and 122.42 apply to all NPDES discharges and must be included in every NPDES permit, are provided in Attachments D. NPDES regulations at 40 CFR 122.41(a)(1) and (b) through (n) establish conditions that apply to all state-issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. NPDES regulations at 40 CFR 123.25(a)(12) allow the state to omit or modify conditions to impose more stringent requirements. The Regional Standard Provisions in Attachment G supplement the Federal Standard Provisions. In accordance with 40 CFR 123.25, this Order omits federal conditions that address enforcement authority specified in 40 CFR

122.41(j)(5) and (k)(2) because the CWC enforcement authority is more stringent. In lieu of these conditions, this Order incorporates by reference CWC section 13387(e).

B. MRP Requirements (Provision VI.B)

The Dischargers are required to monitor the permitted discharges in order to evaluate compliance with permit conditions. Monitoring requirements are contained in the MRP and Attachments D and G. This provision requires compliance with these documents and is authorized by 40 CFR 122.41(h) and (j), and CWC sections 13267 and 13383.

The principal purposes of a monitoring program are to:

- document compliance with waste discharge requirements and prohibitions established by the Regional Water Board,
- facilitate self-policing by the Dischargers in the prevention and abatement of pollution arising from waste discharge,
- develop or assist in the development of limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and
- prepare water and wastewater quality inventories.

The table below summarizes routine monitoring requirements. This table is for informational purposes only. The actual requirements are specified in the MRP and other provisions of this Order.

Table F-13. Monitoring Requirements Summary

Parameter	Influent INF-002 and INF-003	Effluent EFF-001	Effluent EFF-002 and EFF-003	Effluent EFF-001B	Effluent EFF-002B	Biosolids BIO-002 and BIO-003	Receiving Water
Flow	Continuous/D	Continuous/D	Continuous/D		Continuous/D		--
Volume of Partially Treated Wastewater	--	--	--		1/Blending event		--
Duration of Blending Event					1/Blending event		
BOD	3/Week	--	3/Week		1/Year[1]		--
TSS	3/Week	--	1/Day		1/Day		--
Oil and Grease	--	--	2/Month				--
pH	--	--	3/Week		1/Year[1]		Support RMP
Chlorine Residual	--	Continuous	--				
Acute Toxicity	--	1/Month	--	--			Support RMP
Chronic Toxicity	--	1/Quarter	--	--			Support RMP
Total Coliform	--	--	5/Week	1/Day			
Enterococcus	--	--	5/Month	1/Year[1]			
Copper	--	1/Month	--	1/Year[1]			Support RMP
Cyanide	2/Year	1/Month	--	1/Year[1]		2/Year	Support RMP
Nickel	--	1/Month	--	1/Year[1]			Support RMP
Total Ammonia	--	1/Month	--	1/Year[1]			Support RMP
Bis(2-ethylhexyl)phthalate	--	2/Year	--	1/Year[1]			Support RMP
Endrin	--	2/Year	--	1/Year[1]			Support RMP
Heptachlor	--	2/Year	--	1/Year[1]			Support RMP
Dioxin-TEQ	--	2/Year	--	1/Year[1]			Support RMP
Volatile Organic Compounds (VOC's)						2/Year	
Base/neutrals and acids extractable organic compounds (BNA)						2/Year	
Hexavalent Chromium						2/Year	
Metals[2]						2/Year	
Mercury						2/Year	
All other priority pollutants	--	1/Year	--	--			Support RMP

[1] If a TSS sample collected on the same day exceeds 45 mg/L, the frequency is to be once per day.
[2] Arsenic, cadmium, copper, lead, nickel, silver, zinc, and selenium.

C. Special Provisions (Provision VI.C)

1. Reopener Provisions

These provisions are based on 40 CFR 122.63 and allow modification of this Order and its effluent limitations as necessary in response to updated WQOs, regulations, or other new relevant information that may be established in the future and other circumstances as allowed by law.

2. Effluent Characterization Study and Report

This Order does not include effluent limitations for priority pollutants that do not demonstrate reasonable potential, but this provision requires the Dischargers to continue monitoring for these pollutants as described in the Regional Standard Provisions and as specified in the MRP. This requirement is authorized pursuant to CWC section 13267, and is necessary to inform the next permit reissuance and to ensure that the Dischargers takes proper and timely steps in response to any changes in unanticipated effluent quality during the term of this Order.

3. Best Management Practices and Pollutant Minimization Program

This provision for a Pollutant Minimization Program is based on Basin Plan Chapter 4 (section 4.13.2) and SIP Chapter 2 (section 2.4.5).

4. Special Provisions for POTWs

a. Pretreatment Program Requirements. This provision requires the Dischargers to implement and enforce its approved pretreatment program in accordance with federal pretreatment regulations (40 CFR 403).

b. Biosolids Management Practices. This provision is based on Basin Plan Chapter 4, section 4.17, and 40 CFR Parts 257 and 503, and is retained from the previous order.

c. Sanitary Sewer Overflows and Sewer System Management Plan. This provision is to explain the Order's requirements as they relate to the Discharger's collection system and to promote consistency with the State Water Board-adopted General Collection System WDRs (Order No. 2006-0003-DWQ)(General Order,).

The General Order requires public agencies that own or operate sanitary sewer systems with greater than one mile of pipes or sewer lines to enroll for coverage under 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. Furthermore, the General Order contains requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows. Inasmuch that the Discharger's collection system is part of the system that is subject to this Order, certain standard provisions apply as specified in Provisions, section VI.C.4.c. Sanitary Sewer Overflow and Sewer System Management Plan. West County Wastewater District and the City of Richmond must comply with both the General Order

and this Order. The Dischargers and public agencies that are discharging wastewater into the facility were required to enroll under the General Order by December 1, 2006.

The State Water Board amended the General Order on February 20, 2008, in Order No. WQ2008-0002-EXEC, to strengthen the notification and reporting requirements for sanitary sewer overflows. The Regional Standard Provisions contains the same notification and reporting requirements for spills from wastewater treatment facilities.

5. Other Special Provisions

a. Specific Tasks to Reduce Blending. This provision is based on 40 CFR 122.41(m) and USEPA's draft *Peak Wet Weather Policy* (December 2005). USEPA's draft policy sets forth a set of requirements and specific analyses for the Dischargers to complete in order to determine whether its peak wet weather flow blending discharge should be considered a bypass under 40 CFR 122.41(m) and whether any feasible alternatives to blending are available to the Dischargers. These analyses are intended to address the criteria designating bypass status at 40 CFR 122.41(m)(4)(i)(A)-(C). The Order approves bypasses conditioned upon diligent completion of the feasible measures identified by the City of Richmond's September 2012 No Feasible Alternatives Analysis and by the City of Richmond's 2011 Sewer Collection System Master Plan.

Tasks 1, 2, 6, 7, 9, and 10 require annual workplans and completion reports to repair or replace at least two miles of leaking sewer lines each year. These projects will reduce infiltration. The City of Richmond estimates that each year's projects will reduce infiltration to the collection system by about 500,000 gallons per day during wet weather.

Task 3 requires development of a workplan for the Third Street Stormwater Abatement Project. The goal of the project will be to reduce inflow of bay water and stormwater into the collection system by constructing tide gates on the storm sewer system at problem locations. Currently, when the tide is high during wet weather, stormwater mixed with bay water will overflow into the sanitary sewer. The City of Richmond has recently completed similar projects that it estimates has reduced inflow by 3 to 5 million gallons per day during wet weather events.

Task 4 requires completion of the Third Street Stormwater Abatement Project. It will reduce blending by about 3 to5 million gallons per day when blending.

Task 8 requires completion of a storage tank construction project at the Richmond Plant. It will allow the City of Richmond to retain a portion of influent flows and reduce blending in wet weather. The tank or tanks will be designed for a 10-year, 24-hour storm. At least 3 million gallons of wastewater will be stored during wet weather and treated later when flows have receded.

Task 12 requires the City of Richmond to submit a No Feasible Alternatives Analysis if it wants to continue blending during the next permit cycle. This analysis will provide the necessary information for the Regional Water Board to determine whether to allow blending during the next permit cycle.

Many of these projects were developed in response to the City of Richmond's consent decree with San Francisco Baykeeper. The consent decree settles a lawsuit San Francisco Baykeeper filed against the City of Richmond for sanitary sewer overflows. While the consent decree is focused on preventing sanitary sewer overflows, the required actions will also reduce blending because both issues are related to a leaky sewer collection system.

b. Copper Action Plan. This provision is based on Basin Plan section 7.2.1.2. It is necessary to ensure that use of copper site-specific objectives is consistent with antidegradation policies. Data the San Francisco Estuary Institute compiled for 2009-2011 indicate no degradation of San Francisco Bay water quality with respect to copper (http://www.sfei.org/content/copper-site-specific-objective-3-year-rolling-averages).

c. Cyanide Action Plan. This provision is based on Basin Plan section 4.7.2.2. It is necessary to ensure that use of cyanide site-specific objectives is consistent with antidegradation policies. The threshold for considering influent cyanide concentrations to indicate a possible "significant cyanide discharge," 70µg/L, is based on an influent concentration about 1.5 times the maximum cyanide concentration found in the influent at either treatment plant during the term of the previous order. Because the Dischargers have not observed influent cyanide concentrations greater than 46 µg/L, an influent concentrations 1.5 times this historic level could indicate a significant new cyanide source.

VIII. PUBLIC PARTICIPATION

The Regional Water Board considered the issuance of WDRs that will serve as an NPDES permit for the facility. As a step in the WDRs adoption process, Regional Water Board staff developed tentative WDRs. The Regional Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Water Board notified the Dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharge and provided them with an opportunity to submit written comments and recommendations. Notification was provided through the Contra Costa Times.

B. Written Comments

Staff determinations are tentative. Interested persons were invited to submit written comments concerning these tentative WDRs. Comments were to be submitted either in person or by mail to the Executive Office at the Regional Water Board at 1515 Clay Street, Suite 1400, Oakland, CA 94612, Attention: Vince Christian.

To receive full consideration and a written response, written comments were to be received at the Regional Water Board offices by 5:00 p.m. on March 29, 2013.

C. Public Hearing

The Regional Water Board held a public hearing on the tentative WDRs during its regular meeting at the following date and time, and at the following location:

Date: May 8, 2013
Time: 9:00 a.m.
Location: Elihu Harris State Office Building
1515 Clay Street, 1st Floor Auditorium
Oakland, CA 94612

Contact: Vince Christian, (510) 622-2336, email VChristian@waterboards.ca.gov

Interested persons were invited to attend. At the public hearing, the Regional Water Board heard testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony was heard; however, for accuracy of the record, important testimony was to be in writing.

Dates and venues change. The Regional Water Board web address is http://www.waterboards.ca.gov/sanfranciscobay, where one could access the current agenda for changes in dates and locations.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Board to review the decision of the Regional Water Board regarding the final WDRs. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The Report of Waste Discharge related documents, tentative effluent limitations, and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 9:00 a.m. and 5:00 p.m., Monday through Friday. Copying of documents may be arranged by calling 510-622-2300.

F. 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.

G. Additional Information

Requests for additional information or questions regarding this order should be directed to Vince Christian at 510-622-2336 or e-mail at VChristian@waterboards.ca.gov.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ATTACHMENT G

REGIONAL STANDARD PROVISIONS, AND MONITORING AND REPORTING REQUIREMENTS
(SUPPLEMENT TO ATTACHMENT D)

For

NPDES WASTEWATER DISCHARGE PERMITS

March 2010

Contents

I. STANDARD PROVISIONS - PERMIT COMPLIANCE G-1
A. Duty to Comply G-1
B. Need to Halt or Reduce Activity Not a Defense G-1
C. Duty to Mitigate G-1
1. Contingency Plan G-1
2. Spill Prevention Plan G-2
D. Proper Operation & Maintenance G-2
1. Operation and Maintenance (O&M) Manual G-2
2. Wastewater Facilities Status Report G-2
3. Proper Supervision and Operation of Publicly Owned Treatment Works (POTWs) G-3
E. Property Rights G-3
F. Inspection and Entry G-3
G. Bypass G-3
H. Upset G-3
I. Other G-3
J. Stormwater G-3
1. Stormwater Pollution Prevention Plan (SWPP Plan) G-3
2. Source Identification G-4
3. Stormwater Management Controls G-5
4. Annual Verification of SWPP Plan G-6
K. Biosolids Management G-6
II. STANDARD PROVISIONS – PERMIT ACTION – Not Supplemented G-7
III. STANDARD PROVISIONS – MONITORING G-7
A. Sampling and Analyses G-7
1. Use of Certified Laboratories G-7
2. Use of Appropriate Minimum Levels G-7
3. Frequency of Monitoring G-7
B. Biosolids Monitoring G-10
1. Biosolids Monitoring Frequency G-10
2. Biosolids Pollutants to Monitor G-11
C. Standard Observations G-11
1. Receiving Water Observations G-11
2. Wastewater Effluent Observations G-11
3. Beach and Shoreline Observations G-12
4. Land Retention or Disposal Area Observations G-12
5. Periphery of Waste Treatment and/or Disposal Facilities Observations G-12
IV. STANDARD PROVISIONS – RECORDS G-12
A. Records to be Maintained G-12
B. Records of monitoring information G-13
1. Analytical Information G-13
2. Flow Monitoring Data G-13
3. Wastewater Treatment Process Solids G-13
4. Disinfection Process G-13
5. Treatment Process Bypasses G-14

6. Treatment Facility Overflows G-14
C. Claims of Confidentiality G-14
V. STANDARD PROVISIONS – REPORTING G-14
A. Duty to Provide Information G-14
B. Signatory and Certification Requirements G-14
C. Monitoring Reports G-15
1. Self Monitoring Reports G-15
D. Compliance Schedules G-19
E. Twenty-Four Hour Reporting G-19
1. Spill of Oil or Other Hazardous Material Reports G-19
2. Unauthorized Discharges from Municipal Wastewater Treatment Plants G-20
F. Planned Changes G-23
G. Anticipated Noncompliance G-23
H. Other Noncompliance G-23
I. Other Information G-23
VI. STANDARD PROVISION – ENFORCEMENT G-23
VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS G-23
VIII. DEFINITIONS G-23

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

REGIONAL STANDARD PROVISIONS, AND MONITORING AND REPORTING REQUIREMENTS (SUPPLEMENT TO ATTACHMENT D)

FOR

NPDES WASTEWATER DISCHARGE PERMITS

APPLICABILITY

This document applies to dischargers covered by a National Pollutant Discharge Elimination System (NPDES) permit. This document does not apply to Municipal Separate Storm Sewer System (MS4) NPDES permits.

The purpose of this document is to supplement the requirements of Attachment D, Standard Provisions. The requirements in this supplemental document are designed to ensure permit compliance through preventative planning, monitoring, recordkeeping, and reporting. In addition, this document requires proper characterization of issues as they arise, and timely and full responses to problems encountered. To provide clarity on which sections of Attachment D this document supplements, this document is arranged in the same format as Attachment D.

I. STANDARD PROVISIONS - PERMIT COMPLIANCE

A. Duty to Comply – Not Supplemented

B. Need to Halt or Reduce Activity Not a Defense – Not Supplemented

C. Duty to Mitigate – This supplements I.C. of Standard Provisions (Attachment D)

1. **Contingency Plan** - The Dischargers shall maintain a Contingency Plan as originally required by Regional Water Board Resolution 74-10 and as prudent in accordance with current municipal facility emergency planning. The Contingency Plan shall describe procedures to ensure that existing facilities remain in, or are rapidly returned to, operation in the event of a process failure or emergency incident, such as employee strike, strike by suppliers of chemicals or maintenance services, power outage, vandalism, earthquake, or fire. The Dischargers may combine the Contingency Plan and Spill Prevention Plan into one document. Discharge in violation of the permit where the Dischargers have failed to develop and implement a Contingency Plan as described below will be the basis for considering the discharge a willful and negligent violation of the permit pursuant to California Water Code Section 13387. The Contingency Plan shall, at a minimum, contain the provisions of a. through g. below.

a. Provision of personnel for continued operation and maintenance of sewerage facilities during employee strikes or strikes against contractors providing services.

b. Maintenance of adequate chemicals or other supplies and spare parts necessary for continued operations of sewerage facilities.

c. Provisions of emergency standby power.

d. Protection against vandalism.

e. Expeditious action to repair failures of, or damage to, equipment and sewer lines.

f. Report of spills and discharges of untreated or inadequately treated wastes, including measures taken to clean up the effects of such discharges.

g. Programs for maintenance, replacement, and surveillance of physical condition of equipment, facilities, and sewer lines.

2. Spill Prevention Plan - The Dischargers shall maintain a Spill Prevention Plan to prevent accidental discharges and minimize the effects of such events. The Spill Prevention Plan shall:

a. Identify the possible sources of accidental discharge, untreated or partially treated waste bypass, and polluted drainage;

b. Evaluate the effectiveness of present facilities and procedures, and state when they became operational; and

c. Predict the effectiveness of the proposed facilities and procedures, and provide an implementation schedule containing interim and final dates when they will be constructed, implemented, or operational.

This Regional Water Board, after review of the Contingency and Spill Prevention Plans or their updated revisions, may establish conditions it deems necessary to control accidental discharges and to minimize the effects of such events. Such conditions may be incorporated as part of the permit upon notice to the Dischargers.

D. Proper Operation & Maintenance – This supplements I.D of Standard Provisions (Attachment D)

1. Operation and Maintenance (O&M) Manual - The Dischargers shall maintain an O&M Manual to provide the plant and regulatory personnel with a source of information describing all equipment, recommended operational strategies, process control monitoring, and maintenance activities. To remain a useful and relevant document, the O&M Manual shall be kept updated to reflect significant changes in treatment facility equipment and operational practices. The O&M Manual shall be maintained in usable condition and be available for reference and use by all relevant personnel and Regional Water Board staff.

2. Wastewater Facilities Status Report - The Dischargers shall regularly review, revise, or update, as necessary, its Wastewater Facilities Status Report. This report shall document how

the Dischargers operates and maintains its wastewater collection, treatment, and disposal facilities to ensure that all facilities are adequately staffed, supervised, financed, operated, maintained, repaired, and upgraded as necessary to provide adequate and reliable transport, treatment, and disposal of all wastewater from both existing and planned future wastewater sources under the Dischargers' service responsibilities.

3. Proper Supervision and Operation of Publicly Owned Treatment Works (POTWs) - POTWs shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Division 4, Chapter 14, Title 23 of the California Code of Regulations.

E. Property Rights – Not Supplemented

F. Inspection and Entry – Not Supplemented

G. Bypass – Not Supplemented

H. Upset – Not Supplemented

I. Other – This section is an addition to Standard Provisions (Attachment D)

1. Neither the treatment nor the discharge of pollutants shall create pollution, contamination, or nuisance as defined by California Water Code Section 13050.

2. Collection, treatment, storage, and disposal systems shall be operated in a manner that precludes public contact with wastewater, except in cases where excluding the public is infeasible, such as private property. If public contact with wastewater could reasonably occur on public property, warning signs shall be posted.

3. If the Dischargers submit a timely and complete Report of Waste Discharge for permit reissuance, this permit continues in force and effect until a new permit is issued or the Regional Water Board rescinds the permit.

J. Stormwater – This section is an addition to Standard Provisions (Attachment D)

These provisions apply to facilities that do not direct all stormwater flows from the facility to the wastewater treatment plant headworks.

1. Stormwater Pollution Prevention Plan (SWPP Plan)

The SWPP Plan shall be designed in accordance with good engineering practices and shall address the following objectives:

a. To identify pollutant sources that may affect the quality of stormwater discharges; and

b. To identify, assign, and implement control measures and management practices to reduce pollutants in stormwater discharges.

The SWPP Plan may be combined with the existing Spill Prevention Plan as required in accordance with Section C.2. The SWPP Plan shall be retained on-site and made available upon request of a representative of the Regional Water Board.

2. Source Identification

The SWPP Plan shall provide a description of potential sources that may be expected to add significant quantities of pollutants to stormwater discharges, or may result in non-stormwater discharges from the facility. The SWPP Plan shall include, at a minimum, the following items:

a. A topographical map (or other acceptable map if a topographical map is unavailable), extending one-quarter mile beyond the property boundaries of the facility, showing the wastewater treatment facility process areas, surface water bodies (including springs and wells), and discharge point(s) where the facility's stormwater discharges to a municipal storm drain system or other points of discharge to waters of the State. The requirements of this paragraph may be included in the site map required under the following paragraph if appropriate.

b. A site map showing the following:

1) Stormwater conveyance, drainage, and discharge structures;

2) An outline of the stormwater drainage areas for each stormwater discharge point;

3) Paved areas and buildings;

4) Areas of actual or potential pollutant contact with stormwater or release to stormwater, including but not limited to outdoor storage and process areas; material loading, unloading, and access areas; and waste treatment, storage, and disposal areas;

5) Location of existing stormwater structural control measures (i.e., berms, coverings, etc.);

6) Surface water locations, including springs and wetlands; and

7) Vehicle service areas.

c. A narrative description of the following:

1) Wastewater treatment process activity areas;

2) Materials, equipment, and vehicle management practices employed to minimize contact of significant materials of concern with stormwater discharges;

3) Material storage, loading, unloading, and access areas;

4) Existing structural and non-structural control measures (if any) to reduce pollutants in stormwater discharges; and

5) Methods of on-site storage and disposal of significant materials.

d. A list of pollutants that have a reasonable potential to be present in stormwater discharges in significant quantities.

3. Stormwater Management Controls

The SWPP Plan shall describe the stormwater management controls appropriate for the facility and a time schedule for fully implementing such controls. The appropriateness and priorities of controls in the SWPP Plan shall reflect identified potential sources of pollutants. The description of stormwater management controls to be implemented shall include, as appropriate:

a. Stormwater pollution prevention personnel

Identify specific individuals (and job titles) that are responsible for developing, implementing, and reviewing the SWPP Plan.

b. Good housekeeping

Good housekeeping requires the maintenance of clean, orderly facility areas that discharge stormwater. Material handling areas shall be inspected and cleaned to reduce the potential for pollutants to enter the storm drain conveyance system.

c. Spill prevention and response

Identify areas where significant materials can spill into or otherwise enter stormwater conveyance systems and their accompanying drainage points. Specific material handling procedures, storage requirements, and cleanup equipment and procedures shall be identified, as appropriate. The necessary equipment to implement a cleanup shall be available, and personnel shall be trained in proper response, containment, and cleanup of spills. Internal reporting procedures for spills of significant materials shall be established.

d. Source control

Source controls include, for example, elimination or reduction of the use of toxic pollutants, covering of pollutant source areas, sweeping of paved areas, containment of potential pollutants, labeling of all storm drain inlets with "No Dumping" signs, isolation or separation of industrial and non-industrial pollutant sources so that runoff from these areas does not mix, etc.

e. Stormwater management practices

Stormwater management practices are practices other than those that control the sources of pollutants. Such practices include treatment or conveyance structures, such as drop inlets, channels, retention and detention basins, treatment vaults, infiltration galleries, filters, oil/water separators, etc. Based on assessment of the potential of various sources to contribute pollutants to stormwater discharges in significant quantities, additional stormwater management practices to remove pollutants from stormwater discharges shall be implemented and design criteria shall be described.

f. Sediment and erosion control

Measures to minimize erosion around the stormwater drainage and discharge points, such as riprap, revegetation, slope stabilization, etc., shall be described.

g. Employee training

Employee training programs shall inform all personnel responsible for implementing the SWPP Plan. Training shall address spill response, good housekeeping, and material management practices. New employee and refresher training schedules shall be identified.

h. Inspections

All inspections shall be done by trained personnel. Material handling areas shall be inspected for evidence of, or the potential for, pollutants entering stormwater discharges. A tracking or follow up procedure shall be used to ensure appropriate response has been taken in response to an inspection. Inspections and maintenance activities shall be documented and recorded. Inspection records shall be retained for five years.

i. Records

A tracking and follow-up procedure shall be described to ensure that adequate response and corrective actions have been taken in response to inspections.

4. Annual Verification of SWPP Plan

An annual facility inspection shall be conducted to verify that all elements of the SWPP Plan are accurate and up-to-date. The results of this review shall be reported in the Annual Report to the Regional Water Board described in Section V.C.f.

K. Biosolids Management – This section is an addition to Standard Provisions (Attachment D)

Biosolids must meet the following requirements prior to land application. The Dischargers must either demonstrate compliance or, if it sends the biosolids to another party for further treatment or distribution, must give the recipient the information necessary to ensure compliance.

1. Exceptional quality biosolids meet the pollutant concentration limits in Table III of 40 CFR Part 503.13, Class A pathogen limits, and one of the vector attraction reduction requirements in 503.33(b)(1)-(b)(8). Such biosolids do not have to be tracked further for compliance with general requirements (503.12) and management practices (503.14).

2. Biosolids used for agricultural land, forest, or reclamation shall meet the pollutant limits in Table I (ceiling concentrations) and Table II or Table III (cumulative loadings or pollutant concentration limits) of 503.13. They shall also meet the general requirements (503.12) and management practices (503.14) (if not exceptional quality biosolids) for Class A or Class B pathogen levels with associated access restrictions (503.32) and one of the 10 vector attraction reduction requirements in 503.33(b)(1)-(b)(10).

3. Biosolids used for lawn or home gardens must meet exceptional quality biosolids limits.

4. Biosolids sold or given away in a bag or other container must meet the pollutant limits in either Table III or Table IV (pollutant concentration limits or annual pollutant loading rate limits) of 503.13. If Table IV is used, a label or information sheet must be attached to the biosolids packing that explains Table IV (see 503.14). The biosolids must also meet the Class A pathogen limits and one of the vector attraction reduction requirements in 503.33(b)(1)-(b)(8).

II. STANDARD PROVISIONS – PERMIT ACTION – Not Supplemented

III. STANDARD PROVISIONS – MONITORING

A. Sampling and Analyses – This section is a supplement to III.A and III.B of Standard Provisions (Attachment D)

1. Use of Certified Laboratories

Water and waste analyses shall be performed by a laboratory certified for these analyses in accordance with California Water Code Section 13176.

2. Use of Appropriate Minimum Levels

Table C lists the suggested analytical methods for the 126 priority pollutants and other toxic pollutants that should be used, unless a particular method or minimum level (ML) is required in the MRP.

For priority pollutant monitoring, when there is more than one ML value for a given substance, the Dischargers may select any one of the analytical methods cited in Table C for compliance determination, or any other method described in 40 CFR part 136 or approved by USEPA (such as the 1600 series) if authorized by the Regional Water Board. However, the ML must be below the effluent limitation and water quality objective. If no ML value is below the effluent limitation and water quality objective, then the method must achieve an ML no greater than the lowest ML value indicated in Table C. All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

3. Frequency of Monitoring

The minimum schedule of sampling analysis is specified in the MRP portion of the permit.

a. Timing of Sample Collection

1) The Dischargers shall collect samples of influent on varying days selected at random and shall not include any plant recirculation or other sidestream wastes, unless otherwise stipulated by the MRP.

2) The Dischargers shall collect samples of effluent on days coincident with influent sampling unless otherwise stipulated by the MRP or the Executive Officer. The Executive Officer may approve an alternative sampling plan if it is demonstrated to be representative of plant discharge flow and in compliance with all other permit requirements.

3) The Dischargers shall collect grab samples of effluent during periods of day-time maximum peak effluent flows (or peak flows through secondary treatment units for facilities that recycle effluent flows).

4) Effluent sampling for conventional pollutants shall occur on at least one day of any multiple-day bioassay test the MRP requires. During the course of the test, on at least one day, the Dischargers shall collect and retain samples of the discharge. In the event a bioassay test does not comply with permit limits, the Dischargers shall analyze these retained samples for pollutants that could be toxic to aquatic life and for which it has effluent limits.

   i. The Dischargers shall perform bioassay tests on final effluent samples; when chlorine is used for disinfection, bioassay tests shall be performed on effluent after chlorination-dechlorination; and

   ii. The Dischargers shall analyze for total ammonia nitrogen and calculate the amount of un-ionized ammonia whenever test results fail to meet the percent survival specified in the permit.

b. Conditions Triggering Accelerated Monitoring

1) If the results from two consecutive samples of a constituent monitored in a 30-day period exceed the monthly average limit for any parameter (or if the required sampling frequency is once per month and the monthly sample exceeds the monthly average limit), the Dischargers shall, within 24 hours after the results are received, increase its sampling frequency to daily until the results from the additional sampling show that the parameter is in compliance with the monthly average limit.

2) If any maximum daily limit is exceeded, the Dischargers shall increase its sampling frequency to daily within 24 hours after the results are received that indicate the exceedance of the maximum daily limit until two samples collected on consecutive days show compliance with the maximum daily limit.

3) If final or intermediate results of an acute bioassay test indicate a violation or threatened violation (e.g., the percentage of surviving test organisms of any single acute bioassay test is less than 70 percent), the Discharger shall initiate a new test as soon as practical, and the Dischargers shall investigate the cause of the mortalities and report its findings in the next self monitoring report (SMR).

4) The Dischargers shall calibrate chlorine residual analyzers against grab samples as frequently as necessary to maintain accurate control and reliable operation. If an effluent violation is detected, the Dischargers shall collect grab samples at least every 30 minutes until compliance with the limit is achieved, unless the Dischargers monitor chlorine residual continuously. In such cases, the Dischargers shall continue to conduct continuous monitoring as required by its permit.

5) When a bypass occurs (except one subject to provision III.A.3.b.6 below), the Dischargers shall monitor flows and collect samples on a daily basis for all constituents at affected discharge points that have effluent limits for the duration of

the bypass (including acute toxicity using static renewals), except chronic toxicity, unless otherwise stipulated by the MRP.

6) Unless otherwise stipulated by the MRP, when a bypass approved pursuant to Attachment D, Standard Provisions, Sections I.G.2 or I.G.4, occurs, the Dischargers shall monitor flows and, using appropriate procedures as specified in the MRP, collect and retain samples for affected discharge points on a daily basis for the duration of the bypass. The Dischargers shall analyze for total suspended solids (TSS) using 24-hour composites (or more frequent increments) and for bacteria indicators with effluent limits using grab samples. If TSS exceeds 45 mg/L in any composite sample, the Dischargers shall also analyze the retained samples for that discharge for all other constituents that have effluent limits, except oil and grease, mercury, dioxin-TEQ, and acute and chronic toxicity. Additionally, at least once each year, the Dischargers shall analyze the retained samples for one approved bypass discharge event for all other constituents that have effluent limits, except oil and grease, mercury, dioxin-TEQ, and acute and chronic toxicity. This monitoring shall be in addition to the minimum monitoring specified in the MRP.

c. Stormwater Monitoring

The requirements of this section only apply to facilities that are not covered by an NPDES permit for stormwater discharges and where not all site storm drainage from process areas (i.e., areas of the treatment facility where chemicals or wastewater could come in contact with stormwater) is directed to the headworks. For stormwater not directed to the headworks during the wet season (October 1 to April 30), the Dischargers shall:

1) Conduct visual observations of the stormwater discharge locations during daylight hours at least once per month during a storm event that produces significant stormwater discharge to observe the presence of floating and suspended materials, oil and grease, discoloration, turbidity, and odor, etc.

2) Measure (or estimate) the total volume of stormwater discharge, collect grab samples of stormwater discharge from at least two storm events that produce significant stormwater discharge, and analyze the samples for oil and grease, pH, TSS, and specific conductance.

The grab samples shall be taken during the first 30 minutes of the discharge. If collection of the grab samples during the first 30 minutes is impracticable, grab samples may be taken during the first hour of the discharge, and the Dischargers shall explain in the Annual Report why the grab sample(s) could not be taken in the first 30 minutes.

3) Testing for the presence of non-stormwater discharges shall be conducted no less than twice during the dry season (May 1 to September 30) at all stormwater discharge locations. Tests may include visual observations of flows, stains, sludges, odors, and other abnormal conditions; dye tests; TV line surveys; or analysis and validation of accurate piping schematics. Records shall be maintained describing the method used, date of testing, locations observed, and test results.

4) Samples shall be collected from all locations where stormwater is discharged. Samples shall represent the quality and quantity of stormwater discharged from the facility. If a facility discharges stormwater at multiple locations, the Dischargers may sample a reduced number of locations if it establishes and documents through the monitoring program that stormwater discharges from different locations are substantially identical.

5) Records of all stormwater monitoring information and copies of all reports required by the permit shall be retained for a period of at least three years from the date of sample, observation, or report.

d. Receiving Water Monitoring

The requirements of this section only apply when the MRP requires receiving water sampling.

1) Receiving water samples shall be collected on days coincident with effluent sampling for conventional pollutants.

2) Receiving water samples shall be collected at each station on each sampling day during the period within one hour following low slack water. Where sampling during lower slack water is impractical, sampling shall be performed during higher slack water. Samples shall be collected within the discharge plume and down current of the discharge point so as to be representative, unless otherwise stipulated in the MRP.

3) Samples shall be collected within one foot of the surface of the receiving water, unless otherwise stipulated in the MRP.

B. Biosolids Monitoring – This section supplements III.B of Standard Provisions (Attachment D)

When biosolids are sent to a landfill, sent to a surface disposal site, or applied to land as a soil amendment, they must be monitored as follows:

1. Biosolids Monitoring Frequency

Biosolids disposal must be monitored at the following frequency:

Metric tons biosolids/365 days	Frequency
0-290	Once per year
290-1500	Quarterly
1500-15,000	Six times per year
Over 15,000	Once per month

(Metric tons are on a dry weight basis)

2. Biosolids Pollutants to Monitor

Biosolids shall be monitored for the following constituents:

Land Application: arsenic, cadmium, copper, mercury, molybdenum, nickel, lead, selenium, and zinc

Municipal Landfill: Paint filter test (pursuant to 40 CFR 258)

Biosolids-only Landfill or Surface Disposal Site (if no liner and leachate system): arsenic, chromium, and nickel

C. Standard Observations – This section is an addition to III of Standard Provisions (Attachment D)

1. Receiving Water Observations

The requirements of this section only apply when the MRP requires standard observations of the receiving water. Standard observations shall include the following:

a. *Floating and suspended materials* (e.g., oil, grease, algae, and other macroscopic particulate matter): presence or absence, source, and size of affected area.

b. *Discoloration and turbidity*: description of color, source, and size of affected area.

c. *Odor*: presence or absence, characterization, source, distance of travel, and wind direction.

d. *Beneficial water use*: presence of water-associated waterfowl or wildlife, fisherpeople, and other recreational activities in the vicinity of each sampling station.

e. *Hydrographic condition*: time and height of corrected high and low tides (corrected to nearest National Oceanic and Atmospheric Administration location for the sampling date and time of sample collection).

f. *Weather conditions*:

1) Air temperature; and

2) Total precipitation during the five days prior to observation.

2. Wastewater Effluent Observations

The requirements of this section only apply when the MRP requires wastewater effluent standard observations. Standard observations shall include the following:

a. *Floating and suspended material of wastewater origin* (e.g., oil, grease, algae, and other macroscopic particulate matter): presence or absence.

b. *Odor*: presence or absence, characterization, source, distance of travel, and wind direction.

3. Beach and Shoreline Observations

The requirements of this section only apply when the MRP requires beach and shoreline standard observations. Standard observations shall include the following:

a. *Material of wastewater origin*: presence or absence, description of material, estimated size of affected area, and source.

b. *Beneficial use*: estimate number of people participating in recreational water contact, non-water contact, or fishing activities.

4. Land Retention or Disposal Area Observations

The requirements of this section only apply to facilities with on-site surface impoundments or disposal areas that are in use. This section applies to both liquid and solid wastes, whether confined or unconfined. The Dischargers shall conduct the following for each impoundment:

a. Determine the amount of freeboard at the lowest point of dikes confining liquid wastes.

b. Report evidence of leaching liquid from area of confinement and estimated size of affected area. Show affected area on a sketch and volume of flow (e.g., gallons per minute [gpm]).

c. Regarding odor, describe presence or absence, characterization, source, distance of travel, and wind direction.

d. Estimate number of waterfowl and other water-associated birds in the disposal area and vicinity.

5. Periphery of Waste Treatment and/or Disposal Facilities Observations

The requirements of this section only apply when the MRP specifies periphery standard observations. Standard observations shall include the following:

a. *Odor*: presence or absence, characterization, source, and distance of travel.

b. *Weather conditions*: wind direction and estimated velocity.

IV. STANDARD PROVISIONS – RECORDS

A. Records to be Maintained – This supplements IV.A of Standard Provisions (Attachment D)

The Dischargers shall maintain records in a manner and at a location (e.g., wastewater treatment plant or Dischargers offices) such that the records are accessible to Regional Water Board staff. The minimum period of retention specified in Section IV, Records, of the Federal Standard Provisions shall be extended during the course of any unresolved litigation regarding the subject discharge, or when requested by the Regional Water Board or Regional Administrator of USEPA, Region IX.

A copy of the permit shall be maintained at the discharge facility and be available at all times to operating personnel.

B. Records of monitoring information shall include – This supplements IV.B of Standard Provision (Attachment D)

1. Analytical Information

Records shall include analytical method detection limits, minimum levels, reporting levels, and related quantification parameters.

2. Flow Monitoring Data

For all required flow monitoring (e.g., influent and effluent flows), the additional records shall include the following, unless otherwise stipulated by the MRP:

a. Total volume for each day; and

b. Maximum, minimum, and average daily flows for each calendar month.

3. Wastewater Treatment Process Solids

a. For each treatment unit process that involves solids removal from the wastewater stream, records shall include the following:

1) Total volume or mass of solids removed from each collection unit (e.g., grit, skimmings, undigested biosolids, or combination) for each calendar month or other time period as appropriate, but not to exceed annually; and

2) Final disposition of such solids (e.g., landfill, other subsequent treatment unit).

b. For final dewatered biosolids from the treatment plant as a whole, records shall include the following:

1) Total volume or mass of dewatered biosolids for each calendar month;

2) Solids content of the dewatered biosolids; and

3) Final disposition of dewatered biosolids (disposal location and disposal method).

4. Disinfection Process

For the disinfection process, these additional records shall be maintained documenting process operation and performance:

a. For bacteriological analyses:

1) Wastewater flow rate at the time of sample collection; and

2) Required statistical parameters for cumulative bacterial values (e.g., moving median or geometric mean for the number of samples or sampling period identified in this Order).

b. For the chlorination process, when chlorine is used for disinfection, at least daily average values for the following:

1) Chlorine residual of treated wastewater as it enters the contact basin (mg/L);

2) Chlorine dosage (kg/day); and

3) Dechlorination chemical dosage (kg/day).

5. Treatment Process Bypasses

A chronological log of all treatment process bypasses, including wet weather blending, shall include the following:

a. Identification of the treatment process bypassed;

b. Dates and times of bypass beginning and end;

c. Total bypass duration;

d. Estimated total bypass volume; and

e. Description of, or reference to other reports describing, the bypass event, the cause, the corrective actions taken (except for wet weather blending that is in compliance with permit conditions), and any additional monitoring conducted.

6. Treatment Facility Overflows

This section applies to records for overflows at the treatment facility. This includes the headworks and all units and appurtenances downstream. The Dischargers shall retain a chronological log of overflows at the treatment facility and records supporting the information provided in section V.E.2.

C. Claims of Confidentiality – Not Supplemented

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information – Not Supplemented

B. Signatory and Certification Requirements – Not Supplemented

C. Monitoring Reports – This section supplements V.C of Standard Provisions (Attachment D)

1. Self Monitoring Reports

For each reporting period established in the MRP, the Dischargers shall submit an SMR to the Regional Water Board in accordance with the requirements listed in this document and at the frequency the MRP specifies. The purpose of the SMR is to document treatment performance, effluent quality, and compliance with the waste discharge requirements of this Order.

a. Transmittal letter

Each SMR shall be submitted with a transmittal letter. This letter shall include the following:

1) Identification of all violations of effluent limits or other waste discharge requirements found during the reporting period;

2) Details regarding violations: parameters, magnitude, test results, frequency, and dates;

3) Causes of violations;

4) Discussion of corrective actions taken or planned to resolve violations and prevent recurrences, and dates or time schedule of action implementation (if previous reports have been submitted that address corrective actions, reference to the earlier reports is satisfactory);

5) Data invalidation (Data should not be submitted in an SMR if it does not meet quality assurance/quality control standards. However, if the Dischargers wish to invalidate any measurement after it was submitted in an SMR, a letter shall identify the measurement suspected to be invalid and state the Dischargers' intent to submit, within 60 days, a formal request to invalidate the measurement. This request shall include the original measurement in question, the reason for invalidating the measurement, all relevant documentation that supports invalidation [e.g., laboratory sheet, log entry, test results, etc.], and discussion of the corrective actions taken or planned [with a time schedule for completion] to prevent recurrence of the sampling or measurement problem.);

6) If the Dischargers blend, the letter shall describe the duration of blending events and certify whether blended effluent was in compliance with the conditions for blending; and

7) Signature (The transmittal letter shall be signed according to Section V.B of this Order, Attachment D – Standard Provisions.).

b. Compliance evaluation summary

Each report shall include a compliance evaluation summary. This summary shall include each parameter for which the permit specifies effluent limits, the number of

samples taken during the monitoring period, and the number of samples that exceed applicable effluent limits.

c. Results of analyses and observations

1) Tabulations of all required analyses and observations, including parameter, date, time, sample station, type of sample, test result, method detection limit, method minimum level, and method reporting level, if applicable, signed by the laboratory director or other responsible official.

2) When determining compliance with an average monthly effluent limitation and more than one sample result is available in a month, the Dischargers shall compute the arithmetic mean unless the data set contains one or more reported determinations of detected but not quantified (DNQ) or nondetect (ND). In those cases, the Dischargers shall compute the median in place of the arithmetic mean in accordance with the following procedure:

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

ii. 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 values around the middle 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.

If a sample result, or the arithmetic mean or median of multiple sample results, is below the reporting limit, and there is evidence that the priority pollutant is present in the effluent above an effluent limitation and the Dischargers conduct a Pollutant Minimization Program, the Dischargers shall not be deemed out of compliance.

3) Dioxin-TEQ Reporting: The Dischargers shall report for each dioxin and furan congener the analytical results of effluent monitoring, including the quantifiable limit (reporting level), the method detection limit, and the measured concentration. The Dischargers shall report all measured values of individual congeners, including data qualifiers. When calculating dioxin-TEQ, the Dischargers shall set congener concentrations below the minimum levels (ML) to zero. The Dischargers shall calculate and report dioxin-TEQs using the following formula, where the MLs, toxicity equivalency factors (TEFs), and bioaccumulation equivalency factors (BEFs) are as provided in Table A:

$$\text{Dioxin-TEQ} = \Sigma (C_x \times TEF_x \times BEF_x)$$

where: C_x = measured or estimated concentration of congener *x*
TEF_x = toxicity equivalency factor for congener x
BEFx = bioaccumulation equivalency factor for congener *x*

Table A

Minimum Levels, Toxicity Equivalency Factors,
and Bioaccumulation Equivalency Factors

Dioxin or Furan Congener	Minimum Level (pg/L)	1998 Toxicity Equivalency Factor (TEF)	Bioaccumulation Equivalency Factor (BEF)
2,3,7,8-TCDD	10	1.0	1.0
1,2,3,7,8-PeCDD	50	1.0	0.9
1,2,3,4,7,8-HxCDD	50	0.1	0.3
1,2,3,6,7,8-HxCDD	50	0.1	0.1
1,2,3,7,8,9-HxCDD	50	0.1	0.1
1,2,3,4,6,7,8-HpCDD	50	0.01	0.05
OCDD	100	0.0001	0.01
2,3,7,8-TCDF	10	0.1	0.8
1,2,3,7,8-PeCDF	50	0.05	0.2
2,3,4,7,8-PeCDF	50	0.5	1.6
1,2,3,4,7,8-HxCDF	50	0.1	0.08
1,2,3,6,7,8-HxCDF	50	0.1	0.2
1,2,3,7,8,9-HxCDF	50	0.1	0.6
2,3,4,6,7,8-HxCDF	50	0.1	0.7
1,2,3,4,6,7,8-HpCDF	50	0.01	0.01
1,2,3,4,7,8,9-HpCDF	50	0.01	0.4
OCDF	100	0.0001	0.02

d. Data reporting for results not yet available

The Dischargers shall make all reasonable efforts to obtain analytical data for required parameter sampling in a timely manner. Certain analyses require additional time to complete analytical processes and report results. For cases where required monitoring parameters require additional time to complete analytical processes and reports, and results are not available in time to be included in the SMR for the subject monitoring period, the Dischargers shall describe such circumstances in the SMR and include the data for these parameters and relevant discussions of any observed exceedances in the next SMR due after the results are available.

e. Flow data

The Dischargers shall provide flow data tabulation pursuant to Section IV.B.2.

f. Annual self monitoring report requirements

By the date specified in the MRP, the Dischargers shall submit an annual report to the Regional Water Board covering the previous calendar year. The report shall contain the following:

1) Annual compliance summary table of treatment plant performance, including documentation of any blending events;

2) Comprehensive discussion of treatment plant performance and compliance with the permit (This discussion shall include any corrective actions taken or planned, such as changes to facility equipment or operation practices that may be needed to achieve compliance, and any other actions taken or planned that are intended to improve performance and reliability of the Dischargers' wastewater collection, treatment, or disposal practices.);

3) Both tabular and graphical summaries of the monitoring data for the previous year if parameters are monitored at a frequency of monthly or greater;

4) List of approved analyses, including the following:

   (i) List of analyses for which the Dischargers are certified;

   (ii) List of analyses performed for the Dischargers by a separate certified laboratory (copies of reports signed by the laboratory director of that laboratory shall not be submitted but be retained onsite); and

   (iii) List of "waived" analyses, as approved;

5) Plan view drawing or map showing the Dischargers' facility, flow routing, and sampling and observation station locations;

6) Results of annual facility inspection to verify that all elements of the SWPP Plan are accurate and up to date (only required if the Dischargers do not route all stormwater to the headworks of its wastewater treatment plant); and

7) Results of facility report reviews (The Dischargers shall regularly review, revise, and update, as necessary, the O&M Manual, the Contingency Plan, the Spill Prevention Plan, and Wastewater Facilities Status Report so that these documents remain useful and relevant to current practices. At a minimum, reviews shall be conducted annually. The Dischargers shall include, in each Annual Report, a description or summary of review and evaluation procedures, recommended or planned actions, and an estimated time schedule for implementing these actions. The Dischargers shall complete changes to these documents to ensure they are up-to-date.).

g. Report submittal

The Dischargers shall submit SMRs to:

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
Attn: NPDES Wastewater Division

h. Reporting data in electronic format

The Dischargers have the option to submit all monitoring results in an electronic reporting format approved by the Executive Officer. If the Dischargers choose to submit SMRs electronically, the following shall apply:

1) *Reporting Method*: The Dischargers shall submit SMRs electronically via a process approved by the Executive Officer (see, for example, the letter dated December 17, 1999, "Official Implementation of Electronic Reporting System [ERS]" and the progress report letter dated December 17, 2000).

2) *Monthly or Quarterly Reporting Requirements*: For each reporting period (monthly or quarterly as specified in the MRP), the Dischargers shall submit an electronic SMR to the Regional Water Board in accordance with the provisions of Section V.C.1.a-e, except for requirements under Section V.C.1.c(1) where ERS does not have fields for dischargers to input certain information (e.g., sample time). However, until USEPA approves the electronic signature or other signature technologies, Dischargers that use ERS shall submit a hard copy of the original transmittal letter, an ERS printout of the data sheet, and a violation report (a receipt of the electronic transmittal shall be retained by the Dischargers). This electronic SMR submittal suffices for the signed tabulations specified under Section V.C.1.c(1).

3) *Annual Reporting Requirements*: Dischargers who have submitted data using the ERS for at least one calendar year are exempt from submitting the portion of the annual report required under Section V.C.1.f(1) and (3).

D. Compliance Schedules – Not supplemented

E. Twenty-Four Hour Reporting – This section supplements V.E of Standard Provision (Attachment D)

1. Spill of Oil or Other Hazardous Material Reports

a. Within 24 hours of becoming aware of a spill of oil or other hazardous material that is not contained onsite and completely cleaned up, the Dischargers shall report by telephone to the Regional Water Board at (510) 622-2369.

b. The Dischargers shall also report such spills to the State Office of Emergency Services [telephone (800) 852-7550] only when the spills are in accordance with applicable reporting quantities for hazardous materials.

c. The Dischargers shall submit a written report to the Regional Water Board within five working days following telephone notification unless directed otherwise by Regional Water Board staff. A report submitted electronically is acceptable. The written report shall include the following:

1) Date and time of spill, and duration if known;

2) Location of spill (street address or description of location);

3) Nature of material spilled;

4) Quantity of material involved;

5) Receiving water body affected, if any;

6) Cause of spill;

7) Estimated size of affected area;

8) Observed impacts to receiving waters (e.g., oil sheen, fish kill, water discoloration);

9) Corrective actions taken to contain, minimize, or clean up the spill;

10) Future corrective actions planned to be taken to prevent recurrence, and schedule of implementation; and

11) Persons or agencies notified.

2. Unauthorized Discharges from Municipal Wastewater Treatment Plants[1]

The following requirements apply to municipal wastewater treatment plants that experience an unauthorized discharge at their treatment facilities and are consistent with and supercede requirements imposed on the Dischargers by the Executive Officer by letter of May 1, 2008, issued pursuant to California Water Code Section 13383.

a. Two (2)-Hour Notification

For any unauthorized discharges that result in a discharge to a drainage channel or a surface water, the Dischargers shall, as soon as possible, but not later than two (2) hours after becoming aware of the discharge, notify the State Office of Emergency Services (telephone 800-852-7550), the local health officers or directors of environmental health with jurisdiction over the affected water bodies, and the Regional Water Board. The notification to the Regional Water Board shall be via the Regional Water Board's online reporting system at www.wbers.net, and shall include the following:

1) Incident description and cause;

2) Location of threatened or involved waterway(s) or storm drains;

3) Date and time the unauthorized discharge started;

4) Estimated quantity and duration of the unauthorized discharge (to the extent known), and the estimated amount recovered;

[1] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

5) Level of treatment prior to discharge (e.g., raw wastewater, primary treated, undisinfected secondary treated, and so on); and

6) Identity of the person reporting the unauthorized discharge.

b. 24-hour Certification

Within 24 hours, the Dischargers shall certify to the Regional Water Board, at www.wbers.net, that the State Office of Emergency Services and the local health officers or directors of environmental health with jurisdiction over the affected water bodies have been notified of the unauthorized discharge.

c. 5-Day Written Report

Within five business days, the Dischargers shall submit a written report, via the Regional Water Board's online reporting system at www.wbers.net, that includes, in addition to the information required above, the following:

1) Methods used to delineate the geographical extent of the unauthorized discharge within receiving waters;

2) Efforts implemented to minimize public exposure to the unauthorized discharge;

3) Visual observations of the impacts (if any) noted in the receiving waters (e.g., fish kill, discoloration of water) and the extent of sampling if conducted;

4) Corrective measures taken to minimize the impact of the unauthorized discharge;

5) Measures to be taken to minimize the chances of a similar unauthorized discharge occurring in the future;

6) Summary of Spill Prevention Plan or O&M Manual modifications to be made, if necessary, to minimize the chances of future unauthorized discharges; and

7) Quantity and duration of the unauthorized discharge, and the amount recovered.

d. Communication Protocol

To clarify the multiple levels of notification, certification, and reporting, the current communication requirements for unauthorized discharges from municipal wastewater treatment plants are summarized in Table B that follows.

Table B

Summary of Communication Requirements for Unauthorized Discharges[1] from Municipal Wastewater Treatment Plants

Dischargers are required to:	Agency Receiving Information	Time frame	Method for Contact
1. Notify	California Emergency Management Agency (Cal EMA)	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Telephone – (800) 852-7550 (obtain a control number from Cal EMA)
	Local health department	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Depends on local health department
	Regional Water Board	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Electronic[2] www.wbers.net
2. Certify	Regional Water Board	As soon as possible, but not later than **24 hours** after becoming aware of the unauthorized discharge.	Electronic[3] www.wbers.net
3. Report	Regional Water Board	Within **5 business days** of becoming aware of the unauthorized discharge.	Electronic[4] www.wbers.net

[1] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

[2] In the event that the Discharger is unable to provide online notification within 2 hours of becoming aware of an unauthorized discharge, it shall phone the Regional Water Board's spill hotline at (510) 622-2369 and convey the same information contained in the notification form. In addition, within 3 business days of becoming aware of the unauthorized discharge, the Discharger shall enter the notification information into the Regional Water Board's online system in electronic format.

[3] In most instances, the 2-hour notification will also satisfy 24-hour certification requirements. This is because the notification form includes fields for documenting that OES and the local health department have been contacted. In other words, if the Discharger is able to complete all the fields in the notification form within 2 hours, certification requirements are also satisfied. In the event that the Discharger is unable to provide online certification within 24 hours of becoming aware of an unauthorized discharge, it shall phone the Regional Water Board's spill hotline at (510) 622-2369 and convey the same information contained in the certification form. In addition, within 3 business days of becoming aware of the unauthorized discharge, the Discharger shall enter the certification information into the Regional Water Board's online system in electronic format.

[4] If the Discharger cannot satisfy the 5-day reporting requirements via the Regional Water Board's online reporting system, it shall submit a written report (preferably electronically in pdf) to the appropriate Regional Water Board case manager. In cases where the Discharger cannot satisfy the 5-day reporting requirements via the online reporting system, it must still complete the Regional Water Board's online reporting requirements within 15 calendar days of becoming aware of the unauthorized discharge.

F. Planned Changes – Not supplemented

G. Anticipated Noncompliance – Not supplemented

H. Other Noncompliance – Not supplemented

I. Other Information – Not supplemented

VI. STANDARD PROVISION – ENFORCEMENT – Not Supplemented

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS – Not Supplemented

VIII. DEFINITIONS – This section is an addition to Standard Provisions (Attachment D)

More definitions can be found in Attachment A of this NPDES Permit.

1. Arithmetic Calculations

   a. Geometric mean is the antilog of the log mean or the back-transformed mean of the logarithmically transformed variables, which is equivalent to the multiplication of the antilogarithms. The geometric mean can be calculated with either of the following equations:

   $$\text{Geometric Mean} = Anti\log\left(\frac{1}{N}\sum_{i=1}^{N} Log(C_i)\right)$$

   or

   $$\text{Geometric Mean} = (C_1 * C_2 * \ldots * C_N)^{1/N}$$

   Where "N" is the number of data points for the period analyzed and "C" is the concentration for each of the "N" data points.

   b. Mass emission rate is obtained from the following calculation for any calendar day:

   $$\text{Mass emission rate (lb/day)} = \frac{8.345}{N}\sum_{i=1}^{N} Q_i C_i$$

   $$\text{Mass emission rate (kg/day)} = \frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$$

   In which "N" is the number of samples analyzed in any calendar day and "Q_i" and "C_i" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" grab samples that may be taken in any calendar day. If a composite sample is taken, "C_i" is the concentration measured in the composite sample and "Q_i" is the average flow rate occurring during the period over which the samples are composited. The daily concentration of a constituent measured over any calendar day shall be determined from the flow-weighted average of the same constituent in the combined waste streams as follows:

C_d = Average daily concentration = $\frac{1}{Q_t}\sum_{i=1}^{N} Q_i C_i$

In which "N" is the number of component waste streams and "Q" and "C" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" waste streams. "Q_t" is the total flow rate of the combined waste streams.

c. Maximum allowable mass emission rate, whether for a 24-hour, weekly 7-day, monthly 30-day, or 6-month period, is a limitation expressed as a daily rate determined with the formulas in the paragraph above, using the effluent concentration limit specified in the permit for the period and the specified allowable flow.

d. POTW removal efficiency is the ratio of pollutants removed by the treatment facilities to pollutants entering the treatment facilities (expressed as a percentage). The Dischargers shall determine removal efficiencies using monthly averages (by calendar month unless otherwise specified) of pollutant concentration of influent and effluent samples collected at about the same time and using the following equation (or its equivalent):

Removal Efficiency (%) = 100 × [1-(Effluent Concentration/Influent Concentration)]

2. Biosolids means the solids, semi-liquid suspensions of solids, residues, screenings, grit, scum, and precipitates separated from or created in wastewater by the unit processes of a treatment system. It also includes, but is not limited to, all supernatant, filtrate, centrate, decantate, and thickener overflow and underflow in the solids handling parts of the wastewater treatment system.

3. Blending is the practice of recombining wastewater that has been biologically treated with wastewater that has bypassed around biological treatment units.

4. Bottom sediment sample is (1) a separate grab sample taken at each sampling station for the determination of selected physical-chemical parameters, or (2) four grab samples collected from different locations in the immediate vicinity of a sampling station while the boat is anchored and analyzed separately for macroinvertebrates.

5. Composite sample is a sample composed of individual grab samples collected manually or by an automatic sampling device on the basis of time or flow as specified in the MRP. For flow-based composites, the proportion of each grab sample included in the composite sample shall be within plus or minus five percent (+/-5%) of the representative flow rate of the waste stream being measured at the time of grab sample collection. Alternatively, equal volume grab samples may be individually analyzed with the flow-weighted average calculated by averaging flow-weighted ratios of each grab sample analytical result. Grab samples comprising time-based composite samples shall be collected at intervals not greater than those specified in the MRP. The quantity of each grab sample comprising a time-based composite sample shall be a set of flow proportional volumes as specified in the MRP. If a particular time-based or flow-based composite sampling protocol is not specified in the MRP, the Dischargers shall determine and implement the most representative sampling protocol for the given parameter subject to Executive Officer approval.

6. Depth-integrated sample is defined as a water or waste sample collected by allowing a sampling device to fill during a vertical traverse in the waste or receiving water body being sampled. The

Dischargers shall collect depth-integrated samples in such a manner that the collected sample will be representative of the waste or water body at that sampling point.

7. Flow sample is an accurate measurement of the average daily flow volume using a properly calibrated and maintained flow measuring device.

8. Grab sample is an individual sample collected in a short period of time not exceeding 15 minutes. Grab samples represent only the condition that exists at the time the wastewater is collected.

9. Initial dilution is the process that results in the rapid and irreversible turbulent mixing of wastewater with receiving water around the point of discharge.

10. Overflow is the intentional or unintentional spilling or forcing out of untreated or partially treated wastes from a transport system (e.g., through manholes, at pump stations, and at collection points) upstream from the treatment plant headworks or from any part of a treatment plant facility.

11. Priority pollutants are those constituents referred to in 40 CFR Part 122 as promulgated in the Federal Register, Vol. 65, No. 97, Thursday, May 18, 2000, also known as the California Toxics Rule, the presence or discharge of which could reasonably be expected to interfere with maintaining designated uses.

12. Stormwater means stormwater runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

13. Toxic pollutant means any pollutant listed as toxic under federal Clean Water Act section 307(a)(1) or under 40 CFR 401.15.

14. Untreated waste is raw wastewater.

15. Waste, waste discharge, discharge of waste, and discharge are used interchangeably in the permit. The requirements of the permit apply to the entire volume of water, and the material therein, that is disposed of to surface and ground waters of the State of California.

Table C

List of Monitoring Parameters and Analytical Methods

CTR No.	Pollutant/Parameter	Analytical Method[1]	Minimum Levels[2] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
1.	Antimony	204.2					10	5	50	0.5	5	0.5		1000
2.	Arsenic	206.3				20		2	10	2	2	1		1000
3.	Beryllium						20	0.5	2	0.5	1			1000
4.	Cadmium	200 or 213					10	0.5	10	0.25	0.5			1000
5a.	Chromium (III)	SM 3500												
5b.	Chromium (VI)	SM 3500				10	5							1000
	Chromium (total)[3]	SM 3500					50	2	10	0.5	1			1000
6.	Copper	200.9					25	5	10	0.5	2			1000
7.	Lead	200.9					20	5	5	0.5	2			10,000
8.	Mercury	1631 (note)[4]												
9.	Nickel	249.2					50	5	20	1	5			1000
10.	Selenium	200.8 or SM 3114B or C						5	10	2	5	1		1000
11.	Silver	272.2					10	1	10	0.25	2			1000
12.	Thallium	279.2					10	2	10	1	5			1000
13.	Zinc	200 or 289					20		20	1	10			
14.	Cyanide	SM 4500 CN^- C or I				5								
15.	Asbestos (only required for dischargers to MUN waters)[5]	0100.2 [6]												
16.	2,3,7,8-TCDD and 17 congeners (Dioxin)	1613												
17.	Acrolein	603	2.0	5										
18.	Acrylonitrile	603	2.0	2										
19.	Benzene	602	0.5	2										
33.	Ethylbenzene	602	0.5	2										
39.	Toluene	602	0.5	2										
20.	Bromoform	601	0.5	2										
21.	Carbon Tetrachloride	601	0.5	2										
22.	Chlorobenzene	601	0.5	2										
23.	Chlorodibromomethane	601	0.5	2										
24.	Chloroethane	601	0.5	2										

[1] The suggested method is the USEPA Method unless otherwise specified (SM = Standard Methods). The Dischargers may use another USEPA-approved or recognized method if that method has a level of quantification below the applicable water quality objective. Where no method is suggested, the Dischargers have the discretion to use any standard method.

[2] Minimum levels are from the *State Implementation Policy*. They are the concentration of the lowest calibration standard for that technique based on a survey of contract laboratories. Laboratory techniques are defined as follows: GC = Gas Chromatography; GCMS = Gas Chromatography/Mass Spectrometry; LC = High Pressure Liquid Chromatography; Color = Colorimetric; FAA = Flame Atomic Absorption; GFAA = Graphite Furnace Atomic Absorption; ICP = Inductively Coupled Plasma; ICPMS = Inductively Coupled Plasma/Mass Spectrometry; SPGFAA = Stabilized Platform Graphite Furnace Atomic Absorption (i.e., USEPA 200.9); Hydride = Gaseous Hydride Atomic Absorption; CVAA = Cold Vapor Atomic Absorption; DCP = Direct Current Plasma.

[3] Analysis for total chromium may be substituted for analysis of chromium (III) and chromium (VI) if the concentration measured is below the lowest hexavalent chromium criterion (11 ug/l).

[4] The Dischargers shall use ultra-clean sampling (USEPA Method 1669) and ultra-clean analytical methods (USEPA Method 1631) for mercury monitoring. The minimum level for mercury is 2 ng/l (or 0.002 ug/l).

[5] MUN = Municipal and Domestic Supply. This designation, if applicable, is in the Findings of the permit.

[6] Determination of Asbestos Structures over 10 [micrometers] in Length in Drinking Water Using MCE Filters, USEPA 600/R-94-134, June 1994.

CTR No.	Pollutant/Parameter	Analytical Method[1]	Minimum Levels[2] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
25.	2-Chloroethylvinyl Ether	601	1	1										
26.	Chloroform	601	0.5	2										
75.	1,2-Dichlorobenzene	601	0.5	2										
76.	1,3-Dichlorobenzene	601	0.5	2										
77.	1,4-Dichlorobenzene	601	0.5	2										
27.	Dichlorobromomethane	601	0.5	2										
28.	1,1-Dichloroethane	601	0.5	1										
29.	1,2-Dichloroethane	601	0.5	2										
30.	1,1-Dichloroethylene or 1,1-Dichloroethene	601	0.5	2										
31.	1,2-Dichloropropane	601	0.5	1										
32.	1,3-Dichloropropylene or 1,3-Dichloropropene	601	0.5	2										
34.	Methyl Bromide or Bromomethane	601	1.0	2										
35.	Methyl Chloride or Chloromethane	601	0.5	2										
36.	Methylene Chloride or Dichlorormethane	601	0.5	2										
37.	1,1,2,2-Tetrachloroethane	601	0.5	1										
38.	Tetrachloroethylene	601	0.5	2										
40.	1,2-Trans-Dichloroethylene	601	0.5	1										
41.	1,1,1-Trichloroethane	601	0.5	2										
42.	1,1,2-Trichloroethane	601	0.5	2										
43.	Trichloroethene	601	0.5	2										
44.	Vinyl Chloride	601	0.5	2										
45.	2-Chlorophenol	604	2	5										
46.	2,4-Dichlorophenol	604	1	5										
47.	2,4-Dimethylphenol	604	1	2										
48.	2-Methyl-4,6-Dinitrophenol or Dinitro-2-methylphenol	604	10	5										
49.	2,4-Dinitrophenol	604	5	5										
50.	2-Nitrophenol	604		10										
51.	4-Nitrophenol	604	5	10										
52.	3-Methyl-4-Chlorophenol	604	5	1										
53.	Pentachlorophenol	604	1	5										
54.	Phenol	604	1	1		50								
55.	2,4,6-Trichlorophenol	604	10	10										
56.	Acenaphthene	610 HPLC	1	1	0.5									
57.	Acenaphthylene	610 HPLC		10	0.2									
58.	Anthracene	610 HPLC		10	2									
60.	Benzo(a)Anthracene or 1,2 Benzanthracene	610 HPLC	10	5										
61.	Benzo(a)Pyrene	610 HPLC		10	2									
62.	Benzo(b)Fluoranthene or 3,4 Benzofluoranthene	610 HPLC		10	10									
63.	Benzo(ghi)Perylene	610 HPLC		5	0.1									
64.	Benzo(k)Fluoranthene	610 HPLC		10	2									
74.	Dibenzo(a,h)Anthracene	610 HPLC		10	0.1									
86.	Fluoranthene	610 HPLC	10	1	0.05									
87.	Fluorene	610 HPLC		10	0.1									
92.	Indeno(1,2,3-cd) Pyrene	610 HPLC		10	0.05									
100.	Pyrene	610 HPLC		10	0.05									
68.	Bis(2-Ethylhexyl)Phthalate	606 or 625	10	5										

CTR No.	Pollutant/Parameter	Analytical Method[1]	Minimum Levels[2] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
70.	Butylbenzyl Phthalate	606 or 625	10	10										
79.	Diethyl Phthalate	606 or 625	10	2										
80.	Dimethyl Phthalate	606 or 625	10	2										
81.	Di-n-Butyl Phthalate	606 or 625		10										
84.	Di-n-Octyl Phthalate	606 or 625		10										
59.	Benzidine	625		5										
65.	Bis(2-Chloroethoxy)Methane	625		5										
66.	Bis(2-Chloroethyl)Ether	625	10	1										
67.	Bis(2-Chloroisopropyl)Ether	625	10	2										
69.	4-Bromophenyl Phenyl Ether	625	10	5										
71.	2-Chloronaphthalene	625		10										
72.	4-Chlorophenyl Phenyl Ether	625		5										
73.	Chrysene	625		10	5									
78.	3,3'-Dichlorobenzidine	625		5										
82.	2,4-Dinitrotoluene	625	10	5										
83.	2,6-Dinitrotoluene	625		5										
85.	1,2-Diphenylhydrazine (note)[7]	625		1										
88.	Hexachlorobenzene	625	5	1										
89.	Hexachlorobutadiene	625	5	1										
90.	Hexachlorocyclopentadiene	625	5	5										
91.	Hexachloroethane	625	5	1										
93.	Isophorone	625	10	1										
94.	Naphthalene	625	10	1	0.2									
95.	Nitrobenzene	625	10	1										
96.	N-Nitrosodimethylamine	625	10	5										
97.	N-Nitrosodi-n-Propylamine	625	10	5										
98.	N-Nitrosodiphenylamine	625	10	1										
99.	Phenanthrene	625		5	0.05									
101.	1,2,4-Trichlorobenzene	625	1	5										
102.	Aldrin	608	0.005											
103.	α-BHC	608	0.01											
104.	β-BHC	608	0.005											
105.	γ-BHC (Lindane)	608	0.02											
106.	δ-BHC	608	0.005											
107.	Chlordane	608	0.1											
108.	4,4'-DDT	608	0.01											
109.	4,4'-DDE	608	0.05											
110.	4,4'-DDD	608	0.05											
111.	Dieldrin	608	0.01											
112.	Endosulfan (alpha)	608	0.02											
113.	Endosulfan (beta)	608	0.01											
114.	Endosulfan Sulfate	608	0.05											
115.	Endrin	608	0.01											
116.	Endrin Aldehyde	608	0.01											
117.	Heptachlor	608	0.01											
118.	Heptachlor Epoxide	608	0.01											
119-	PCBs: Aroclors 1016, 1221,	608	0.5											

[7] Measurement for 1,2-Diphenylhydrazine may use azobenzene as a screen: if azobenzene is measured at >1 ug/l, then the Dischargers shall analyze for 1,2-Diphenylhydrazine.

CTR No.	Pollutant/Parameter	Analytical Method[1]	Minimum Levels[2] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
125	1232, 1242, 1248, 1254, 1260													
126.	Toxaphene	608	0.5											

ATTACHMENT H – PRETREATMENT REQUIREMENTS

CALIFORNIA REGIONAL WATER QUALITY CONTROL
BOARD
SAN FRANCISCO BAY REGION

ATTACHMENT H
PRETREATMENT PROGRAM PROVISIONS

For

NPDES POTW WASTEWATER DISCHARGE PERMITS

March 2011
(Corrected May 2011)

CONTENTS Page

I. Pretreatment Program Provisions H-3

II. APPENDIX H-1 ..... H-5
REQUIREMENTS FOR PRETREATMENT ANNUAL REPORTS
A) Cover Sheet H-5
B) Introduction H-5
C) Definitions H-6
D) Discussion of Upset, Interference and Pass Through H-6
E) Influent, Effluent and Biosolids Monitoring Results H-6
F) Inspection, Sampling and Enforcement Programs H-7
G) Updated List of Regulated SIUs H-7
H) SIU (categorical and non-categorical) Compliance Activities H-8
I) Baseline Monitoring Report Update H-10
J) Pretreatment Program Changes H-10
K) Pretreatment Program Budget H-10
L) Public Participation Summary H-11
M) Biosolids Storage and Disposal Practice H-11
N) Other Pollutant Reduction Activities H-11
O) Other Subjects H-11
P) Permit Compliance System (PCS) Data Entry Form H-11

III. APPENDIX H-2 ..... H-13
REQUIREMENTS FOR JANUARY-JUNE PRETREATMENT SEMIANNUAL REPORT
A) Influent, Effluent and Biosolids Monitoring H-13
B) Industrial User Compliance Status H-13
C) Discharger's Compliance with Pretreatment Program Requirements H-14

IV. APPENDIX H-3 ..... H-15
SIGNATURE REQUIREMENTS FOR PRETREATMENT ANNUAL AND SEMIANNUAL REPORTS

V. APPENDIX H-4 ..... H-16
REQUIREMENTS FOR INFLUENT, EFFLUENT AND BIOSOLIDS MONITORING
A) Organic Constituent Monitoring H-16
B) Influent and Effluent Monitoring H-16
C) Biosolids Monitoring H-17

Attachment H: Pretreatment Program Provisions

A. The Discharger shall be responsible and liable for the performance of all Control Authority pretreatment requirements contained in 40 CFR 403, including any regulatory revisions to Part 403. Where a Part 403 revision is promulgated after the effective date of the Discharger's permit and places mandatory actions upon the Discharger as Control Authority but does not specify a timetable for completion of the actions, the Discharger shall complete the required actions within six months from the issuance date of this permit or six months from the effective date of the Part 403 revisions, whichever comes later.

(If the Discharger cannot complete the required actions within the above six-month period due to the need to process local adoption of sewer use ordinance modifications or other substantial pretreatment program modifications, the Discharger shall notify the Executive Officer in writing at least 60 days prior to the six-month deadline. The written notification shall include a summary of completed required actions, an explanation for why the six month deadline cannot be met, and a proposed timeframe to complete the rest of the required actions as soon as practical but not later than within twelve months of the issuance date of this permit or twelve months of the effective date of the Part 403 revisions, whichever comes later. The Executive Officer will notify the Discharger in writing within 30 days of receiving the request if the extension is not approved.)

The United States Environmental Protection Agency (USEPA), the State and/or other appropriate parties may initiate enforcement action against a nondomestic user for noncompliance with applicable standards and requirements as provided in the Clean Water Act (Act).

B. The Discharger shall enforce the requirements promulgated under Sections 307(b), 307(c), 307(d) and 402(b) of the Act with timely, appropriate and effective enforcement actions. The Discharger shall cause nondomestic 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 nondomestic user, upon commencement of the discharge.

C. The Discharger shall perform the pretreatment functions as required in 40 CFR 403 and amendments or modifications thereto including, but not limited to:

1. Implement the necessary legal authorities to fully implement the pretreatment regulations as provided in 40 CFR 403.8(f)(1);

2. Implement the programmatic functions as provided in 40 CFR 403.8(f)(2);

3. Publish an annual list of nondomestic users in significant noncompliance as provided per 40 CFR 403.8(f)(2)(viii);

4. Provide for the requisite funding and personnel to implement the pretreatment program as provided in 40 CFR 403.8(f)(3); and

5. Enforce the national pretreatment standards for prohibited discharges and categorical standards as provided in 40 CFR 403.5 and 403.6, respectively.

D. The Discharger shall submit annually a report to USEPA Region 9, the State Water Board and the Regional Water Board describing its pretreatment program activities over the previous calendar year. In the event that the Discharger is not in compliance with any conditions or requirements of the Pretreatment Program, the Discharger shall also include the reasons for noncompliance and a plan and schedule for achieving compliance. The report shall contain, but is not limited to, the information specified in Appendix H-1 entitled, "Requirements for Pretreatment Annual Reports." The annual report is due each year on February 28.

E. The Discharger shall submit a pretreatment semiannual report to USEPA Region 9, the State Water Board and the Regional Water Board describing the status of its significant industrial users (SIUs). The report shall contain, but is not limited to, information specified in Appendix H-2 entitled, "Requirements for Pretreatment Semiannual Reports." The semiannual report is due July 31 for the period January through June. The information for the period July through December of each year shall be included in the Annual Report identified in Appendix H-1. The Executive Officer may exempt the Discharger from the semiannual reporting requirements on a case by case basis subject to State Water Board and USEPA's comment and approval.

F. The Discharger shall conduct the monitoring of its treatment plant's influent, effluent, and sludge (biosolids) as described in Appendix H-4 entitled, "Requirements for Influent, Effluent and Sludge (Biosolids) Monitoring." (The term "biosolids," as used in this Attachment, shall have the same meaning as wastewater treatment plant "sludge" and will be used from this point forward.) The Discharger shall evaluate the results of the sampling and analysis during the preparation of the semiannual and annual reports to identify any trends. Signing the certification statement used to transmit the reports shall be deemed to certify the Discharger has completed this data evaluation. A tabulation of the data shall be included in the pretreatment annual report as specified in Appendix H-4. The Executive Officer may require more or less frequent monitoring on a case by case basis.

APPENDIX H-1

REQUIREMENTS FOR PRETREATMENT ANNUAL REPORTS

The Pretreatment Annual Report is due each year on February 28 and shall contain activities conducted during the previous calendar year. The purpose of the Annual Report is to:

- Describe the status of the Discharger's pretreatment program; and
- Report on the effectiveness of the program, as determined by comparing the results of the preceding year's program implementation.

The report shall contain, at a minimum, the following information:

A. Cover Sheet

The cover sheet shall include:

1. The name(s) and National Pollutant Discharge Elimination Discharge System (NPDES) permit number(s) of the Discharger(s) that is part of the Pretreatment Program;

2. The name, address and telephone number of a pretreatment contact person;

3. The period covered in the report;

4. A statement of truthfulness; and

5. The dated signature of a principal executive officer, ranking elected official, or other duly authorized employee who is responsible for overall operation of the Publicly Owned Treatment Works (POTW) (40 CFR 403.12(m)).

B. Introduction

This section shall include:

1. Any pertinent background information related to the Discharger and/or the nondomestic user base of the area;

2. List of applicable interagency agreements used to implement the Discharger's pretreatment program (e.g., Memoranda of Understanding (MOU) with satellite sanitary sewer collection systems); and

3. A status summary of the tasks required by a Pretreatment Compliance Inspection (PCI), Pretreatment Compliance Audit (PCA), Cleanup and Abatement Order (CAO), or other pretreatment-related enforcement actions required by the Regional Water Board or the USEPA. A more detailed discussion can be referenced and included in the section entitled, "Program Changes," if needed.

C. Definitions

This section shall include a list of key terms and their definitions that the Discharger uses to describe or characterize elements of its pretreatment program, or the Discharger may provide a reference to its website if the applicable definitions are available on-line.

D. Discussion of Upset, Interference and Pass Through

This section shall include a discussion of Upset, Interference or Pass Through incidents, if any, at the Discharger's treatment plant(s) that the Discharger knows of or suspects were caused by nondomestic user discharges. Each incident shall be described, at a minimum, consisting of the following information:

1. A description of what occurred;

2. A description of what was done to identify the source;

3. The name and address of the nondomestic user responsible;

4. The reason(s) why the incident occurred;

5. A description of the corrective actions taken; and

6. An examination of the local and federal discharge limits and requirements for the purposes of determining whether any additional limits or changes to existing requirements may be necessary to prevent other Upset, Interference or Pass Through incidents.

E. Influent, Effluent and Biosolids Monitoring Results

The Discharger shall evaluate the influent, effluent and biosolids monitoring results as specified in Appendix H-4 in preparation of this report. The Discharger shall retain the analytical laboratory reports with the Quality Assurance and Quality Control (QA/QC) data validation and make these reports available upon request.

This section shall include:

1. Description of the sampling procedures and an analysis of the results (see Appendix H-4 for specific requirements);
2. Tabular summary of the compounds detected (compounds measured above the detection limit for the analytical method used) for the monitoring data generated during the reporting year as specified in Appendix H-4;
3. Discussion of the investigation findings into any contributing sources of the compounds that exceed NPDES limits; and
4. Graphical representation of the influent and effluent metal monitoring data for the past five years with a discussion of any trends.

F. Inspection, Sampling and Enforcement Programs

This section shall include at a minimum the following information:

1. Inspections: Summary of the inspection program (e.g., criteria for determining the frequency of inspections and inspection procedures);

2. Sampling Events: Summary of the sampling program (e.g., criteria for determining the frequency of sampling and chain of custody procedures); and

3. Enforcement: Summary of Enforcement Response Plan (ERP) implementation including dates for adoption, last revision and submission to the Regional Water Board.

G. Updated List of Regulated SIUs

This section shall contain a list of all of the federal categories that apply to SIUs regulated by the Discharger. The specific categories shall be listed including the applicable 40 CFR subpart and section, and pretreatment standards (both maximum and average limits). Local limits developed by the Discharger shall be presented in a table including the applicability of the local limits to SIUs. If local limits do not apply uniformly to SIUs, specify the applicability in the tables listing the categorical industrial users (CIUs) and non-categorical SIUs. Tables developed in Sections 7A and 7B can be used to present or reference this information.

1. CIUs - Include a table that alphabetically lists the CIUs regulated by the Discharger as of the end of the reporting period. This list shall include:

    a. Name;

    b. Address;

    c. Applicable federal category(ies);

    d. Reference to the location where the applicable Federal Categorical Standards are presented in the report;

    e. Identify all deletions and additions keyed to the list submitted in the previous annual report. All deletions shall be briefly explained (e.g., closure, name change, ownership change, reclassification, declassification); and

    f. Information, calculations and data used to determine the limits for those CIUs for which a combined waste stream formula is applied.

2. Non-categorical SIUs - Include a table that alphabetically lists the SIUs not subject to any federal categorical standards that were regulated by the Discharger as of the end of the reporting period. This list shall include:

    a. Name;

b. Address;

c. A brief description of the type of business;

d. Identify all deletions and additions keyed to the list submitted in the previous annual report. All deletions shall be briefly explained (e.g., closure, name change, ownership change, reclassification, declassification); and

e. Indicate the applicable discharge limits (e.g., different from local limits) to which the SIUs are subject and reference to the location where the applicable limits (e.g., local discharge limits) are presented in the report.

H. SIU (categorical and non-categorical) Compliance Activities

The information required in this section may be combined in the table developed in Section 7 above.

1. **Inspection and Sampling Summary:** This section shall contain a summary of all the SIU inspections and sampling activities conducted by the Discharger and sampling activities conducted by the SIU over the reporting year to gather information and data regarding SIU compliance. The summary shall include:

   a. The number of inspections and sampling events conducted for each SIU by the Discharger;

   b. The number of sampling events conducted by the SIU. Identify SIUs that are operating under an approved Total Toxic Organic Management Plan;

   c. The quarters in which the above activities were conducted; and

   d. The compliance status of each SIU, delineated by quarter, and characterized using all applicable descriptions as given below:

      (1) Consistent compliance;

      (2) Inconsistent compliance;

      (3) Significant noncompliance;

      (4) On a compliance schedule to achieve compliance (include the date final compliance is required);

      (5) Not in compliance and not on a compliance schedule; and

      (6) Compliance status unknown, and why not.

2. **Enforcement Summary:** This section shall contain a summary of SIU compliance and enforcement activities during the reporting year. The summary may be included in the summary table developed in section 8A and shall include the names and addresses of all SIUs affected by the actions identified below. For each notice specified in enforcement action "i" through "iv," indicate whether it was for an infraction of a federal or local standard/limit or requirement.

    a. Warning letters or notices of violations regarding SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements;

    b. Administrative Orders regarding the SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements;

    c. Civil actions regarding the SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements;

    d. Criminal actions regarding the SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements;

    e. Assessment of monetary penalties. Identify the amount of penalty in each case and reason for assessing the penalty;

    f. Order to restrict/suspend discharge to the Discharger; and

    g. Order to disconnect the discharge from entering the Discharger.

3. **July-December Semiannual Data:** For SIU violations/noncompliance during the semiannual reporting period from July 1 through December 31, provide the following information:

    a. Name and facility address of the SIU;

    b. Indicate if the SIU is subject to Federal Categorical Standards; if so, specify the category including the subpart that applies;

    c. For SIUs subject to Federal Categorical Standards, indicate if the violation is of a categorical or local standard;

    d. Indicate the compliance status of the SIU for the two quarters of the reporting period; and

    e. For violations/noncompliance identified in the reporting period, provide:

        (1) The date(s) of violation(s);

(2) The parameters and corresponding concentrations exceeding the limits and the discharge limits for these parameters; and

(3) A brief summary of the noncompliant event(s) and the steps that are being taken to achieve compliance.

I. Baseline Monitoring Report Update

This section shall provide a list of CIUs added to the pretreatment program since the last annual report. This list of new CIUs shall summarize the status of the respective Baseline Monitoring Reports (BMR). The BMR must contain the information specified in 40 CFR 403.12(b). For each new CIU, the summary shall indicate when the BMR was due; when the CIU was notified by the Discharger of this requirement; when the CIU submitted the report; and/or when the report is due.

J. Pretreatment Program Changes

This section shall contain a description of any significant changes in the Pretreatment Program during the past year including, but not limited to:

1. Legal authority;
2. Local limits;
3. Monitoring/ inspection program and frequency;
4. Enforcement protocol;
5. Program's administrative structure;
6. Staffing level;
7. Resource requirements;
8. Funding mechanism;
9. If the manager of the Discharger's pretreatment program changed, a revised organizational chart shall be included; and
10. If any element(s) of the program is in the process of being modified, this intention shall also be indicated.

K. Pretreatment Program Budget

This section shall present the budget spent on the Pretreatment Program. The budget, either by the calendar or fiscal year, shall show the total expenses required to implement the pretreatment program. A brief discussion of the source(s) of funding shall be provided. In addition, the Discharger

shall make available upon request specific details on its pretreatment program expense amounts such as for personnel, equipment, and chemical analyses.

L. Public Participation Summary

This section shall include a copy of the public notice as required in 40 CFR 403.8(f)(2)(viii). If a notice was not published, the reason shall be stated.

M. Biosolids Storage and Disposal Practice

This section shall describe how treated biosolids are stored and ultimately disposed. If a biosolids storage area is used, it shall be described in detail including its location, containment features and biosolids handling procedures.

N. Other Pollutant Reduction Activities

This section shall include a brief description of any programs the Discharger implements to reduce pollutants from nondomestic users that are not classified as SIUs. If the Discharger submits any of this program information in an Annual Pollution Prevention Report, reference to this other report shall satisfy this reporting requirement.

O. Other Subjects

Other information related to the Pretreatment Program that does not fit into any of the above categories should be included in this section.

P. Permit Compliance System (PCS) Data Entry Form

The annual report shall include the PCS Data Entry Form. This form shall summarize the enforcement actions taken against SIUs in the past year. This form shall include the following information:

1. Discharger's name,
2. NPDES Permit number,
3. Period covered by the report,
4. Number of SIUs in significant noncompliance (SNC) that are on a pretreatment compliance schedule,
5. Number of notices of violation and administrative orders issued against SIUs,
6. Number of civil and criminal judicial actions against SIUs,
7. Number of SIUs that have been published as a result of being in SNC, and

8. Number of SIUs from which penalties have been collected.

APPENDIX H-2

REQUIREMENTS FOR JANUARY-JUNE PRETREATMENT SEMIANNUAL REPORT

The pretreatment semiannual report is due on July 31 for pretreatment program activities conducted from January through June unless an exception has been granted by the Regional Water Board's Executive Officer (e.g., pretreatment programs without any SIUs may qualify for an exception to the pretreatment semiannual report). Pretreatment activities conducted from July through December of each year shall be included in the Pretreatment Annual Report as specified in Appendix H-1. The pretreatment semiannual report shall contain, at a minimum the following information:

A. Influent, Effluent and Biosolids Monitoring

The influent, effluent and biosolids monitoring results shall be evaluated in preparation of this report. The Discharger shall retain analytical laboratory reports with the QA/QC data validation and make these reports available upon request. The Discharger shall also make available upon request a description of its influent, effluent and biosolids sampling procedures. Violations of any parameter that exceed NPDES limits shall be identified and reported. The contributing source(s) of the parameters that exceed NPDES limits shall be investigated and discussed.

B. Significant Industrial User Compliance Status

This section shall contain a list of all SIUs that were not in consistent compliance with all pretreatment standards/limits or requirements for the reporting period. For the reported SIUs, the compliance status for the previous semiannual reporting period shall be included. Once the SIU has determined to be out of compliance, the SIU shall be included in subsequent reports until consistent compliance has been achieved. A brief description detailing the actions that the SIU undertook to come back into compliance shall be provided.

For each SIU on the list, the following information shall be provided:

1. Name and facility address of the SIU;

2. Indicate if the SIU is subject to Federal Categorical Standards; if so, specify the category including the subpart that applies;

3. For SIUs subject to Federal Categorical Standards, indicate if the violation is of a categorical or local standard;

4. Indicate the compliance status of the SIU for the two quarters of the reporting period; and

5. For violations/noncompliance identified in the reporting period, provide:

    a. The date(s) of violation(s);

    b. The parameters and corresponding concentrations exceeding the limits and the discharge limits for these parameters; and

c. A brief summary of the noncompliant event(s) and the steps that are being taken to achieve compliance.

C. Discharger's Compliance with Pretreatment Program Requirements

This section shall contain a discussion of the Discharger's compliance status with the Pretreatment Program Requirements as indicated in the latest Pretreatment Compliance Audit (PCA) Report or Pretreatment Compliance Inspection (PCI) Report. It shall contain a summary of the following information:

1. Date of latest PCA or PCI report;

2. Date of the Discharger's response;

3. List of unresolved issues; and

4. Plan(s) and schedule for resolving the remaining issues.

APPENDIX H-3

SIGNATURE REQUIREMENTS FOR PRETREATMENT ANNUAL AND SEMIANNUAL REPORTS

The pretreatment annual and semiannual reports shall be signed by a principal executive officer, ranking elected official, or other duly authorized employee who is responsible for the overall operation of the Discharger [POTW - 40 CFR 403.12(m)]. Signed copies of the reports shall be submitted to the USEPA, the State Water Board, and the Regional Water Board at the following addresses unless the Discharger is instructed by any of these agencies to submit electronic copies of the required reports:

Pretreatment Program Reports
Clean Water Act Compliance Office (WTR-7)
Water Division
Pacific Southwest Region
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

Submit electronic copies only to State and Regional Water Boards:
Pretreatment Program Manager
Regulatory Unit
State Water Resources Control Board
Division of Water Quality-15th Floor
1001 I Street
Sacramento, CA 95814
DMR@waterboards.ca.gov
NPDES_Wastewater@waterboards.ca.gov

Pretreatment Coordinator
NPDES Wastewater Division
SF Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612
(Submit the report as a single Portable Document Format (PDF) file to the Pretreatment Coordinator's folder in the Regional Water Board's File Transfer Protocol (FTP) site. The instructions for using the FTP site can be found at the following internet address:
http://www.waterboards.ca.gov/sanfranciscobay/publications_forms/documents/FTP_Discharger_Guide-12-2010.pdf.)

APPENDIX H-4

REQUIREMENTS FOR INFLUENT, EFFLUENT AND BIOSOLIDS MONITORING

The Discharger shall conduct sampling of its treatment plant's influent, effluent and biosolids at the frequency shown in **the pretreatment requirements table** of the Monitoring and Reporting Program (MRP, Attachment E). When sampling periods coincide, one set of test results, reported separately, may be used for those parameters that are required to be monitored by both the influent and effluent monitoring requirements of the MRP and the Pretreatment Program. The Pretreatment Program monitoring reports as required in Appendices H-1 and H-2 shall be transmitted to the Pretreatment Program Coordinator.

A. Reduction of Monitoring Frequency

The minimum frequency of Pretreatment Program influent, effluent, and biosolids monitoring shall be dependant on the number of SIUs identified in the Discharger's Pretreatment Program as indicated in Table H-1.

Table H-1: Minimum Frequency of Pretreatment Program Monitoring

Number of SIUs	Minimum Frequency
< 5	Once every five years
> 5 and < 50	Once every year
> 50	Twice per year

If the Discharger's required monitoring frequency is greater than the minimum specified in Table H-1, the Discharger may request a reduced monitoring frequency for that constituent(s) as part of its application for permit reissuance if it meets the following criteria:

The monitoring data for the constituent(s) consistently show non-detect (ND) levels for the effluent monitoring and very low (i.e., near ND) levels for influent and biosolids monitoring for a minimum of eight previous years' worth of data.

The Discharger's request shall include tabular summaries of the data and a description of the trends in the industrial, commercial, and residential customers in the Discharger's service area that demonstrate control over the sources of the constituent(s). The Regional Water Board may grant a reduced monitoring frequency in the reissued permit after considering the information provided by the Discharger and any other relevant information.

B. Influent and Effluent Monitoring

The Discharger shall monitor for the parameters using the required sampling and test methods listed in **the pretreatment table** of the MRP. Any test method substitutions must have received prior written Executive Officer approval. Influent and effluent sampling locations shall be the same as those sites specified in the MRP.

The influent and effluent samples should be taken at staggered times to account for treatment plant detention time. Appropriately staggered sampling is considered consistent with the requirement for

collection of effluent samples coincident with influent samples in Section III.A.3.a(2) of Attachment G. All samples must be representative of daily operations. Sampling and analysis shall be performed in accordance with the techniques prescribed in 40 CFR 136 and amendments thereto. For effluent monitoring, the reporting limits for the individual parameters shall be at or below the minimum levels (MLs) as stated in the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (2000) [also known as the State Implementation Policy (SIP)]; any revisions to the MLs shall be adhered to. If a parameter does not have a stated ML, then the Discharger shall conduct the analysis using the lowest commercially available and reasonably achievable detection levels.

The following report elements should be used to submit the influent and effluent monitoring results. A similarly structured format may be used but will be subject to Regional Water Board approval. The monitoring reports shall be submitted with the Pretreatment Annual Report identified in Appendix H-1.

1. Sampling Procedures, Sample Dechlorination, Sample Compositing, and Data Validation (applicable quality assurance/quality control) shall be performed in accordance with the techniques prescribed in 40 CFR 136 and amendments thereto. The Discharger shall make available upon request its sampling procedures including methods of dechlorination, compositing, and data validation.

2. A tabulation of the test results for the detected parameters shall be provided.

3. Discussion of Results – The report shall include a complete discussion of the test results for the detected parameters. If any pollutants are detected in sufficient concentration to upset, interfere or pass through plant operations, the type of pollutant(s) and potential source(s) shall be noted, along with a plan of action to control, eliminate, and/or monitor the pollutant(s). Any apparent generation and/or destruction of pollutants attributable to chlorination/dechlorination sampling and analysis practices shall be noted.

C. Biosolids Monitoring

Biosolids should be sampled in a manner that will be representative of the biosolids generated from the influent and effluent monitoring events except as noted in (C) below. The same parameters required for influent and effluent analysis shall be included in the biosolids analysis. The biosolids analyzed shall be a composite sample of the biosolids for final disposal consisting of:

1. Biosolids lagoons – 20 grab samples collected at representative equidistant intervals (grid pattern) and composited as a single grab, or

2. Dried stockpile – 20 grab samples collected at various representative locations and depths and composited as a single grab, or

3. Dewatered biosolids - daily composite of 4 representative grab samples each day for 5 days taken at equal intervals during the daily operating shift taken from a) the dewatering units or b) each truckload, and shall be combined into a single 5- day composite.

The USEPA manual, POTW Sludge Sampling and Analysis Guidance Document, August 1989, containing detailed sampling protocols specific to biosolids is recommended as a guidance for sampling procedures. The USEPA manual Analytical Methods of the National Sewage Sludge Survey, September 1990, containing detailed analytical protocols specific to biosolids, is recommended as a guidance for analytical methods.

In determining if the biosolids are a hazardous waste, the Discharger shall adhere to Article 2, "Criteria for Identifying the Characteristics of Hazardous Waste," and Article 3, "Characteristics of Hazardous Waste," of Title 22, California Code of Regulations, sections 66261.10 to 66261.24 and all amendments thereto.

The following report elements should be used to submit the biosolids monitoring results. A similarly structured form may be used but will be subject to Regional Water Board approval. The results shall be submitted with the Pretreatment Annual Report identified in Appendix H-1.

- Sampling Procedures and Data Validation (applicable quality assurance/quality control) shall be performed in accordance with the techniques prescribed in 40 CFR 136 and amendments thereto. The Discharger shall make available upon request its biosolids sampling procedures and data validation methods.

- Test Results – Tabulate the test results for the detected parameters and include the percent solids.

- Discussion of Results – Include a complete discussion of test results for the detected parameters. If the detected pollutant(s) is reasonably deemed to have an adverse effect on biosolids disposal, a plan of action to control, eliminate, and/or monitor the pollutant(s) and the known or potential source(s) shall be included. Any apparent generation and/or destruction of pollutants attributable to chlorination/dechlorination sampling and analysis practices shall be noted.

The Discharger shall also provide a summary table presenting any influent, effluent or biosolids monitoring data for non-priority pollutants that the Discharger believes may be causing or contributing to interference, pass through or adversely impacting biosolids quality.

APPENDIX E – MERCURY AND PCBS WATERSHED PERMIT

San Francisco Bay Regional Water Quality Control Board

ORDER No. R2-2012-0096
NPDES No. CA0038849

WASTE DISCHARGE REQUIREMENTS FOR MERCURY AND PCBS FROM MUNICIPAL AND INDUSTRIAL WASTEWATER DISCHARGES TO SAN FRANCISCO BAY

The following dischargers and discharge locations are subject to waste discharge requirements as set forth in this Order, for the purpose of implementing the San Francisco Bay Mercury and PCBs Total Maximum Daily Load (TMDL) wasteload allocations for municipal and industrial wastewater discharges to San Francisco Bay and its contiguous bay segments:

Table 1. Discharger Information

Discharger **Name of Facility** **Facility Address**	See attached Tables 1A and 1B for Discharger Information.
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified these discharges as either major or minor discharges as indicated in Tables 1A and 1B.	

Table 2. Discharge Locations

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
See attached Tables 2A and 2B for Discharge Locations.				

Table 3. Administrative Information

This Order was adopted by the Regional Water Quality Control Board on:	**December 12, 2012**
This Order shall become effective on:	**January 1, 2013**
This Order shall expire on:	**December 31, 2017**

I, Bruce H. Wolfe, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on the date indicated above.

Bruce H. Wolfe, Executive Officer

Table 1A. Municipal Discharger Information

Discharger	Name of Facility	Facility Address	Minor/ Major
American Canyon, City of	Wastewater Treatment and Reclamation Facility	151 Mezzetta Court American Canyon, CA 94503 Napa County	Major
Benicia, City of	Benicia Wastewater Treatment Plant	614 East Fifth Street Benicia, CA 94510 Solano County	Major
Burlingame, City of	Burlingame Wastewater Treatment Plant	1103 Airport Boulevard Burlingame, CA 94010 San Mateo County	Major
Calistoga, City of	Dunaweal Wastewater Treatment Plant	1185 Dunaweal Lane Calistoga, CA 94515 Napa County	Minor
Central Contra Costa Sanitary District	Central Contra Costa Sanitary District Wastewater Treatment Plant	5019 Imhoff Place Martinez, CA 94553 Contra Costa County	Major
Central Marin Sanitation Agency	Central Marin Sanitation Agency Wastewater Treatment Plant	1301 Andersen Drive San Rafael, CA 94901 Marin County	Major
Crockett Community Services District, Port Costa Sanitary Dept.	Port Costa Wastewater Treatment Plant	End of Canyon Lake Drive Port Costa, CA 94569 Contra Costa County	Minor
Delta Diablo Sanitation District	Wastewater Treatment Plant	2500 Pittsburg-Antioch Highway Antioch, CA 94509 Contra Costa County	Major
East Bay Dischargers Authority (EBDA); Cities of Hayward and San Leandro; Oro Loma Sanitary District; Castro Valley Sanitary District; Union Sanitary District; Livermore-Amador Valley Water Management Agency; Dublin San Ramon Services District; and City of Livermore	EBDA Common Outfall	EBDA Common Outfall 14150 Monarch Bay Drive San Leandro, CA 94577 Alameda County	Major
	Hayward Water Pollution Control Facility		
	San Leandro Water Pollution Control Plant		
	Oro Loma/Castro Valley Sanitary Districts Water Pollution Control Plant		
	Raymond A. Boege Alvarado Wastewater Treatment Plant		
	Livermore-Amador Valley Water Management Agency Export and Storage Facilities		
	Dublin San Ramon Services District Wastewater Treatment Plant		
	City of Livermore Water Reclamation Plant		
East Bay Municipal Utility District	East Bay Municipal Utility District, Special District No. 1 Wastewater Treatment Plant (WWTP)	2020 Wake Avenue Oakland, CA 94607 Alameda County	Major
Fairfield-Suisun Sewer District	Fairfield-Suisun Wastewater Treatment Plant	1010 Chadbourne Road Fairfield, CA 94534 Solano County	Major

Discharger	Name of Facility	Facility Address	Minor/ Major
Las Gallinas Valley Sanitary District	Las Gallinas Valley Sanitary District Sewage Treatment Plant	300 Smith Ranch Road San Rafael, CA 94903 Marin County	Major
Marin County (Paradise Cove), Sanitary District No. 5 of	Paradise Cove Treatment Plant	3700 Paradise Drive Tiburon, CA 94920 Marin County	Minor
Marin County (Tiburon), Sanitary District No. 5 of	Wastewater Treatment Plant	2001 Paradise Drive Tiburon, CA 94920 Marin County	Major
Millbrae, City of	Water Pollution Control Plant	400 East Millbrae Avenue Millbrae, CA 94030 San Mateo County	Major
Mt. View Sanitary District	Mt. View Sanitary District Wastewater Treatment Plant	3800 Arthur Road Martinez, CA 94553 Contra Costa County	Major
Napa Sanitation District	Soscol Water Recycling Facility	1515 Soscol Ferry Road Napa, CA 94558 Napa County	Major
Novato Sanitary District	Novato Sanitary District Wastewater Treatment Plant	500 Davidson Street Novato, CA 94945 Marin County	Major
Palo Alto, City of	Palo Alto Regional Water Quality Control Plant	2501 Embarcadero Way Palo Alto, CA 94303 Santa Clara County	Major
Petaluma, City of	Municipal Wastewater Treatment Plant	950 Hopper Street Petaluma, CA 94952 Sonoma County	Major
Pinole, City of	Pinole-Hercules Water Pollution Control Plant	11 Tennent Avenue Pinole, CA, 94564 Contra Costa County	Major
Rodeo Sanitary District	Rodeo Sanitary District Water Pollution Control Facility	800 San Pablo Avenue Rodeo, CA 94572 Contra Costa County	Major
Saint Helena, City of	City of St. Helena Wastewater Treatment and Reclamation Plant	1 Thomann Lane St. Helena, CA 94574 Napa County	Minor
San Francisco, City and County of, San Francisco International Airport	Mel Leong Treatment Plant, Sanitary Plant	918 Clearwater Drive San Francisco International Airport San Francisco, CA 94128 San Mateo County	Major
San Francisco (Southeast Plant), City and County of	Southeast Water Pollution Control Plant	750 Phelps Street San Francisco, CA 94124 San Francisco County	Major
San Jose/Santa Clara Water Pollution Control Plant and Cities of San Jose and Santa Clara	San Jose/Santa Clara Water Pollution Control Plant	4245 Zanker Road San Jose, CA 95134 Santa Clara County	Major
San Mateo, City of	City of San Mateo Wastewater Treatment Plant	2050 Detroit Drive San Mateo, CA 94404 San Mateo County	Major
Sausalito-Marin City Sanitary District	Sausalito-Marin City Sanitary District Wastewater Treatment Plant	#1 Fort Baker Road Sausalito, CA 94965 Marin County	Major

Discharger	Name of Facility	Facility Address	Minor/ Major
Sewerage Agency of Southern Marin	Wastewater Treatment Plant	450 Sycamore Avenue Mill Valley, CA 94941 Marin County	Major
Sonoma Valley County Sanitary District	Municipal Wastewater Treatment Plant	22675 8th Street East Sonoma, CA 95476 Sonoma County	Major
South Bayside System Authority	South Bayside System Authority Wastewater Treatment Plant	1400 Radio Road Redwood City, CA 94065 San Mateo County	Major
South San Francisco and San Bruno, Cities of	South San Francisco and San Bruno Water Quality Control Plant	195 Belle Air Road South San Francisco, CA 94080 San Mateo County	Major
Sunnyvale, City of	Sunnyvale Water Pollution Control Plant	1444 Borregas Avenue, Sunnyvale, CA 94089 Santa Clara County	Major
US Department of Navy, Treasure Island	Wastewater Treatment Plant	681 Avenue M, Treasure island San Francisco, CA 94130-1807 San Francisco County	Major
Vallejo Sanitation and Flood Control District	Vallejo Sanitation and Flood Control District Wastewater Treatment Plant	450 Ryder Street Vallejo, CA 94590 Solano County	Major
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	West County Agency Combined Outfall	601 Canal Blvd. Richmond, CA 94804 Contra Costa County	Major
Yountville, Town of	Municipal Wastewater Treatment Plant	7501 Solano Avenue Yountville, CA 94599 Napa County	Minor

Table 1B. Industrial Discharger Information

Discharger	Name of Facility	Facility Address	Minor/ Major
Industrial Wastewater Discharger (Non-Petroleum Refinery):			
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	Joint Use Phillip F. Meads Water Treatment Plant	830 Loring Avenue Crockett, CA 94525 Contra Costa County	Major
Crockett Cogeneration, LP, and Pacific Crockett Energy, Inc.	Crockett Cogeneration Plant	550 Loring Avenue Crockett, CA 94525-1232 Contra Costa County	Minor
Pacific Gas and Electric Company (PG&E)	PG&E Shell Pond	0.5 miles northwest of North Broadway Street Bay Point, CA 94565 Contra Costa County	Minor
Rhodia, Inc.	Sulfuric Acid Regeneration Martinez Plant	100 Mococo Road Martinez, CA 94553 Contra Costa County	Major
GenOn Delta, LLC (formerly Mirant)	Pittsburg Power Plant	GenOn Delta LLC, Pittsburg Power Plant 696 W. 10th Street Pittsburg, CA 94565 Contra Costa County	Major
USS-Posco Industries	Pittsburg Plant	900 Loveridge Road Pittsburg, CA 94565 Contra Costa County	Major
Industrial Wastewater Discharger (Petroleum Refinery):			
Chevron Products Company	Richmond Refinery	841 Chevron Way Richmond, CA 94801 Contra Costa County	Major
Phillips 66 (formerly ConocoPhillips)	San Francisco Refinery	1380 San Pablo Avenue Rodeo, CA 94572-1354 Contra Costa County	Major
Shell Oil Products US and Equilon Enterprises LLC	Shell Martinez Refinery	3485 Pacheco Blvd Martinez CA 94553 Contra Costa County	Major
Tesoro Refining & Marketing Co.	Golden Eagle Refinery	150 Solano Way Martinez, CA 94553 Contra Costa County	Major
Valero Refining Company	Valero Benicia Refinery	3400 East Second Street Benicia, CA 94510-1005 Solano County	Major

Table 2A. Municipal Discharger Location Information

Discharger	Discharge Point(s)	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
American Canyon, City of	001-S	38º 11' 3.7" N	122º 16' 39.0" W	North Slough
	003-R	38º 11' 5.7" N	122º 16' 44.8" W	Constructed freshwater wetlands
Benicia, City of	E-001	38º 02' 30" N	122º 09' 03" W	Carquinez Strait
Burlingame, City of	E-002[(a)]	37º 39' 55" N	122º 21' 41" W	Lower San Francisco Bay
Calistoga, City of	001	38º 33' 34" N	122º 33' 28" W	Napa River
	002	38º 33' 13" N	122º 33' 40" W	Napa River
Central Contra Costa Sanitary District	001	38º 2' 44" N	122º 5' 55" W	Suisun Bay
Central Marin Sanitation Agency	001	37º 56' 54" N	122º 27' 23" W	Central San Francisco Bay
Crockett Community Services District, Port Costa Sanitary Dept.	001	38° 02' 55'' N	122° 10' 56'' W	Carquinez Strait
Delta Diablo Sanitation District	E-001	38º 01' 40" N	121º 50' 14" W	New York Slough
East Bay Dischargers Authority, including City of Hayward, City of San Leandro, Oro Loma Sanitary District, Castro Valley Sanitary District, Union Sanitary District, Livermore-Amador Valley Water Management Agency, Dublin San Ramon Services District, and City of Livermore	001	37º 41' 40" N	122 º 17' 42" W	Lower San Francisco Bay
East Bay Municipal Utility District	E-001	37º 49' 2 " N	122º 20' 55" W	Central San Francisco Bay
Fairfield-Suisun Sewer District	E-001	38° 12' 33" N	122° 03' 24" W	Boynton Slough
	E-002	38° 12' 52" N	122° 03' 56" W	Boynton Slough
	E-003	38° 12' 35" N	122° 03' 29" W	Boynton Slough
	E-005	38° 14' 06" N	122° 03' 31" W	Ledgewood Creek
Las Gallinas Valley Sanitary District	E-001	38° 01' 32" N	122° 30' 58" W	Miller Creek
	E-002	38° 01' 36" N	122° 30' 45" W	Miller Creek
Marin County (Paradise Cove), Sanitary District No. 5 of	001	37 º 53' 50" N	122 º 27' 40" W	Central San Francisco Bay
Marin County (Tiburon), Sanitary District No. 5 of	E-001	37º 52' 12" N	122º 27' 5" W	Raccoon Strait, Central San Francisco Bay
Millbrae, City of	E-001	37º 39' 55" N	122º 21' 41" W	Lower San Francisco Bay
Mt. View Sanitary District	E-001	38º 01' 12" N	122º 05' 47" W	Peyton Slough, a tributary to Carquinez Strait
Napa Sanitation District	E-001	38° 14' 09"N	122° 17' 10" W	Napa River
Novato Sanitary District	E-003	38° 03' 36" N	122º 29' 24" W	San Pablo Bay
Palo Alto, City of	E-001	37º 27' 30"N	122º 06' 37" W	Unnamed channel tributary to Lower San Francisco Bay
	E-002	37º 26' 30" N	122º 06' 45" W	Matedero Creek via Renzel Marsh Pond
Petaluma, City of	E-001	38° 12' 33" N	122° 34' 22" W	Petaluma River
Pinole, City of	E-001	38° 03' 06" N	122° 16' 12" W	San Pablo Bay
Rodeo Sanitary District	E-001	38º 03' 06" N	122º 16' 12" W	San Pablo Bay
Saint Helena, City of	E-001	30° 30'10" N	122º 26' 15" W	Napa River
San Francisco, City and County of, San Francisco International Airport	E-002[(a)]	37° 39' 55" N	122° 21' 41" W	Lower San Francisco Bay
San Francisco (Southeast Plant), City and County of	E-001	37° 44' 58" N	122° 22' 22" W	Lower San Francisco Bay

Discharger	Discharge Point(s)	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
San Jose/Santa Clara Water Pollution Control Plant and Cities of San Jose and Santa Clara	E-001	37° 26' 23"N	121° 57' 29" W	Artesian Slough, a tributary to Coyote Creek and South San Francisco Bay
San Mateo, City of	E-001	37º 34' 50" N	122º 14' 45" W	Lower San Francisco Bay
Sausalito-Marin City Sanitary District	001	37º 50' 37" N	122º 28' 3" W	Central San Francisco Bay
Sewerage Agency of Southern Marin	E-001	37° 52' 12" N	122° 27' 5" W	Raccoon Strait
Sonoma Valley County Sanitary District	001	38° 14' 14" N	122° 25' 51" W	Schell Slough, a tributary to the San Pablo Bay
South Bayside System Authority	001	37° 33' 40" N	122° 13' 02" W	Lower San Francisco Bay
South San Francisco and San Bruno, Cities of	E-002[(a)]	37° 39' 55" N	122° 21' 41" W	Lower San Francisco Bay
Sunnyvale, City of	E-001	37° 25' 13" N	122° 1' 0" W	Moffett Channel, a tributary to Guadalupe Slough and South San Francisco Bay
US Department of Navy, Treasure Island	E-001	37° 49' 50" N	122° 21' 25" W	San Francisco Bay
Vallejo Sanitation and Flood Control District	E-001	38º 3' 53" N	122 º 13' 42" W	Carquinez Strait
	E-002	38º 5' 23" N	122º 15' 12" W	Mare Island Strait, a tributary to Carquinez Strait
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	E-001	37°54'47"N	122°25'06"W	Central San Francisco Bay
Yountville, Town of	E-001	38° 24' 30''N	122°20'25''W	Napa River

[(a)] These Dischargers share the North Bayside System Unit outfall which serves as combined discharge point E-002 into San Francisco Bay. However, compliance with the requirements of this Order are by each Discharger at its individual compliance station specified in the Monitoring and Reporting Program, Attachment E, of this Order.

Table 2B. Industrial Discharger Location Information

Discharger	Discharge Point	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
Industrial Wastewater Discharger (Non-Petroleum Refinery):				
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	002	38º 03' 30" N	122º 13' 28" W	Carquinez Strait
Crockett Cogeneration, LP, and Pacific Crockett Energy, Inc.	E-001	38º 3' 22" N	122º 13' 5" W	Carquinez Strait
Pacific Gas and Electric Company	E-001	38º 2' 34" N	121º 57' 14" W	Suisun Bay
Rhodia, Inc.	E-001	38º 2' 18" N	122º 7' 1" W	Suisun Bay
GenOn Delta, LLC	E-001[(a)]	38º 2' 29" N	121º 53' 25" W	Suisun Bay
USS-Posco Industries	E-001	38º 1' 48" N	121º 51' 32" W	Suisun Bay
	E-002	38º 1' 51" N	121º 51' 58" W	Suisun Bay
Industrial Wastewater Discharger (Petroleum Refinery):				
Chevron Products Company	E-001	37º 58' 15" N	122º 25' 45" W	San Pablo Bay
Phillips 66 (formerly ConocoPhillips)	E-002	38º 3' 22" N	122º 15' 36" W	San Pablo Bay
Shell Oil Products US and Equilon Enterprises LLC	E-001	38º 1' 56" N	122º 7' 44" W	Carquinez Strait
Tesoro Refining & Marketing Co.	E-001	38º 2' 54" N	122º 5' 22" W	Suisun Bay
Valero Refining Company	E-001	38º 3' 18" N	122º 7' 7" W	Suisun Bay

[(a)] This Order applies to the mercury discharges from internal waste streams discharged through these discharge points, and not to the once through cooling water discharges of these discharge points.

Contents

I. Facility Information 2
II. Findings 7
III. Effluent Limitations and Discharge Specifications 8
A. Municipal Discharger Effluent Limits 8
B. Industrial Discharger Effluent Limits 12
IV. Receiving Water Limitations. 14
V. Provisions 14
A. Federal and Regional Standard Provisions 14
B. Monitoring and Reporting Program Requirements. 15
C. Special Provisions 15
1. Triggers for Additional Mercury Control 15
2. Mercury and PCBs Source Control Program 16
3. Risk Reduction Programs 17
4. Mercury and PCBs Discharge Adjustment for Recycled Wastewater Use by Industrial Dischargers 17
5. PCBs Discharge Adjustment for Urban Stormwater Treatment by Municipal Dischargers 19
6. Reopener Provision 20
VI. Compliance Determination 20

Tables

Table 1. Discharger Information i
Table 2. Discharge Locations i
Table 3. Administrative Information i
Table 4. Facility Information 2
Table 5. Municipal -- Individual Mercury and PCBs Effluent Limitations 8
Table 6. Industrial – Individual Mercury and PCBs Effluent Limitations 12
Table 7. Mercury Triggers for Municipal Dischargers 15
Table 8. Mercury Triggers for Industrial Dischargers 15
Table 9. Action Plan for Mercury Trigger Exceedance 16

Attachments

Attachment A – Definitions A-1
Attachment B – Existing Order Nos. And NPDES Permit Nos. B-1
Attachment C – Map Of Municipal And Industrial Dischargers C-1
Attachment D – Not included .....
Attachment E – Monitoring and Reporting Program (MRP) E-1
Attachment F – Fact Sheet F-1
Attachment G – Not included .....

I. FACILITY INFORMATION

The following Dischargers are subject to waste discharge requirements as set forth in this Order:

Table 4. Facility Information

Discharger	See Tables 1A and 1B above.
Name of Facility	
Facility Address	
Facility Contact, Title, and Phone	See Tables 4A and 4B below.
Mailing Address	
Type of Facility	
Facility Design Flow	

Table 4A. Additional Information on Municipal Facility (see also Table 1A)

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (mgd)
American Canyon, City of	Peter Lee Wastewater Systems Manager (707) 647-4525	Same as Facility Address	Advanced Secondary	2.5
Benicia, City of	Gerald Gall Superintendent (707)746-4294	Same as Facility Address	Secondary	4.5
Burlingame, City of	William Toci Plant Manager (650)342-3727	501 Primrose Burlingame, CA 94010	Secondary	5.5
Calistoga, City of	Warren Schenstrom Water Systems Super't (707) 942-2847	414 Washington Street Calistoga, CA 94515	Secondary	0.84
Central Contra Costa Sanitary District	Doug Craig Director of Plant Operations (925) 228-9500	Same as Facility Address	Secondary	53.8
Central Marin Sanitation Agency	Robert Cole Environmental Services Manager (415) 459-1455	Same as Facility Address	Secondary	10
Crockett Community Services District, Port Costa Sanitary Dept.	Michael Kirker Port Costa Dept. Manager (510) 787-2992	Crockett Community Services District, Port Costa Sanitary Department P.O. Box 578 Crockett, CA 94525	Secondary	0.033
Delta Diablo Sanitation District	Gary W. Darling General Manager (925) 756-1920	Same as Facility Address	Secondary	16.5
East Bay Dischargers Authority: EBDA Common Outfall	Michael S. Connor General Manager	2651 Grant Avenue San Lorenzo, CA	Secondary	107.8

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (mgd)
Hayward Water Pollution Control Facility	(510) 278-5910	94580		
San Leandro Water Pollution Control Plant				
Oro Loma/Castro Valley Sanitary Districts Water Pollution Control Plant				
Raymond A. Boege Alvarado Wastewater Treatment Plant				
Livermore-Amador Valley Water Management Agency (LAVWMA) Export and Storage Facilities				
Dublin San Ramon Services District Wastewater Treatment Plant				
City of Livermore Water Reclamation Plant				
East Bay Municipal Utility District Main Wastewater Treatment Plant	Kurt H. Haunschild Manager of Wastewater Treatment (510) 287-1407	P.O. Box 24055 Oakland, CA 94623-1055	Secondary	120
Fairfield-Suisun Sewer District	Kathy Hopkins General Manager (707) 429-8930	Same as Facility Address	Advanced Secondary	17.5
Las Gallinas Valley Sanitary District	Mark Williams District Manager (415) 472-1734	300 Smith Ranch Rd San Rafael, CA 94903-1929	Secondary	2.92
Marin County (Paradise Cove), Sanitary District No. 5 of	Tony Rubio Chief Plant Operator (415) 435-1501	P.O. Box 227 Tiburon, CA 94920	Secondary	0.08
Marin County (Tiburon), Sanitary District No. 5 of	Tony Rubio Chief Plant Operator (415) 435-1501	2001 Paradise Drive Tiburon, CA 94920	Secondary	0.98
Millbrae, City of	Joseph Magner Superintendent (650) 259-2388	621 Magnolia Avenue Millbrae, CA 94030	Secondary	3
Mt. View Sanitary District	Michael D. Roe District Manager (925) 228-5635 ext. 32	P. O. Box 2757 Martinez, CA 94553	Advanced Secondary	3.2
Napa Sanitation District	Tim Healy General Manager (707) 258-6000	P.O. Box 2480 Napa, CA 94558	Secondary	15.4
Novato Sanitary District	Beverly James Manager-Engineer (415) 892-1694 x111	500 Davidson Street Novato, CA 94945	Secondary	5.4
Palo Alto, City of	James Allen Environmental Compliance Manager (650) 329-2243	2501 Embarcadero Way, Palo Alto, CA 94303	Advanced Secondary	39

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (mgd)
Petaluma, City of	Matthew Pierce Operations Supervisor (707) 776-3777	202 N. McDowell Blvd. Petaluma, CA 94954	Secondary	5.2
Pinole, City of	Ron Tobey Plant Manager (510) 724-8963	2131 Pear Street, Pinole, CA 94564	Secondary	4.06
Rodeo Sanitary District	Steven S. Beall Engineer-Manager 510-799-2970	Same as Facility Address	Secondary	1.14
Saint Helena, City of	John Ferons Director of Public Works (707) 968-2741 johnf@ci.st-helena.ca.us	1480 Main Street St. Helena, CA 94574	Secondary	0.05
San Francisco, City and County of (Airport Commission)	Mark Costanzo Utilities Manager (650)821-7809	P.O. Box 8097 San Francisco, CA 94128	Secondary	2.2
San Francisco (Southeast Plant), City and County of	Tommy Moala Assistant General Manager of Wastewater (415) 554-2465	1155 Market St., 11th Floor San Francisco, CA 94103	Secondary	150
San Jose/Santa Clara, Cities of	James Ervin Acting Environmental Compliance Officer (408) 945-5124	700 Los Esteros Road San Jose, CA 95134	Advanced Secondary	167
San Mateo, City of	Mark Von Aspern Plant Manager (650) 522-7385	330 West 20th Avenue San Mateo, CA 94403	Secondary	15.7
Sausalito-Marin City Sanitary District	Robert Simmons General Manager (415) 332-0244	P.O. Box 39 Sausalito, CA 94966-0039	Secondary	1.8
Sewerage Agency of Southern Marin	Jeff Carson Interim Manager (415) 388-2402	26 Corte Madera Ave. Mill Valley, CA 94941	Secondary	3.6
Sonoma Valley County Sanitary District	Pam Jeane Deputy Chief Engineer (707)521-1864	Sonoma County Water Agency 404 Aviation Blvd. Santa Rosa, CA 95403	Secondary	3
South Bayside System Authority	Daniel Child Manager (650) 591-7121	Same as Facility Address	Secondary	29
South San Francisco and San Bruno, Cities of	Brian Schumacker Plant Superintendent (650) 877-8555	South San Francisco-San Bruno Water Pollution Control Plant 195 Belle Air Road South San Francisco, CA 94080	Secondary	13

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (mgd)
Sunnyvale, City of	Melody Tovar Division Manager (408) 730-7808	Sunnyvale Water Pollution Control Plant P.O. Box 3707 Sunnyvale, CA 94088-3707	Advanced Secondary	29.5
US Department of Navy, Treasure Island	Patricia A. McFadden BRAC Field Team Leader San Francisco Bay Area (415) 743-4720	Navy BRAC PMOW 410 Palm Avenue, Bldg 1, Suite 161 Treasure Island, San Francisco, CA 94130-1807	Secondary	2
Vallejo Sanitation and Flood Control District	Ron Matheson District Manager (707) 644-8949 X211	Same as Facility Address	Secondary	15.5
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	E.J. Shalaby, District Manager 510-222-6700	2910 Hilltop Drive Richmond, CA 94806	Secondary	28.5
Yountville, Town of	Donald Moore Wastewater System Supervisor (707) 944-2988	6550 Yount Street Yountville, CA 94599	Secondary	0.55

Table 4B. Additional Information on Industrial Facility (see also Table 1B)

Discharger	Facility Contact, Title, and Phone	Mailing Address	Type of Facility	Facility Design Flow (mgd)
Industrial Wastewater Discharger (Non-Petroleum Refinery):				
C&H Sugar and Crockett Community Services District, Crockett Sanitary Dept. (CSD)	Tanya Akkerman Environmental Compliance Manager C&H Sugar Company (510) 787-4352 Dale McDonald General Manager (510) 787-2992	Same as Facility Address for C&H Crockett Sanitary Department P.O. Box 578 Crockett, CA 94525 for CSD	Sugar Cane Crystalline Industry	0.93
Crockett Cogeneration, LP, and Pacific Crockett Energy, Inc.	Christopher Sargent Environmental Coordinator (510) 787-4105	Same as Facility Address	Industrial – Electrical Generation, SIC Code 4931	0.243 (Daily Discharge Rate From 2000 to 2002)
Pacific Gas and Electric Company	Robert M. Gray Consulting Environmental Scientist (925) 866-5508	3400 Crow Canyon Road, M-138 San Ramon, CA 94583	Flow-through pond for habitat enhancement	1 (Maximum Average Dry Weather Flow)
Rhodia, Inc.	Anthony Koo Environmental Coordinator (925) 313-8221	Same as Facility Address	Industrial – Chemical and Allied Products, SIC Code 2891	0.779 (Potential Maximum Daily Rate)
GenOn Delta, LLC	Monte Ash, Vice President California Operations (925) 427-3575	Pittsburg Power Plant P.O. Box 192 Pittsburg, CA 94565	Electric Power generation	506
USS-Posco Industries	David Allen Env. Group Manager (925) 439-6290	P.O. Box 471 MS67 Pittsburg, CA 94565	Industrial - SIC Code 3312	28
Industrial Wastewater Discharger (Petroleum Refinery):				
Chevron Products Company	Pascha McAlister (510) 242-6912	Same as Facility Address	Industrial - Petroleum Refining	7.6
Phillips 66 (formerly ConocoPhillips)	Dennis Quilici Water Compliance Specialist (510) 245-4403	Same as Facility Address	Industrial – Petroleum Refining	10
Shell Oil Products US and Equilon Enterprises LLC	Michael Armour Senior Engineer (925) 313-3886	Same as Facility Address	Industrial – Petroleum Refining	10
Tesoro Refining & Marketing Co.	Peter Carroll Environmental Engineer (925) 335-3497	Same as Facility Address	Industrial - Petroleum Refining	5.1
Valero Refining Company	Sky Bellenca Senior Engineer (707) 745-7749	Same as Facility Address	Industrial - Petroleum Refining	2.34

II. FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Regional Water Board), finds:

A. Legal Authorities. This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and chapter 5.5, division 7 of the California Water Code (commencing with section 13370). It shall serve as an NPDES permit for point source discharges of mercury and PCBs from Dischargers' facilities to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to article 4, chapter 4, division 7 of the Water Code (commencing with section 13260).

B. Background and Rationale for Requirements. The Regional Water Board developed the requirements in this Order based on detailed technical analyses which provide the foundation for the mercury and PCBs TMDL. The Fact Sheet (Attachment F), which contains background information and rationale for the requirements of this Order, is hereby incorporated into and constitutes part of the Findings for this Order. Attachments A through E are also incorporated into this Order.

C. Notification of Interested Parties. The Regional Water Board has notified the Dischargers and interested agencies and persons of its intent to prescribe WDRs for the discharges and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet of this Order.

D. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharges. Details of the Public Hearing are provided in the Fact Sheet of this Order.

IT IS HEREBY ORDERED, that this Order supersedes Order No. R2-2007-0077, as amended by Order No. R2-2011-0012, 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 federal Clean Water Act (CWA) and regulations and guidelines adopted thereunder, the Dischargers shall comply with the requirements in this Order.

III. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Municipal Discharger Effluent Limits for Mercury and PCBs

The mass and concentration of mercury and PCBs in the effluent at the Discharge Points indicated in Table 4A for each Discharger shall not exceed the limitations in Tables 5A and 5B. Monitoring locations are described in Attachment E of this Order.

Table 5A. Municipal -- Individual Mercury Effluent Limitations

Discharger	Average Annual Effluent Limit for Mercury[(1)] (kg/yr)	Average Monthly Effluent Limit for Mercury (µg/L)	Average Weekly Effluent Limit for Mercury (µg/L)
American Canyon, City of	0.095	0.025	0.027
Benicia, City of	0.088	0.066	0.072
Burlingame, City of	0.089	0.066	0.072
Calistoga, City of	0.016	0.066	0.072
Central Contra Costa Sanitary District	1.3	0.066	0.072
Central Marin Sanitation Agency	0.11	0.066	0.072
Crockett Community Services District, Port Costa Sanitary Dept.	0.00072	0.066	0.072
Delta Diablo Sanitation District	0.19	0.066	0.072
East Bay Dischargers Authority, including City of Hayward, City of San Leandro, Oro Loma Sanitary District, Castro Valley Sanitary District, Union Sanitary District, Livermore-Amador Valley Water Management Agency, Dublin San Ramon Services District, and City of Livermore	2.2	0.066	0.072
East Bay Municipal Utility District	1.5	0.066	0.072
Fairfield-Suisun Sewer District	0.17	0.025	0.027
Las Gallinas Valley Sanitary District	0.10	0.066	0.072

Discharger	Average Annual Effluent Limit for Mercury[1] (kg/yr)	Average Monthly Effluent Limit for Mercury (µg/L)	Average Weekly Effluent Limit for Mercury (µg/L)
Marin County (Paradise Cove), Sanitary District No. 5 of	0.00055	0.066	0.072
Marin County (Tiburon), Sanitary District No. 5 of	0.0099	0.066	0.072
Millbrae, City of	0.052	0.066	0.072
Mt. View Sanitary District	0.034	0.025	0.027
Napa Sanitation District	0.17	0.066	0.072
Novato Sanitary District	0.079	0.066	0.072
Palo Alto, City of	0.31	0.025	0.027
Petaluma, City of	0.063	0.066	0.072
Pinole, City of	0.055	0.066	0.072
Rodeo Sanitary District	0.060	0.066	0.072
Saint Helena, City of	0.047	0.066	0.072
San Francisco , City and County of, San Francisco International Airport	0.032	0.066	0.072
San Francisco (Southeast Plant), City and County of	1.6	0.066	0.072
San Jose/Santa Clara, Cities of	0.8	0.025	0.027
San Mateo, City of	0.19	0.066	0.072
Sausalito-Marin City Sanitary District	0.078	0.066	0.072
Sewerage Agency of Southern Marin	0.076	0.066	0.072
Sonoma Valley County Sanitary District	0.041	0.066	0.072
South Bayside System Authority	0.32	0.066	0.072
South San Francisco and San Bruno, Cities of	0.18	0.066	0.072
Sunnyvale, City of	0.12	0.025	0.027
US Department of Navy[2] (Treasure Island)	0.026	0.066	0.072
Vallejo Sanitation and Flood Control District	0.34	0.066	0.072
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	0.23	0.066	0.072
Yountville, Town of	0.040	0.066	0.072
Aggregate Mass Emission Limit[1,3] (kg/yr)	**11**	**Not applicable**	**Not applicable**

Footnotes:

(1) Compliance with the Average Annual Effluent Limitations is determined annually for each Municipal Discharger each calendar year and is attained if the sum of all individual Municipal Dischargers' mercury mass emissions, calculated as described below, is not greater than the Aggregate Mass Emission Limit of 11 kg/yr. If the sum of all individual Municipal Dischargers' mercury mass emission(s) is greater than 11 kg/yr, the Municipal Discharger(s) whose mercury mass emission(s) exceed(s) its (their) individual limitation(s) in Table 5A shall be deemed to be in violation of its (their) mercury mass limitation(s). For compliance determination, mass emissions shall be determined as defined below:

a. The total annual aggregate mass emission shall be the sum of the individual annual mass emissions from each Municipal Discharger. The sum shall be rounded to the nearest kilogram for comparison with the 11 kg/yr.

b. The annual average mass emission for each Discharger shall be computed for the period January 1 through December 31, annually.

c. The annual average mass emission for each Discharger listed in Table 5A above shall be the sum of monthly emissions on a calendar year basis and computed as follows:

$$Annual\ Mass\ Emission, kg/year = \sum \left(Monthly\ Mass\ Emission\ Rates, kg/month \right)$$

or, for Dischargers with less frequent mercury monitoring than monthly, the Annual Mass Emission shall be computed using the arithmetic average of available monthly mass emissions as follows:

$$Annual\ Mass\ Emission, kg/year = \left(\frac{\sum MonthlyMassEmission, kg/mo}{NumberofMonthlyMassEmissionsCalculated} \right) * 12 mo/year$$

where

$$Monthly\ Mass\ Emission, kg/mo = \left(\frac{0.003785}{N} \right) * \left(\sum_{i=1}^{N} Q_i C_i \right) * 30.5 = \frac{0.1154425}{N} * \left(\sum_{i=1}^{N} Q_i C_i \right)$$

and where

C_i = mercury concentration of each individual sample, µg/l
Q_i = Discharger flow rate on date of sample, millions of gallons per day (mgd)
N = number of samples collected during the month
0.003785 = conversion factor to convert (µg/l)*(mgd) into kg/day
30.5 = number of days in a standard month
0.1154425= product of (conversion factor)·(number of standard days per month)

and where Q_i for intermittent Dischargers [Dischargers who do not discharge every day in a calendar month, or have no discharge for an entire month ($Q_i = 0$)] shall be computed as follows:

$$Q_i = \left(\frac{\sum_{d=1}^{D} Q_d}{30.5} \right)$$

where

Q_d = is the total flow for the day when discharge occurred, million gallons

D = total number of days where discharge occurred in a month
30.5 = number of days in a standard month

d. The Monthly Mass Emission for a Discharger who provides recycled wastewater for industrial supply shall include the effluent discharge adjustment granted to the Industrial Discharger for its recycled wastewater use as described in III.B and Provision V.C.4 of this Order. The monthly effluent discharge adjustment mass shall be reported in each Self-Monitoring Report and noted in the Annual Report.

(2) This Discharger serves domestic customers but is not a municipal government agency. For the purpose of this Order, this Discharger is a "Municipal Discharger."

(3) Total differs slightly from the column sum due to rounding to the nearest kilogram.

Table 5B. Municipal -- Individual PCBs Effluent Limitations

Discharger	Average Monthly Effluent Limit for PCBs (µg/L)	Maximum Daily Effluent Limit for PCBs (µg/L)
American Canyon, City of	0.00039	0.00049
Benicia, City of	0.012	0.017
Burlingame, City of	0.012	0.017
Calistoga, City of	0.012	0.017
Central Contra Costa Sanitary District	0.012	0.017
Central Marin Sanitation Agency	0.012	0.017
Crockett Community Services District, Port Costa Sanitary Dept.	0.012	0.017
Delta Diablo Sanitation District	0.012	0.017
East Bay Dischargers Authority, including City of Hayward, City of San Leandro, Oro Loma Sanitary District, Castro Valley Sanitary District, Union Sanitary District, Livermore-Amador Valley Water Management Agency, Dublin San Ramon Services District, and City of Livermore	0.012	0.017
East Bay Municipal Utility District,	0.012	0.017
Fairfield-Suisun Sewer District	0.00039	0.00049
Las Gallinas Valley Sanitary District	0.012	0.017
Marin County (Paradise Cove), Sanitary District No. 5	0.012	0.017
Marin County (Tiburon), Sanitary District No. 5	0.012	0.017
Millbrae, City of	0.012	0.017
Mt. View Sanitary District	0.00039	0.00049
Napa Sanitation District	0.012	0.017
Novato Sanitary District	0.012	0.017
Palo Alto, City of	0.00039	0.00049
Petaluma, City of	0.012	0.017
Pinole, City of	0.012	0.017
Rodeo Sanitary District	0.012	0.017
Saint Helena, City of	0.012	0.017
San Francisco, City and County of, San Francisco International Airport, Sanitary	0.012	0.017

Discharger	Average Monthly Effluent Limit for PCBs (µg/L)	Maximum Daily Effluent Limit for PCBs (µg/L)
San Francisco (Southeast Plant), City and County of	0.012	0.017
San Jose/Santa Clara, Cities of	0.00039	0.00049
San Mateo, City of	0.012	0.017
Sausalito-Marin City Sanitary District	0.012	0.017
Sewerage Agency of Southern Marin	0.012	0.017
Sonoma Valley County Sanitary District	0.012	0.017
South Bayside System Authority	0.012	0.017
South San Francisco and San Bruno, Cities of	0.012	0.017
Sunnyvale, City of	0.00039	0.00049
US Department of Navy (Treasure Island)	0.012	0.017
Vallejo Sanitation and Flood Control District	0.012	0.017
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	0.012	0.017
Yountville, Town of	0.012	0.017

B. Industrial Discharger Effluent Limits

The mass and concentration of mercury and PCBs in the effluent at the Discharge Points indicated in Table 4B for each Discharger shall not exceed the limitations in Tables 6A and 6B. Monitoring locations are described in Attachment E of this Order.

Table 6A. Industrial -- Individual Mercury Effluent Limitations

Permitted Entity	Average Annual Effluent Limit for Mercury[(1)] (kg/yr)	Average Monthly Effluent Limit for Mercury (µg/L)	Maximum Daily Effluent Limit for Mercury (µg/L)
Industrial Wastewater Discharger (Non-Petroleum Refinery):			
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	0.045	0.079	0.12
Crockett Cogeneration, LP, and Pacific Crockett Energy, Inc.	0.0047	0.079	0.12
Pacific Gas and Electric Company	0.00063	0.079	0.12
Rhodia, Inc.	0.011	0.079	0.12
GenOn Delta LLC	0.0078	0.079	0.12
USS-Posco Industries	0.045	0.079	0.12
Industrial Wastewater Discharger (Petroleum Refinery):			
Chevron Products Company	0.34	0.079	0.12
Phillips 66 (formerly ConocoPhillips)	0.13	0.079	0.12
Shell Oil Products US and Equilon Enterprises LLC	0.22	0.079	0.12
Tesoro Refining & Marketing Co.	0.11	0.079	0.12

Permitted Entity	Average Annual Effluent Limit for Mercury[(1)] (kg/yr)	Average Monthly Effluent Limit for Mercury (µg/L)	Maximum Daily Effluent Limit for Mercury (µg/L)
Valero Refining Company	0.08	0.079	0.12
Aggregate Mass Emission Limit[(2)] (kg/yr)	**1.0**	**Not applicable**	**Not applicable**

Footnotes:

(1) Compliance with the Average Annual Effluent Limitations is determined annually for each Industrial Discharger each calendar year and is attained if the sum of the individual Industrial Dischargers' mercury mass emissions, calculated as described below, is not greater than the Aggregate Mass Emission Limit of 1.0 kg/yr. If the sum of all individual Industrial Dischargers' mercury mass emission(s) is greater than 1.0 kg/yr, the Industrial Discharger(s) whose mercury mass emission(s) exceed(s) its (their) individual limitation, above, shall be deemed to be in violation of its (their) mercury mass limitation(s). For compliance determination, mass emissions shall be determined as defined below:

a. The total annual aggregate mass emission shall be the sum of the individual annual mass emissions from each Industrial Discharger. The sum shall be rounded to the nearest tenth of a kilogram for comparison with the 1.0 kg/yr.

b. The annual average mass emission for each Industrial Discharger shall be computed for the period January 1 through December 31, annually.

c. The annual average mass emission for each Discharger listed in Table 6A above shall be the sum of monthly emissions on a calendar year basis and computed as follows:

$$Annual\ Mass\ Emission, kg/year = \sum \left(Monthly\ Mass\ Emission\ Rates, kg/month \right)$$

Or, for Dischargers with less than monthly mercury monitoring, the Annual Mass Emission shall be computed using the arithmetic average of available monthly mass emissions as follows:

$$Annual\ \ Mass\ \ Emission\ , kg/year = \left(\frac{\sum MonthlyMas\ \ sEmission\ , kg/mo}{NumberofMo\ \ nthlyMassE\ \ missionsCa\ \ lculated} \right) * 12\, mo/year$$

where

$$Monthly\ Mass\ Emission, kg/mo = \left(\frac{0.003785}{N} \right) * \left(\sum_{i=1}^{N} Q_i C_i \right) * 30.5 = \frac{0.1154425}{N} * \left(\sum_{i=1}^{N} Q_i C_i \right)$$

and where

C_i = mercury concentration of each individual sample, µg/l
Q_i = Discharger flow rate on date of sample, millions of gallons per day (mgd)
N = number of samples collected during the month
0.003785 = conversion factor to convert (µg/l)*(mgd) into kg/day
30.5 = number of days in a standard month
0.1154425= product of (conversion factor)·(number of standard days per month)

and where Q_i for intermittent Dischargers [Dischargers who do not discharge every day in a calendar month, or have no discharge for an entire month (Q_i = 0)] shall be computed as follows:

$$Q_i = \left(\frac{\sum_{d=1}^{D} Q_d}{30.5} \right)$$

where

Q_d = is the total flow for the day when discharge occurred, million gallons
D = total number of days where discharge occurred in a month
30.5 = number of days in a standard month

d. For an Industrial Discharger who uses treated recycled wastewater for industrial supply from a Municipal Discharger named in this Order, the Industrial Discharger shall subtract from its Monthly Mass Emission in c., above, an adjustment for the recycled water used and discharged through its discharge point as provided in Provision V.C.4 of this Order. The Industrial Discharger shall report this effluent discharge adjustment mass to the Municipal Discharger that provided the recycled wastewater within 15 days following the end of the calendar month for which an adjustment is applied and shall report the adjustment in each Self-Monitoring Report and in its Annual Report.

(2) Total differs slightly from the column sum due to rounding to two significant digits.

Table 6B. Industrial -- Individual PCBs Effluent Limitations

Discharger	Average Monthly Effluent Limit for PCBs (µg/L)	Maximum Daily Effluent Limit for PCBs (µg/L)
Industrial Wastewater Discharger (Petroleum Refinery):		
Chevron Products Company	0.00095	0.0015
Phillips 66 (formerly ConocoPhillips)	0.00095	0.0015
Shell Oil Products US	0.00095	0.0015
Tesoro Refining & Marketing Co.	0.00095	0.0015
Valero Refining Company	0.00095	0.0015
Industrial Wastewater Discharger (Non-Petroleum Refinery):		
C&H Sugar and Crockett Community Services District, Crockett Sanitary Dept.	0.012	0.018
Pacific Gas and Electric Company	0.012	0.018
Rhodia, Inc.	0.012	0.018
USS-Posco Industries	0.012	0.018

IV. RECEIVING WATER LIMITATIONS

IV. RECEIVING WATER LIMITATIONS – Receiving water limitations are specified in each Discharger's individual NPDES Permits (see Attachment B).

V. PROVISIONS

A. Federal and Regional Standard Provisions

Dischargers shall comply with the Federal and Regional Standard Provisions included in Attachments D and G, as amended, of their individual permits.

B. Monitoring and Reporting Program Requirements

Dischargers shall comply with the Monitoring and Reporting Program (MRP), and future revisions thereto, in Attachment E of this Order.

C. Special Provisions

1. Triggers for Additional Mercury Control

a. Each individual Discharger shall comply with the tasks specified in C.1.c. of this Order if its discharge exceeds any of the applicable mercury triggers described in Tables 7 and 8.

Table 7. Mercury Triggers for Municipal Dischargers

Type of Trigger	Average Monthly	Maximum Daily
Concentration of Mercury in Discharge for Secondary Treatment Plants	0.041 μg/L	0.065 μg/L
Concentration of Mercury in Discharge for Advanced Secondary Treatment Plants	0.011 μg/L	0.021 μg/L
Mass Emission of Mercury in Discharge	Individual annual mass emission limit, as depicted in Table 5A, above, and computed as a 12-month running average, as shown in C.1.b., below.	

Table 8. Mercury Triggers for Industrial Dischargers

Type of Trigger	Average Monthly	Maximum Daily
Concentration of Mercury in Discharge	0.037 μg/L	0.062 μg/L
Mass Emission of Mercury in Discharge	Individual annual mass emission limit, as depicted in Table 6A, above, and computed as a 12-month running average, as shown in C.1.b., below.	

b. The running 12-month average mercury mass emission shall be computed monthly for each calendar month as follows:

$$(12-month\ Running\ Average, kg) = (Current\ Mass\ Emission, kg) + \sum (Previous\ 11\ months'\ mass\ emissions, kg)$$

where the current mass emission is the emission for the current calendar month computed as shown in III.A. above.

c. Each Discharger who exceeds any of the applicable triggers for mercury listed in Table 7 or 8, above, shall comply with the following action requirements:

Table 9. Action Plan Required in Response to Mercury Trigger Exceedance

Task	Deadline
i. *Accelerated Sampling.* As soon as the Discharger becomes aware of an exceedance of a mercury trigger, resample within 48 hours and commence weekly sampling (or more frequent than weekly) for a total of at least 6 new samples. If all 6 new samples show mercury levels below the triggers, return to routine sampling. If during the accelerated sampling, (1) any of the new samples are above the maximum daily trigger, or (2) the monthly average of the new samples is above the monthly trigger, or (3) the 12-month running average mass is above the mass trigger, then proceed with action plan for mercury reduction and continue sampling monthly until the observed mercury discharge is below the trigger levels for 3 consecutive months, at which point the Discharger shall complete the reporting of this exceedance as required by Tasks ii and iv, and return to routine monitoring, and discontinue efforts under Task iii, below.	See deadlines in task description.
ii. *Report Trigger Exceedance.* The Discharger shall report to the Regional Water Board any exceedance of mercury trigger levels in the cover letter of its Self-Monitoring Report and the status of its plans and actions to accelerate monitoring and/or develop and implement an action plan for mercury reduction.	In the Self-Monitoring Report due 30 days after the end of the monitoring period.
iii. *Action Plan for Mercury Reduction*. Develop, submit, and implement an Action Plan that (1) evaluates the cause[1] of the trigger exceedance(s); (2) evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances; (3) evaluates the feasibility and effectiveness of technology enhancements to improve treatment plant performance; and (4) evaluates other measures for preventing future exceedances. In addition, the Discharger shall identify in the Action Plan mercury reduction measures it will take along with an implementation schedule for those measures to correct current and prevent future trigger exceedances. [1] *Possible causes of exceedances include (but are not limited to) changes in reclamation; increases in the number of sewer connections, increases in infiltration and inflow (I/I); changes in the type or number of industrial, commercial, or residential sources; changes in the raw material used in manufacturing processes; changes in treatment system operation; or factors beyond the Discharger's control, such as a natural disaster, vandalism, illegal dumping, or extreme flood event.*	Within 130 days of the initial trigger exceedance.
iv. *Annual Reporting*. The Discharger shall provide a status of its mercury reduction efforts in the annual Self-Monitoring Report. Additionally, as causes and corrective actions are identified, the Discharger shall amend or supplement its Action Plan as appropriate. Such changes shall be reported to the Regional Water Board in the Discharger's Annual Self-Monitoring Report.	Annually due February 1 of each year until the Discharger demonstrates compliance with trigger levels for a continuous 3-month period of sampling.

2. Mercury and PCBs Source Control Program

Each Discharger shall evaluate whether there are controllable sources of mercury or PCBs to its wastewater system. For PCBs, controllable sources can be industrial equipment containing PCBs. For mercury, controllable sources can be the cumulative process discharges from amalgam-generating dental practices in a municipal wastewater service area. The Discharger shall continue to implement and look for opportunities to improve existing measures to control such sources. Each Discharger

shall submit the results of this evaluation, including any proposed control actions and implementation schedules, in its annual pollution prevention reports required by its individual NPDES permit.

3. Risk Reduction Programs

Dischargers shall continue to implement and participate in programs to reduce mercury and PCB-related risks to humans from consumption of San Francisco Bay/Delta fish. This requirement may be satisfied by a combination of related efforts through the Regional Monitoring Program or other similar collaborative efforts. Dischargers shall describe the progress of their efforts in the Annual Self-Monitoring Report. Alternatively, the Bay Area Clean Water Agencies (BACWA) may fulfill the annual reporting requirement by providing a summary of annual risk reduction program efforts for agencies that choose to participate through BACWA.

4. Mercury and PCBs Discharge Adjustments for Recycled Wastewater Use by Industrial Dischargers

When an Industrial Discharger named on Table 1B of this Order uses recycled wastewater from a Municipal Discharger named on Table 1A of this Order, the Industrial Discharger may, at its option, apply adjustments (hereinafter mercury or PCBs Adjustment) to its mercury mass emission or mercury or PCBs discharge concentration when determining compliance with its concentration and mass limits specified in section III of this Order. The mercury or PCBs Adjustments shall be based on measured influent mercury and PCBs levels from the recycled wastewater in accordance with the following:

a. The Industrial Discharger shall sample and analyze the influent recycled wastewater and the effluent discharge at least monthly for mercury and quarterly for PCBs. Influent sampling shall include measurement of daily flow volume for the entire duration that mercury or PCBs Adjustments are applied. Influent sampling shall occur at an appropriate influent sampling station as identified in the Discharger's individual permit.

b. The Industrial Discharger shall determine the time interval between introduction of a given constituent of concern in the influent recycled water and the first appearance of the constituent in the final effluent. The basis for this determination must be included in any calculation of mercury or PCBs Adjustments.

c. Calculation of Mercury or PCBs Discharge Adjustment.

   <u>Concentration Adjustment</u>
   Influent concentration multiplied by total influent recycled water flow volume for that monitoring interval will yield an influent mass, which is valid for that monitoring interval. This influent mass is then divided by the total effluent flow volume for the time interval following the appropriate time lag, described in 4.b. above, for that monitoring period to give a Concentration Adjustment that will

apply for the monitoring interval. The monitoring interval is the time between sampling days. For example, monthly sampling yields a one month monitoring interval. An example follows:

ex.: Mercury is monitored monthly. The lag time is Y days.

Step 1: {(Influent concentration of mercury in Recycled Wastewater) – (Influent concentration of mercury in potable water)} x (Total Influent Volume of Recycled Wastewater for the month) = (Influent mass of mercury from Recycled Wastewater)

Step 2: (Influent mass) ÷ (Total effluent discharge volume for the 30-day period, Y days after influent sampled) = (Concentration Adjustment to be subtracted from concentration of mercury in the discharge, valid for that month)

Mass Adjustment

Influent concentration multiplied by total influent recycled water flow volume for that monitoring interval will yield an influent mass, which is valid for that monitoring interval. This influent mass is divided by the number of days in that monitoring period to give a Mass Adjustment that will apply for the monitoring interval. The monitoring interval is the time between sampling days. For example, monthly sampling yields a one month monitoring interval. A schematic example follows:

ex.: Constituent B is monitored monthly. The lag time is Y days.

Step 1: {(Influent concentration of mercury in Recycled Wastewater) – (Influent concentration of mercury in potable water)} x (Total Influent Volume of Recycled Wastewater for the month) = (Influent mass of mercury in Recycled Wastewater)

Step 2: (Influent mass) ÷ (30.5, the number of days in a standard month) = (Mass Adjustment to be subtracted from monthly mass emission for that month)

d. If an Industrial Discharger opts to apply a Mass Adjustment, the Regional Water Board shall transfer that Adjustment to the mass emission for the corresponding discharge interval from the Municipal Discharger who is the producer and source of the recycled wastewater. If this reverse Adjustment results in an adjusted mass discharge level above both of the following criteria, then that Municipal Discharger is in violation of its Annual Average Effluent Limit and is subject to enforcement action by the Regional Water Board:

   i. The sum of the adjusted mass discharge levels from the Industrial Discharger and the Municipal Discharger exceeds the sum of the individual Average Annual Effluent Limits for these two Dischargers; and

ii. The adjusted mass discharge levels from the Municipal Discharger results in an aggregate mass emission from all Municipal Dischargers that exceeds the Aggregate Mass Emission Limit for Municipal Dischargers.

5. **PCBs Discharge Adjustment for Urban Stormwater Treatment by Municipal Dischargers**

When a Municipal Discharger accepts and treats in all or parts of its municipal wastewater treatment facility urban runoff that is diverted from municipal separate storm sewer systems, the Municipal Discharger may, at its option, apply an adjustment (hereinafter Runoff Adjustment) to its PCBs discharge concentration when determining compliance with its concentration limits specified in Table 5B provided the total mass used in Runoff Adjustments from all Municipal Dischargers does not exceed one kg/year. The Runoff Adjustment shall be based on measured influent PCBs levels from urban runoff in accordance with the following:

i. The Municipal Discharger shall have data from representative sample or samples of the urban runoff targeted for diversion. Separate sampling will be necessary to characterize dry weather diversions and wet weather diversions. The Discharger shall measure daily flow volumes for the entire duration that the Runoff Adjustment is to be applied. The Discharger shall measure these flows at an appropriate influent sampling station as identified in the Discharger's individual permit and shall categorize each diversion as a dry weather diversion or a wet weather diversion.

ii. Calculation of Runoff Adjustment

Influent concentration multiplied by total influent urban flow volume for that monitoring interval will yield an influent mass, which is valid for that monitoring interval. This influent mass is then divided by the total effluent flow volume for the time period that PCBs effluent monitoring is applicable (e.g., 90 days for quarterly monitoring, 180 days for semi-annual monitoring). For this period, this will give a Runoff Adjustment that will apply for the monitoring interval, which is based on the frequency of effluent monitoring. For example, sampling effluent quarterly yields a 90-day monitoring interval. An example follows:

ex.: PCBs is monitored in effluent quarterly.

Step 1: {(Influent concentration of PCBs in dry weather) x (Volume of dry weather diversion for the quarter) + (Influent concentration of PCBs in wet weather) x (Volume of wet weather diversion for the quarter)} = (Influent mass of PCBs from urban runoff)

Step 2: (Influent mass) ÷ (Total effluent discharge volume for the 90-day period) = (Runoff Adjustment to be subtracted from concentration of PCBs in the discharge, valid for that quarter)

6. Reopener Provision

This Order may be reopened for modification, or revocation and reissuance, if there is modification of the San Francisco Bay Mercury or PCBs TMDL implementation provisions.

VI. COMPLIANCE DETERMINATION

Compliance with the effluent limitations contained in section IV of this Order will be determined as specified below:

A. General.

Compliance with effluent limitations for mercury shall be determined using sample reporting protocols defined in the MRP and Attachment A of this Order. For purposes of reporting and administrative enforcement by the Regional and State Water Boards, a Discharger shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reporting level (RL).

B. Multiple Sample Data.

When determining compliance with an average monthly effluent limit (AMEL) for priority pollutants and more than one sample result is available, the Dischargers 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 Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

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.

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 values around the middle 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.

ATTACHMENT A – DEFINITIONS

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:

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

Detected, but Not Quantified (DNQ) are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Maximum Daily Effluent Limitation (MDEL)
The highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median
The middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (*n*) is odd, then the median = $X_{(n+1)/2}$. If *n* is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the *n*/2 and *n*/2+1).

Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML) is 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.

Not Detected (ND) are those sample results less than the laboratory's MDL.

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 a priority pollutant(s) 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 or Regional Water Board.

Reporting Level (RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. 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 4 of the SIP in accordance with section 2.4.2 of the SIP or established in accordance with section 2.4.3 of the SIP. 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 RL.

Total Maximum Daily Load (TMDL) is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources.

ATTACHMENT B – EXISTING ORDER NOS. AND NPDES PERMIT NOS.

Municipal Dischargers:

Discharger	NPDES Permit No.	Existing Order No.[1]	Existing Order Adoption Date	Existing Order Expiration Date
American Canyon, City of	CA0038768	R2-2011-0046	7/13/11	8/31/16
Benicia, City of	CA0038091	R2-2008-0014	3/12/08	5/30/13
Burlingame, City of	CA0037788	R2-2008-0008	1/30/08	3/31/13
Calistoga, City of	CA0037966	R2-2010-0104	9/08/10	10/31/15
Central Contra Costa Sanitary District	CA0037648	R2-2012-0016	2/08/12	3/31/17
Central Marin Sanitation Agency	CA0038628	R2-2012-0051	6/13/12	7/31/17
Crockett Community Services District, Port Costa Sanitary Dept.	CA0037885	R2-2008-0005	1/30/08	3/31/13
Delta Diablo Sanitation District	CA0038547	R2-2009-0018	3/11/09	4/30/14
East Bay Dischargers Authority	CA0037869	R2-2012-0004	1/18/12	2/28/17
Union S.D. Wet Weather Outfall	CA0038733	R2-2010-0097	7/14/10	8/31/15
Union S.D. Hayward Marsh	CA0038636	R2-2011-0058	9/14/11	10/31/16
Dublin San Ramon Services District	CA0037613	R2-2012-0005	1/18/12	2/28/17
City of Livermore	CA0038008	R2-2012-0006	1/18/12	2/28/17
LAVWMA Wet Weather Outfall	CA0038679	R2-2011-0028	5/11/11	6/30/16
East Bay Municipal Utility Dist. WWTP	CA0037702	R2-2009-0004	1/14/09	1/13/14
Fairfield-Suisun Sewer District	CA0038024	R2-2009-0039	4/08/09	5/31/14
Las Gallinas Valley Sanitary District	CA0037851	R2-2009-0070	10/14/09	11/30/14
Marin County (Paradise Cove), Sanitary District No. 5 of	CA0037427	R2-2011-0016	4/13/11	5/31/16
Marin County (Tiburon), Sanitary District No. 5 of	CA0037753	R2-2008-0057	7/09/08	8/31/13
Millbrae, City of	CA0037532	R2-2008-0071	8/13/08	9/30/13
Mt. View Sanitary District	CA0037770	R2-2010-0114	11/10/10	12/31/15
Napa Sanitation District	CA0037575	R2-2011-0007	2/09/11	3/31/16
Novato Sanitary District	CA0037958	R2-2010-0074	5/12/10	6/30/15
Palo Alto, City of	CA0037834	R2-2009-0032	4/08/09	5/31/14
Petaluma, City of	CA0037810	R2-2011-0003	1/12/11	2/28/16
Pinole, City of	CA0037796	R2-2012-0059	8/08/12	9/30/17
Rodeo Sanitary District	CA0037826	R2-2012-0027	4/11/12	5/31/17
Saint Helena, City of	CA0038016	R2-2010-0105	9/08/10	10/31/15
San Francisco, City and County of, San Francisco International Airport	CA0038318	R2-2007-0058	8/8/07	9/30/12
San Francisco (Southeast Plant), City and County of	CA0037664	R2-2008-0007	1/30/08	3/31/13
San Jose/Santa Clara Water Pollution Control Plant and Cities of San Jose and Santa Clara	CA0037842	R2-2009-0038	4/08/2009	5/31/14
San Mateo, City of	CA0037541	R2-2007-0075	11/01/07	1/31/13
Sausalito-Marin City Sanitary District	CA0038067	R2-2012-0083	11/14/12	12/31/17
Sewerage Agency of Southern Marin	CA0037711	R2-2012-0094	12/12/12	1/31/18
Sonoma Valley County Sanitary District	CA0037800	R2-2008-0090	10/08/08	11/30/13
South Bayside System Authority	CA0038369	R2-2007-0006	1/23/07	3/31/12
South San Francisco and San Bruno, Cities of	CA0038130	R2-2008-0094	11/12/08	12/31/13
Sunnyvale, City of	CA0037621	R2-2009-0061	8/12/09	9/30/14
US Department of Navy, Treasure Island	CA0110116	R2-2010-0001	1/13/10	2/28/15

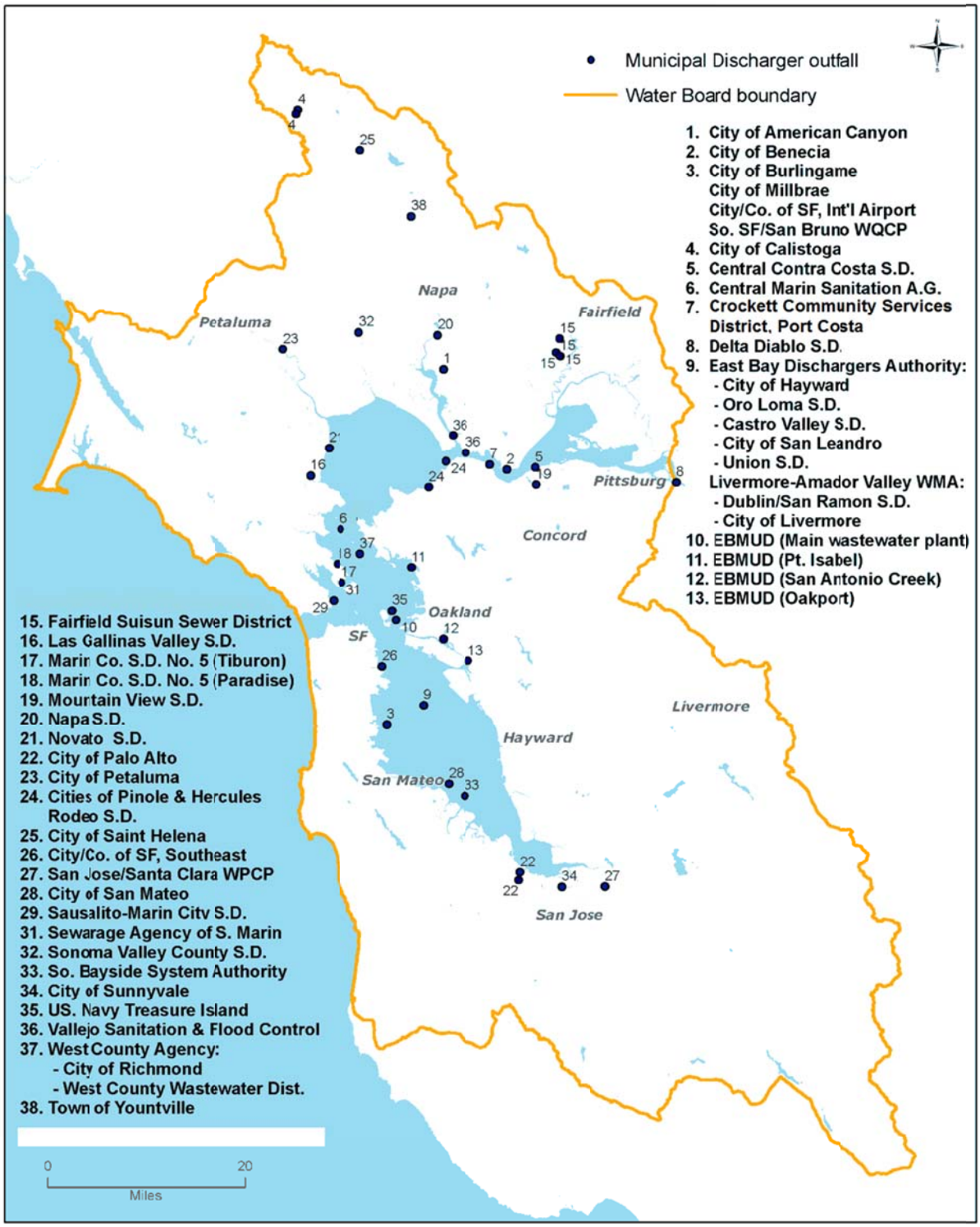
Discharger	NPDES Permit No.	Existing Order No.[1]	Existing Order Adoption Date	Existing Order Expiration Date
Vallejo Sanitation and Flood Control District	CA0037699	R2-2012-0017	2/08/12	3/31/17
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	CA0038539	R2-2008-0003	3/31/08	3/31/13
Yountville, Town of	CA0038121	R2-2010-0072	5/12/10	6/30/15

[1] The orders shown are for the primary permit reissuance and do not include permit amendments.

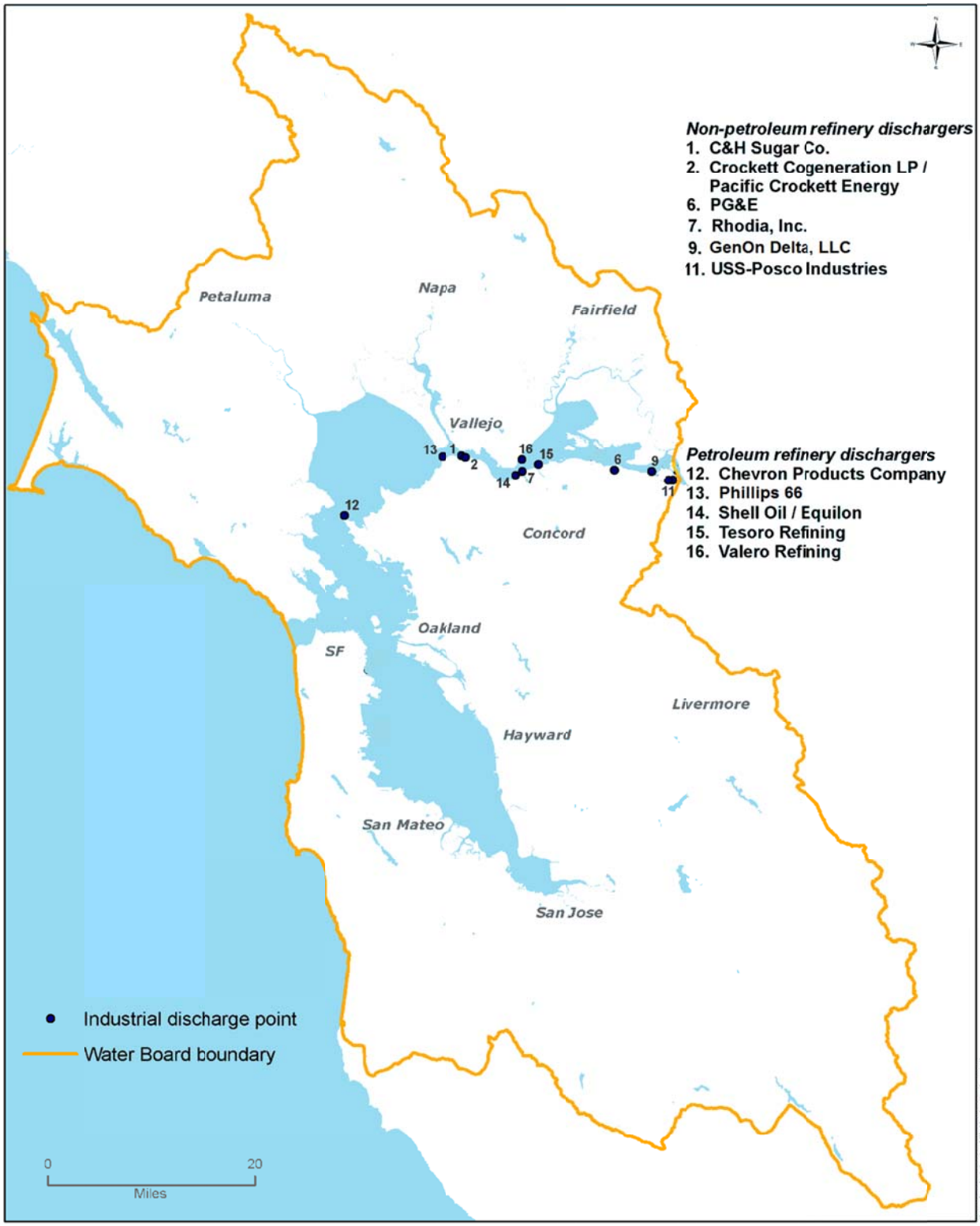
Industrial Dischargers:

Discharger	NPDES Permit No.	Existing Order No.	Existing Order Adoption Date	Existing Order Expiration Date
Industrial Wastewater Discharger (Non-Petroleum Refinery):				
C&H Sugar and Crockett Community Services District, Crockett Sanitary Dept.	CA0005240	R2-2012-0084	11/14/12	12/31/17
Crockett Cogeneration, LP, and Pacific Crockett Energy, Inc.	CA0029904	R2-2010-0073	5/12/10	6/30/15
Pacific Gas and Electric Company	CA0030082	R2-2006-0010	2/8/06	3/31/11
Rhodia, Inc.	CA0006165	R2-2010-0058	3/10/10	4/30/15
GenOn Delta, LLC (formerly Mirant)	CA0004880	R2-2002-0072	6/19/02	5/31/07
USS-Posco Industries	CA0005002	R2-2011-0048	7/13/11	8/31/16
Industrial Wastewater Discharger (Petroleum Refinery):				
Chevron Products Company	CA0005134	R2-2011-0049	7/13/11	8/31/16
Phillips 66 (formerly ConocoPhillips)	CA0005053	R2-2011-0027	5/11/11	6/31/16
Shell Oil Products US and Equilon Enterprises LLC	CA0005789	R2-2012-0052	6/13/12	7/31/17
Tesoro Refining & Marketing Co.	CA0004961	R2-2010-0084	6/09/10	6/30/15
Valero Refining Company	CA0005550	R2-2009-0079	11/18/09	12/31/14

ATTACHMENT C – MAP OF MUNICIPAL AND INDUSTRIAL DISCHARGERS



Industrial Discharge Outfalls



ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Contents

I. General Monitoring Provisions 2
II. Monitoring Locations 3
III. Effluent Monitoring Requirements 3
IV. Reporting Requirements 4
A. General Monitoring and Reporting Requirements 4
B. Individual Reporting in Self Monitoring Reports (SMRs) 4

Tables

Table E-1. Monitoring Station Locations 3
Table E-2. Monitoring Requirements 3

ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

The Code of Federal Regulations section 122.48 requires that all NPDES permits specify monitoring and reporting requirements. Water Code sections 13267 and 13383 also authorize Regional Water Board to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements that implement the federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. Dischargers shall comply with the MRP for this Order as adopted by the Regional Water Board and with all of the requirements contained in the Regional Standard Provisions (Attachment G of individual permits). The MRP may be amended by the Executive Officer pursuant to 40 CFR 122.62, 122.63, and 124.5. If any discrepancies exist between the MRP and the Regional Standard Provisions, the MRP prevails.

B. Sampling is required during the entire year when discharging. All compliance analyses shall be conducted using current USEPA methods, or that have been approved by the USEPA Regional Administrator pursuant to 40 CFR 136.4 and 40 CFR 136.5, or equivalent methods that are commercially and reasonably available, and that provide quantification of sampling parameters and constituents sufficient to evaluate compliance with applicable effluent limits. Equivalent methods must be more sensitive than those specified in 40 CFR 136, must be specified in the permit, and must be approved for use by the Executive Officer, following consultation with the State Water Board's Quality Assurance Program. The Regional Water Board will find a Discharger in violation of the limitation if the discharge concentration exceeds the effluent limitation and the Reporting Level for the analysis for that constituent.

C. Minimum Levels. For compliance monitoring, analyses shall be conducted using the lowest commercially available and reasonably achievable detection levels. The objective is to provide quantification of constituents sufficient to allow evaluation of observed concentrations with respect to the Minimum Levels given below. All Minimum Levels are expressed as µg/L, equivalent to parts per billion (ppb). According to the SIP, method-specific factors can be applied. In such cases, this additional factor must be applied in the computation of the Reporting Level. Application of such factors will alter the Reporting Level from the Minimum Level for the analysis. Dischargers are to instruct laboratories to establish calibration standards so that the Minimum Level value is the lowest calibration standard. At no time is a Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve. The table below indicates the highest minimum level that the Discharger's laboratory must achieve for calibration purposes.

Constituent	Minimum Level	Units
Mercury	0.0005	µg/L
PCB 1016, 1221, 1232, 1242, 1248, 1254, 1260	0.5	µg/L

II. MONITORING LOCATIONS

Dischargers 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
Discharge point indicated in individual NPDES permits for discharge from the Discharger's wastewater treatment plant (often but not always E-001)	Location as indicated in individual NPDES permits for mercury or other toxic pollutants. For C&H Sugar Company, location is EFF-002. For GenOn Delta, LLC, locations are E-001B through to and including E-001I. For San Francisco International Airport, location is EFF-001A for both its Sanitary and Industrial Plants. For Calistoga, annual monitoring shall alternate each year between EFF-001 and EFF-002.	As described in individual NPDES permits for mercury or other toxic pollutants

III. EFFLUENT MONITORING REQUIREMENTS

The Dischargers shall monitor mercury and PCBs in effluent as shown in Tables E-2 below and report as described in the next section:

Table E-2. Monitoring Requirements

Parameter	Units[1]	Sample Type[2]	Minimum Sampling Frequency[3,4]
Total mercury[5]	µg/L	C-24 or Grab[6]	Monthly for Major Dischargers (see Table 1A and 1B)
			Quarterly for Minor Dischargers (see Table 1A and 1B), except as otherwise indicated below
			Annually for Marin County (Paradise Cove) Sanitary District No. 5, City of St. Helena, and Crockett Community Services District (Port Costa)
Total PCBs (as aroclors)[7]	µg/L	Grab	Semi-annually for Major Dischargers
			Annually for Minor Dischargers
PCBs (as congeners)[8]	µg/L	Grab	Quarterly for Major Dischargers with Design Flow[9] > 5.0 mgd
			Semi-annually for Major Dischargers with Design Flow ≤ 5.0 mgd
			Annually for Minor Dischargers, except as otherwise indicated below
			Once every Five Years for Marin County (Paradise Cove) Sanitary District No. 5, City of St. Helena, and Crockett Community Services District (Port Costa)

(1) Unit Abbreviation: µg/L = micrograms per liter

(2) Sample Type: C-24 = 24-hour composite. 24-hour composites may be made up of discrete grab samples collected over a 24-hour period, or may be collected using automatic compositing equipment. If using compositing equipment, the Discharger shall implement all feasible ultra clean techniques to reduce sample contamination (such as use of ultra clean Teflon tubing).

(3) Intermittent or seasonal dischargers shall collect samples during those months for which a discharge occurs.

(4) Monitoring frequency: Monitoring frequency may be increased subsequent to reissuance of this Order.

(5) Total mercury: The Dischargers shall use ultra-clean sampling (USEPA Method 1669) and ultra-clean analytical methods (USEPA Method 1631) for total mercury monitoring.

(6) Grab Samples: If allowed in the Pretreatment and Biosolids Monitoring Requirements of the Dischargers' individual NPDES permits, grab samples shall be collected coincident with composite samples collected for the analysis of other regulated parameters.

(7) Aroclor Monitoring: Dischargers shall use USEPA Method 608 for this monitoring. These data will be used for assessing compliance with the limits in Tables 6B and 7B. Non-detected and/or estimated values shall be treated as zeros in the calculation of Total PCBs.

(8) Congener Monitoring: This monitoring is for informational purposes. Dischargers shall use USEPA Proposed Method 1668c and report the results for each of the 40 congeners that contribute to the Bay's impairment and congeners that co-elute with the 40 congeners (see Table F-14). For congeners that co-elute with the 40 congeners, Dischargers shall report the sum of these co-eluting congeners. A summation for total PCBs is not required.

(9) Design Flow: The design flows for each facility are included in Tables F-1A and F-1B of the Fact Sheet.

IV. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Dischargers shall comply with all Federal Standard Provisions (Attachment D) and Regional Standard Provisions (Attachment G) related to monitoring, reporting, and recordkeeping. These attachments are included in the Dischargers' individual permits.

B. Individual Reporting in Self Monitoring Reports (SMRs)

1. Reporting of Mercury and PCBs Data

a. Report Data with Routine SMR

Dischargers shall submit mercury and PCBs data collected as part of this Order in the regular monthly or quarterly SMRs required in that Discharger's individual permit. This includes data for mercury, total PCBs (as aroclors) using USEPA Method 608, and PCBs (as congeners). The PCB congeners shall include the 40 that contribute to water quality impairment plus co-elutes (66 congeners in total, see Table F-14), using USEPA Method 1668c.

(i) For Industrial Dischargers claiming an effluent credit for recycled water use pursuant to Provision V.C.4, the amount of credit claimed for that month shall be reported monthly to the Municipal Discharger that supplied the recycled water. The reporting from the Industrial Discharger to the Municipal Discharger shall be completed no later than 15 days following the end of the calendar month. The Municipal and Industrial Dischargers shall then include this information in their respective monthly (or quarterly) and annual SMRs.

(ii) If a Discharger monitors effluent mercury or PCBs 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.

b. Annual SMR

Annual SMRs are due February 1 following each calendar year. Each Discharger shall summarize mercury data in its Annual SMR. This summary shall include, at a minimum, mercury concentrations for each sample, the corresponding flow, and the annual mercury loading. For PCBs, each Discharger shall reference the months it reported USEPA Method 1668c data.

2. **Monitoring Periods**

Monitoring periods for all required monitoring shall be completed according to the following schedule:

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Monthly	Effective date of permit	1st day of calendar month through last day of calendar month
Quarterly	Effective date of permit	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
Semiannually	Effective date of permit	January 1 through June 30 July 1 through December 31
Annually	Effective date of permit	January 1 through December 31

3. **Reporting of ML or RL, DNQ, and ND, and Establishing Calibration Standards**

The Dischargers shall report with each sample result the applicable Minimum Level (ML) or Reporting Level (RL) and the current Method Detection Limit (MDL), as determined by the procedure in 40 CFR Part 136.

The Dischargers shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

b. Sample results less than the RL, 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.

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.

c. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND.

d. Dischargers 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 a Discharger to use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve.

4. **Reporting Data in Tabular Format**
The Dischargers 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 effluent limitations. The Dischargers are not required to duplicate the submittal of data that is entered in a tabular format within CIWQS.

5. **Cover Letter for SMR**
Each Discharger shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of the WDRs and any exceedances of trigger levels; describe the requirement that was violated or the trigger exceedance; discuss corrective actions taken or planned; and describe the proposed time schedule for corrective actions.

6. **Signatory and Certification of SMR**
SMRs must be submitted to the Regional Water Board, signed and certified as required by the Standard Provisions (Attachment D). Dischargers shall submit electronic and/or paper SMRs as required by each individual permit. For paper SMRs, Dischargers shall submit SMRs to the address listed below:

Executive Officer
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
ATTN: NPDES Wastewater Division

C. Discharge Monitoring Reports (DMRs)

1. DMRs must be signed and certified as required by the standard provisions (Attachment D). Until the State Water Board approves electronic submittal of DMRs, each Discharger shall submit one original hard copy through the mail to one of the addresses listed below:

Standard Mail	**FedEx/UPS/ Other Private Carriers**
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO 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

2. All discharge monitoring results must be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format of EPA Form 3320-1.

ATTACHMENT F – FACT SHEET

Contents

I. Permit Information 2
II. Facilities Description 7
A. Description of Wastewater Treatment 7
B. Discharge Points and Receiving Waters 7
C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data 8
D. Compliance Summary 11
III. Applicable Plans, Policies, and Regulations 12
A. Legal Authorities 13
B. California Environmental Quality Act (CEQA) 13
C. State and Federal Regulations, Policies, and Plans 13
D. Impaired Water Bodies on CWA 303(d) List 14
IV. Rationale For Effluent Limitations and Discharge Specifications 15
A. Water Quality-Based Effluent Limitations (WQBELs) 15
V. Rationale for Receiving Water Limitations – 27
VI. Rationale for Monitoring and Reporting Requirements 28
VII. Rationale for Provisions 29
A. Standard Provisions 29
B. Special Provisions 29
VIII. Public Participation 33
A. Notification of Interested Parties 33
B. Written Comments 34
C. Public Hearing 34
D. Waste Discharge Requirements Petitions 34
E. Information and Copying 35
F. Register of Interested Persons 35
G. Additional Information 35
Appendix F-1 -- Example of When Required Actions are Triggered 36
Appendix F-2 -- Calculation of Concentration Based Mercury Limits 38
Appendix F-3 -- Summary of PCBs Loads 42
Appendix F-4 -- Data Supporting Performance-Based PCBs Limits 46

ATTACHMENT F – FACT SHEET

As described in section II 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.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the facility:

Table F-1. Facility Information
(information not already presented in this Order is shown in bold)

WDID	
Discharger	See Tables 1A and 1B attached to cover page above.
Name of Facility	
Facility Address	
Facility Contact, Title and Phone	See Tables 4A and 4B starting on page 3 above.
Authorized Person to Sign and Submit Reports	**See Tables F-1A and F-1B below.**
Mailing Address	See Tables 4A and 4B starting on page 3 above.
Billing Address	**See Tables F-1A and F-1B below.**
Type of Facility	See Tables 4A and 4B starting on page 3 above.
Major or Minor Facility	See Tables 1A and 1B attached to cover page above.
Pretreatment Program	**See Tables F-1A and F-1B below.**
Reclamation Requirements	**Not applicable.**
Facility Permitted Flow	See Facility Design Flow below.
Facility Design Flow	See Tables 4A and 4B starting on page 3 above.
Watershed	**San Francisco Bay**
Receiving Water	**See Tables F-1A and F-1B below.**
Receiving Water Type	

Table F-1A. Additional Information on Municipal Facilities

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Pretreatment Program	Receiving Water Type
American Canyon, City of	Same as Contact	Same as mailing address	Y	Estuarine
Benicia, City of	Same As Contact	Same as mailing address	Y	Estuarine
Burlingame, City of	Same as contact	Same as mailing address	Y	Marine
Calistoga, City of	Warren Schenstrom Water Systems Superintendent (707) 942-2828	Same as mailing address	N	Freshwater
Central Contra Costa Sanitary District	Same as contact	Same as mailing address	Y	Estuarine
Central Marin Sanitation Agency	Same as contact	Same as mailing address	Y	Estuarine
Crockett Community Services District, Port Costa Sanitary Dept.	Same as contact	Same as mailing address	N	Estuarine
Delta Diablo Sanitation District	Steve Dominguez Plant Manager (925) 756-1967	Same as mailing address	Y	Estuarine
East Bay Dischargers Authority	Same as contact	Same as mailing address	Y	Estuarine
Hayward Water Pollution Control Facility				
San Leandro Water Pollution Control Plant				
Oro Loma/Castro Valley Sanitary Districts Water Pollution Control Plant				
Raymond A. Boege Alvarado Wastewater Treatment Plant				
Livermore-Amador Valley Water Management Agency Export and Storage Facilities				
Dublin San Ramon Services District Wastewater Treatment Plant				
City of Livermore Water Reclamation Plant				
East Bay Municipal Utility District	David R. Williams Director of Wastewater (510) 287-1496	EBMUD Accounts Payable P.O. Box 24055, MS #5 Oakland, CA 94623-2306	Y	Marine

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Pretreatment Program	Receiving Water Type
Fairfield-Suisun Sewer District	Same as contact	Same as mailing address	Y	Estuarine
Las Gallinas Valley Sanitary District	Same as contact	Same as mailing address	N	Estuarine
Marin County (Paradise Cove), Sanitary District No. 5 of	Same as contact	Same as mailing address	N	Marine
Marin County (Tiburon), Sanitary District No. 5 of	Same as contact	Same as mailing address	N	Marine
Millbrae, City of	Same as contact	Same as mailing address	N	Marine
Mt. View Sanitary District	Same as contact	Same as mailing address	N	Estuarine
Napa Sanitation District	Sharleen Maglione Plant Manager (707)258-6020	Same as mailing address	Y	Estuarine
Novato Sanitary District	Same as contact	Same as mailing address	Y	Estuarine
Palo Alto, City of	Same as contact	Same as mailing address	Y	Estuarine
Petaluma, City of	Same as contact	Same as mailing address	Y	Estuarine
Pinole, City of	Same as contact	Same as mailing address	N	Marine
Rodeo Sanitary District	Same as contact	Same as mailing address	N	Estuarine
Saint Helena, City of	Michael Sample Chief Plant Operator (707) 967-2878	Same as mailing address	N	Freshwater
San Francisco, City and County of, San Francisco International Airport	Peter Acton Deputy Airport Director (650) 821-5000	Same as mailing address	Y	Marine
San Francisco (Southeast Plant), City and County of	George Engel Superintendent (415) 920-4944	Same as mailing address	Y	Marine
San Jose/Santa Clara Water Pollution Control Plant and Cities of San Jose and Santa Clara	Joanna De Sa Acting Deputy Director (408) 535-8560	Same as mailing address	Y	Estuarine
San Mateo, City of	Chad Davisson Environmental Services Division Manager (650) 522-7385	Same as mailing address	Y	Marine
Sausalito-Marin City Sanitary District	Same as contact	Same as mailing address	N	Marine
Sewerage Agency of Southern Marin	Same as contact	Same as mailing address	N	Marine
Sonoma Valley County Sanitary District	Brian Anderson Operations Coordinator (707) 526-5370	Same as mailing address	N	Estuarine

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Pretreatment Program	Receiving Water Type
South Bayside System Authority	Same as contact	Same as mailing address	Y	Marine
South San Francisco and San Bruno, Cities of	Same as contact	Same as mailing address	Y	Marine
Sunnyvale, City of	Same as contact	Same as mailing address	Y	Estuarine
US Department of Navy, Treasure Island	Same as contact	Same as mailing address	N	Marine
Vallejo Sanitation and Flood Control District	Ronald J. Matheson District Manager (707) 644-8949	Same as mailing address	Y	Estuarine
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	E.J. Shalaby District Manager (510) 222-6700	Same as mailing address	Y	Estuarine
Yountville, Town of	Don Moore Wastewater Assistant System Supervisor (707) 944-2988	Same as mailing address	N	Freshwater

Table. F-1B. Additional Information for Industrial Facilities

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Pretreatment Program	Receiving Water Type
C&H Sugar and Crockett Community Services District, Crockett Sanitary Dept.	Tanya Akkerman Environmental Manager C&H Sugar Company, Inc. (510) 787-4352	Same as mailing address	N	Enclosed Bay
Crockett Cogeneration, LP, and Pacific Crockett Energy, Inc.	Dan Consie Asset Manager (510) 787-4100	Same as mailing address	N	Enclosed Bay
Pacific Gas and Electric Company	David Harnish Site Remediation Manager (925) 866-5882	Same as mailing address	N	Enclosed Bay
Rhodia, Inc.	Darryl Hodge Plant Manager (925) 313-8221	Same as mailing address	N	Enclosed Bay

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Pretreatment Program	Receiving Water Type
GenOn Delta, LLC (formerly Mirant)	Monte Ash, Vice President California Operations (925) 427-3575	Pittsburg Power Plant P.O. Box 192 Pittsburg, CA 94565	N	Estuary
USS-Posco Industries	Same as contact	Same as mailing address	N	Enclosed Bay
Chevron Products Company	Dave Feiglstok HES Manager (925) 842-1000	Same as mailing address	N	Enclosed Bay
Phillips 66 (formerly ConocoPhillips)	Paul Miller Manager, Technical Services (510) 245-4400	Same as mailing address	N	Enclosed Bay
Shell Oil Products US and Equilon Enterprises LLC	Natalie Braden Manager, Env. Affairs (925) 313-3000	Same as mailing address	N	Enclosed Bay
Tesoro Refining & Marketing Co.	Matthew Marusich Environmental Manager (925) 228-1220	Same as mailing address	N	Enclosed Bay
Valero Refining Company	Christopher Howe Director, Health, Safety, Environment, and Government Affairs (707) 745-7011	Same as mailing address	N	Enclosed Bay

A. The discharge of mercury and PCBs by the Dischargers listed in this Order were regulated by Order No. R2-2007-0077, as amended by Order No. R2-2011-0012. This Order supercedes those orders and continues to implement the wasteload allocations and implementation requirements of the mercury and PCBs TMDLs. The Regional Water Board adopted the mercury TMDL on August 9, 2006, and the PCBs TMDL on February 13, 2008.

For the purposes of this Order, references to the "dischargers" or "permittees" in applicable federal and State laws, regulations, plans, or policy are held to be equivalent to references to the Dischargers herein.

B. The Dischargers listed in Table 1A of the Order own and operate secondary and advanced secondary wastewater treatment facilities as described in their respective permits. The Dischargers listed in Table 1B of the Order own and operate wastewater treatment facilities as described in their respective permits. Wastewater is discharged to San Francisco Bay and its tributaries, which are waters of the United States within the San Francisco Bay watershed. Attachment C shows a map of the Dischargers subject to this Order.

II. FACILITIES DESCRIPTION

A. Description of Wastewater Treatment

Municipal wastewater treatment plants provide secondary treatment, which includes screening, settling, and biological treatment. Some plants also provide advanced treatment, which removes additional solids often with sand filtration. Removing additional solids removes additional pollutants, like mercury and PCBs, that adhere to particles. Municipal wastewater treatment plants generally remove over 90% of the mercury and PCBs in their influent. While the removed mercury and PCBs are not directly discharged to water, some is returned to the environment through landfills, incinerators, or soil amendments. The primary sources of mercury in municipal wastewater are expected to be human waste and medical and dental facilities, while the primary sources of PCBs are expected to be human waste and wastewater generated from old industrial equipment that may contain PCBs.

Industrial Dischargers include petroleum refineries, chemical plants, and other large industrial facilities. Their mercury and PCBs loads depend on the types of activities in which these Dischargers engage. Their wastewater treatment facilities also vary depending on their activities. Individual permits, listed in Attachment B, provide further descriptions of treatment processes.

B. Discharge Points and Receiving Waters

The locations of discharge points are shown in Tables 4A and 4B of the Order, above. Treated wastewater is discharged to San Francisco Bay and its tributaries as indicated on Tables 2A and 2B of the Order.

C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

The effluent limitations for mercury and PCBs contained in Order No. R2-2007-0077, as amended by Order No. R2-2011-0012, for each Discharger are shown in the tables F-2, F-3, F-4, and F-5 below:

Table F-2. Current Individual Permit Mercury Effluent Limits for Municipalities

Discharger	Average Annual Effluent Limit for Mercury (kg/yr)	Average Monthly Effluent Limit for Mercury (µg/L)	Average Weekly Effluent Limit Mercury (µg/L)
American Canyon, City of	0.12	0.025	0.027
Benicia, City of	0.088	0.066	0.072
Burlingame, City of	0.089	0.066	0.072
Calistoga, City of	0.016	0.066	0.072
Central Contra Costa Sanitary District	2.23	0.066	0.072
Central Marin Sanitation Agency	0.18	0.066	0.072
Crockett Community Services District, Port Costa Sanitary Dept.	0.00072	0.066	0.072
Delta Diablo Sanitation District	0.31	0.066	0.072
East Bay Dischargers Authority, including City of Hayward, City of San Leandro, Oro Loma Sanitary District, Castro Valley Sanitary District, Union Sanitary District, Livermore-Amador Valley Water Management Agency, Dublin San Ramon Services District, and City of Livermore	3.6	0.066	0.072
East Bay Municipal Utility District	2.6	0.066	0.072
Fairfield-Suisun Sewer District	0.22	0.025	0.027
Las Gallinas Valley Sanitary District	0.17	0.066	0.072
Marin County (Paradise Cove), Sanitary District No. 5 of	0.00055	0.066	0.072
Marin County (Tiburon), Sanitary District No. 5 of	0.0099	0.066	0.072
Millbrae, City of	0.052	0.066	0.072
Mt. View Sanitary District	0.034	0.025	0.027
Napa Sanitation District	0.28	0.066	0.072
Novato Sanitary District	0.079	0.066	0.072
Palo Alto, City of	0.38	0.025	0.027
Petaluma, City of	0.063	0.066	0.072
Pinole, City of	0.055	0.066	0.072
Rodeo Sanitary District	0.060	0.066	0.072
Saint Helena, City of	0.047	0.066	0.072
San Francisco, City and County of, San Francisco International Airport	0.032	0.066	0.072
San Francisco (Southeast Plant), City and County of	2.7	0.066	0.072
San Jose/Santa Clara WPCP	1.0	0.025	0.027
San Mateo, City of	0.32	0.066	0.072
Sausalito-Marin City Sanitary District	0.078	0.066	0.072
Sewerage Agency of Southern Marin	0.13	0.066	0.072
Sonoma Valley County Sanitary District	0.041	0.066	0.072
South Bayside System Authority	0.53	0.066	0.072

Discharger	Average Annual Effluent Limit for Mercury (kg/yr)	Average Monthly Effluent Limit for Mercury (µg/L)	Average Weekly Effluent Limit Mercury (µg/L)
South San Francisco and San Bruno, Cities of	0.29	0.066	0.072
Sunnyvale, City of	0.15	0.025	0.027
US Department of Navy (Treasure Island)	0.026	0.066	0.072
Vallejo Sanitation and Flood Control District	0.57	0.066	0.072
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	0.38	0.066	0.072
Yountville, Town of	0.040	0.066	0.072
Aggregate Mass Emission Limit (kg/yr)	**17**	**Not applicable**	**Not applicable**

Table F-3. Current Individual Permit Mercury Effluent Limits for Industries

Permitted Entity	Average Annual Effluent Limit for Mercury (kg/yr)	Average Monthly Effluent Limit for Mercury (µg/L)	Maximum Daily Effluent Limit for Mercury (µg/L)
Industrial Wastewater Discharger (Non-Petroleum Refinery):			
C&H Sugar Company, Inc., and Crockett Community Services District, Crockett Sanitary Dept.	0.045	0.079	0.12
Crockett Cogeneration, LP, and Pacific Crockett Energy, Inc.	0.0047	0.079	0.12
Dow Chemical Company	0.041	0.079	0.12
General Chemical West, LLC	0.21	0.079	0.12
GWF Power Systems L. P., Site I	0.0016	0.079	0.12
GWF Power Systems L. P., Site V	0.0025	0.079	0.12
Pacific Gas and Electric Company	0.00063	0.079	0.12
Rhodia, Inc.	0.011	0.079	0.12
San Francisco Airport Commission	0.051	0.079	0.12
GenOn Delta, LLC	0.0078	0.079	0.12
USS-Posco Industries	0.045	0.079	0.12
Industrial Wastewater Discharger (Petroleum Refinery):			
Chevron Products Company	0.34	0.079	0.12
ConocoPhillips	0.13	0.079	0.12
Shell Oil Products US and Equilon Enterprises LLC	0.22	0.079	0.12
Tesoro Refining & Marketing Co.	0.11	0.079	0.12
Valero Refining Company	0.08	0.079	0.12
Aggregate Mass Emission Limit (kg/yr)	**1.3**	**Not applicable**	**Not applicable**

Table F-4. Current Individual Permit PCBs Effluent Limits for Municipalities

Discharger	Average Monthly Effluent Limit for PCBs (µg/L)	Maximum Daily Effluent Limit for PCBs (µg/L)
American Canyon, City of	0.00039	0.00049
Benicia, City of	0.012	0.017
Burlingame, City of	0.012	0.017
Calistoga, City of	0.012	0.017
Central Contra Costa Sanitary District	0.012	0.017
Central Marin Sanitation Agency	0.012	0.017
Contra Costa County Sanitation District No. 5	0.012	0.017
Delta Diablo Sanitation District	0.012	0.017
East Bay Dischargers Authority, including City of Hayward, City of San Leandro, Oro Loma Sanitary District, Castro Valley Sanitary District, Union Sanitary District, Livermore-Amador Valley Water Management Agency, Dublin San Ramon Services District, and City of Livermore	0.012	0.017
East Bay Municipal Utility District, Wastewater Treatment Plant	0.012	0.017
Fairfield-Suisun Sewer District	0.00039	0.00049
Las Gallinas Valley Sanitary District	0.012	0.017
Marin County (Paradise Cove), Sanitary District No. 5	0.012	0.017
Marin County (Tiburon), Sanitary District No. 5	0.012	0.017
Millbrae, City of	0.012	0.017
Mt. View Sanitary District	0.00039	0.00049
Napa Sanitation District	0.012	0.017
Novato Sanitary District	0.012	0.017
Palo Alto, City of	0.00039	0.00049
Petaluma, City of	0.012	0.017
Pinole, City of	0.012	0.017
Rodeo Sanitary District	0.012	0.017
Saint Helena, City of	0.012	0.017
San Francisco, City and County of, San Francisco International Airport, Sanitary	0.012	0.017
San Francisco (Southeast Plant), City and County of	0.012	0.017
San Jose/Santa Clara WPCP	0.00039	0.00049
San Mateo, City of	0.012	0.017
Sausalito-Marin City Sanitary District	0.012	0.017
Sewerage Agency of Southern Marin	0.012	0.017
Sonoma Valley County Sanitary District	0.012	0.017
South Bayside System Authority	0.012	0.017
South San Francisco and San Bruno, Cities of	0.012	0.017
Sunnyvale, City of	0.00039	0.00049
US Department of Navy (Treasure Island)	0.012	0.017
Vallejo Sanitation and Flood Control District	0.012	0.017
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	0.012	0.017
Yountville, Town of	0.012	0.017

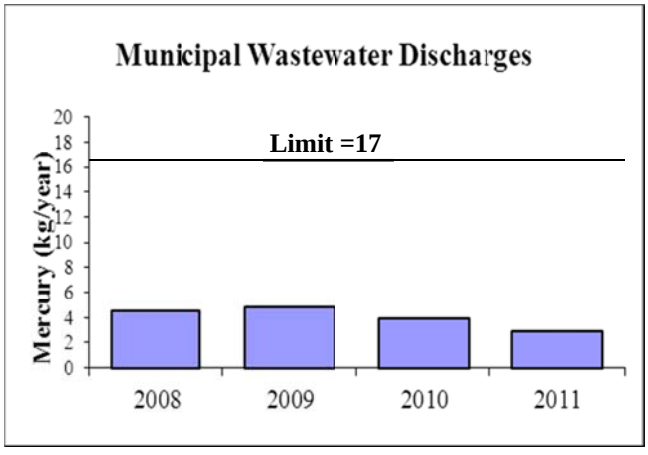
Table F-5. Current Individual Permit PCBs Effluent Limits for Industry

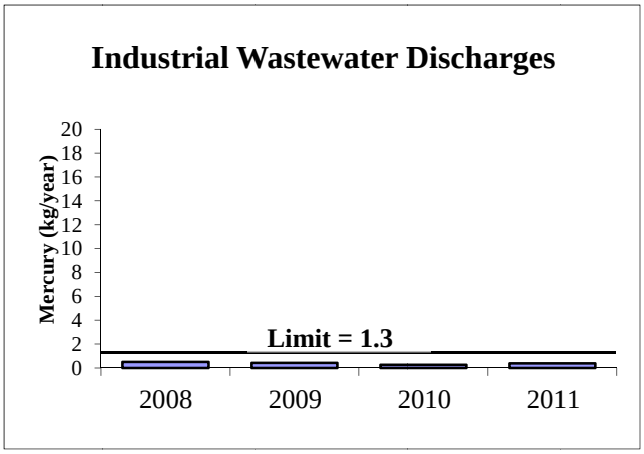
Discharger	Average Monthly Effluent Limit for PCBs (µg/L)	Maximum Daily Effluent Limit for PCBs (µg/L)
Industrial Wastewater Discharger (Petroleum Refinery):		
Chevron Products Company	0.00095	0.0015
Phillips 66 (formerly ConocoPhillips)	0.00095	0.0015
Shell Oil Products US	0.00095	0.0015
Tesoro Refining & Marketing Co.	0.00095	0.0015
Valero Refining Company	0.00095	0.0015
Industrial Wastewater Discharger (Non-Petroleum Refinery):		
C&H Sugar and Crockett Community Services District, Crockett Sanitary Dept.	0.012	0.018
Pacific Gas and Electric Company	0.012	0.018
Rhodia, Inc.	0.012	0.018
San Francisco, City and County of, San Francisco International Airport, Industrial	0.012	0.018
USS-Posco Industries	0.012	0.018

D. Compliance Summary

The charts below show mercury loads for Municipal and Industrial Dischargers have been well below their mass allocations since the previous permit became effective in 2008. In 2011, the municipal load was 2.9 kg/year, the lowest loading yet recorded. The average municipal load for the past four years has been about 75 percent below its current permit limit of 17 kg/year and is also well within the final limit of 11 kg/year that will come into effect with this permit.

Mercury loadings from Industrial Dischargers are considerably lower than Municipal Dischargers. In 2011, the industrial load was 0.39 kg/year, which is comparable to past years and 70 percent below permit allocation of 1.3 kg/year, and is also well within the limit of 1.0 kg/year that will come into effect with this permit.





The most significant exceedance of mercury effluent limitations was from the GenOn Delta LLC, Pittsburg Power Plant, which violated concentration limits for mercury 14 times between August 2010 and April 2012. However, because of the very small flow associated with these violations, it did not have a meaninful impact on the overall mercury loads from industrial wastewater discharges. Regional Water Board staff issued a notice of violation, and GenOn Delta LLC is addressing mercury violations by implementing a more frequent cleaning schedule and considering additional treatment options.

For PCBs, there have been no effluent limit violations since the previous permit became effective in 2011, and available data show that the Dischargers are currently within their TMDL-allocated loads. The Regional Water Board adopted concentration limits to implement TMDL loading allocations for PCBs in Order No. R2-2011-0012, in part, because more samples would be needed to accurately measure loads from individual Dischargers and the cost of PCBs analysis is relatively high. Availble data show that this concentration limits approach has effectively documented that loads are well below the 2.0 kg/year allocation for Municipal Dischargers and the 0.031 kg/year allocation for Industrial Dischargers. The PCBs TMDL originally allocated 0.035 kg/year for Industrial Dischargers, but the Regional Water Board has rescinded a number of industrial permits since the deveopment of the PCBs TMDL. While the Regional Water Board used Method 608 to evaluate compliance with concentration-based effluent limits for PCBs, the data analyzed for measuring loads included PCBs Method 1668C informational data from April 2011 through June 2012. To calculate loads, the Regional Water Board used detected concentrations (including estimated values) from the 66 congeners used to develop the TMDL and each Discharger's average monthly flow, and then normalized for a yearly loading (e.g., each of 5 samples would account for 73 days of loading). Appendix F-3 includes tables that show this information in detail for four discharger types: (1) advanced secondary Municipal Dischargers, (2) secondary Municipal Dischargers, (3) petroleum refinery, and (4) other industry. Table F-6 summarizes the information and shows that the Dischargers are well below the TMDL allocation for PCBs.

Table F-6. PCBs Discharges Relative to TMDL Wasteload Allocations

Discharge Type	PCBs Discharge (kg/year)	PCBs TMDL Allocation (kg/year)
Municipal Wastewater	0.95	2.0
Industrial Wastewater	0.007	0.031

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in the Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and chapter 5.5, division 7 of the California Water Code (commencing with section 13370). It shall serve as a NPDES permit for point source discharges or mercury and PCBs from the facilities listed in this Order to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to article 4, chapter 4, division 7 of the Water Code (commencing with section 13260).

B. California Environmental Quality Act (CEQA)

Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of CEQA, Public Resources Code sections 21100 through 21177.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** The Regional Water Quality Control Board (Regional Water Board) adopted a Water Quality Control Plan for the San Francisco Bay Basin (Region 2) (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 established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Beneficial uses applicable to San Francisco Bay Water are as follows:

Table F-7. Basin Plan Beneficial Uses

Receiving Water Name	Beneficial Use(s)
San Francisco Bay and Applicable Tributaries – See individual Order Nos. (Attachment B) for specific Beneficial Uses that apply.	Agricultural Supply (AGR), Cold Freshwater Habitat (COLD), Ocean, Commercial, and Sport Fishing (COMM), Estuarine habitat (EST), Industrial Service Supply (IND), Marine Habitat (MAR), Fish Migration (MIGR), Municipal and domestic Supply (MUN), Navigation (NAV), Industrial Process Supply (PROC), Preservation of Rare and Endangered Species (RARE), Water Contact Recreation (REC1), Noncontact Water Recreation (REC2), Shellfish Harvesting (SHELL), Fish Spawning (SPWN), Warm Freshwater Habitat (WARM) Wildlife Habitat (WILD)

The Regional Water Board adopted a Basin Plan Amendment on August 9, 2006, that establishes new water quality objectives for mercury and that establishes the San Francisco Bay Mercury TMDL to attain the new mercury objectives in San Francisco Bay and contiguous bay segments. The Regional Water Board's Executive Officer made corrections on May 23, 2007, and the State Water Board approved the Basin Plan Amendment (as corrected) and new water quality objectives on July 17, 2007. The USEPA approved the new water quality objectives on February 12, 2008.

The Regional Water Board also adopted a Basin Plan Amendment on February 13, 2008, that established waste load allocations for PCBs in San Francisco Bay and contiguous bay segments. The State Water Board approved the Basin Plan amendment on October 20, 2009. The USEPA approved the amendment on March 29, 2010.

2. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated for California by the USEPA through the California Toxics Rule and National Toxics Rule and to the priority pollutant objectives established by the Regional Water Board in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria promulgated by the USEPA through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

3. **Antidegradation Policy.** 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 No. 68-16. Resolution No. 68-16 incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 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 discharges must be consistent with the antidegradation provision of section 131.12 and State Water Board Resolution No. 68-16.

4. **Anti-Backsliding Requirements.** Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at title 40, Code of Federal Regulations[1] section 122.44(l) prohibit 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.

D. Impaired Water Bodies on CWA 303(d) List

In November 2006, the USEPA approved a revised list of impaired water bodies prepared by the State [hereinafter referred to as the 303(d) list], prepared pursuant to provisions of CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. San Francisco Bay is listed as an impaired waterbody for mercury and PCBs. The SIP requires final effluent limitations

[1] All further statutory references are to title 40 of the Code of Federal Regulations unless otherwise indicated.

for all 303(d)-listed pollutants to be based on total maximum daily loads and associated wasteload allocations.

San Francisco Bay is impaired for mercury and PCBs because mercury and PCBs contamination is adversely affecting existing beneficial uses, including sport fishing, preservation of rare and endangered species, and wildlife habitat. Mercury and PCBs concentrations in San Francisco Bay fish are high enough to threaten the health of humans who consume them. In addition, mercury concentrations in some bird eggs harvested from the shores of San Francisco Bay are high enough to account for abnormally high rates of eggs failing to hatch.

On February 12, 2008, USEPA approved a TMDL for mercury in San Francisco Bay. On March 29, 2010, USEPA approved a TMDL for PCBs in San Francisco Bay. The numeric targets, allocations, and associated implementation plan will ensure that all San Francisco Bay segments attain applicable water quality standards to protect and support beneficial uses.

IV. 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. Section 122.44(d) of the Code of Federal Regulations requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water.

A. Water Quality-Based Effluent Limitations (WQBELs)

1. Scope and Authority

Section 301(b) of the CWA and 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. Water quality-based effluent limitations are included in this permit to implement wasteload allocations which are part of the San Francisco Bay mercury and PCBs TMDLs.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The WQC and WQOs applicable to the receiving waters for this discharge are from the Basin Plan. A Basin Plan amendment, adopted by the Regional Water Board on August 9, 2006, and corrected by the Regional Water Board Executive Officer on May 23, 2007, (for the WLA for C&H Sugar Co.) was approved by the State Water Board on July 17, 2007. This Basin Plan amendment added two new mercury water quality objectives and vacated an outdated objective. The new objectives apply to all segments of San Francisco Bay, including all marine and estuarine waters contiguous to San Francisco Bay. The new objective to protect people who consume Bay fish applies to fish large enough to be consumed by humans. The objective is

0.2 mg mercury per kg fish tissue (average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans). The objective to protect aquatic organisms and wildlife applies to small fish (3–5 cm in length) commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish (average wet weight concentration). These two new objectives replace the water column four-day average marine mercury objective of 0.025 µg/L, which no longer applies to San Francisco Bay waters.

The water quality objectives for PCBs that are not attained include the numeric water quality criterion from the California Toxics Rule of 0.00017 µg/L and the narrative water quality objective. The narrative water quality objective states that controllable water quality factors shall not cause a detrimental increase in toxic substances found in bottom sediments or aquatic life. The PCBs TMDL and implementation plan are designed to resolve PCB impairment in all segments of San Francisco Bay. For municipal and industrial wastewater discharges this means limiting loads to 2.0 kg/year and 0.035 kg/year, respectively.

Effluent limitations and provisions contained in this Order for mercury and PCBs are designed to implement the San Francisco Bay Mercury and PCBs TMDLs to ensure that the Dischargers do not cause impairment of San Francisco Bay for these pollutants.

3. Determining the Need for WQBELs

This Order contains WQBELs for mercury and PCBs. As required by section 122.44(d)(1)(vii), the Regional Water Board is including WQBELs for mercury and PCBs in this Order that are consistent with the assumptions and requirements of the San Francisco Bay Mercury and PCBs TMDLs. Based on the water quality monitoring done at the time of these TMDL adoptions, which set the wasteload allocations for mercury and PCBs at levels necessary to attain water quality standards, the Regional Water Board has determined that the WQBELs are consistent with the assumptions of these TMDLs. Similarly, compliance with the effluent limitations will satisfy the requirements of the TMDL.

The Regional Water Board has developed WQBELs for mercury and PCBs pursuant to section 122.44(d)(1)(vii), which does not require or contemplate a reasonable potential analysis. Similarly, the SIP at Section 1.3 recognizes that reasonable potential analysis is not appropriate if a TMDL has been developed.

4. WQBEL Calculations - Mercury

There are two sets of WQBELs for mercury in this Order: mass-based and concentration-based.

Mass-based WQBELs

The mass-based WQBELs are based on the established aggregate wasteload allocations for Municipal Dischargers and Industrial Dischargers that comprise a portion of the San Francisco Bay mercury TMDL. For the San Francisco Bay mercury TMDL, loads are expressed in terms of annual mercury loads in kilograms per year (kg/yr) because the adverse effects of mercury occur through long-term bioaccumulation. The loads are intended to represent long-term averages and account for long-term variability, including seasonal variability.

The San Francisco Bay mercury TMDL's initial aggregate load limit of 17 kg/yr and associated individual load limits for Municipal Dischargers are shown in Table F-8 below. Also shown are the final wasteloads allocations that will apply with this Order.

Table F-8. TMDL Mass Limits and Wasteload Allocations for Municipal Wastewater Dischargers

Permitted Entity	NPDES Permit	Current Initial Load Limit (kg/yr)	Final Allocation (kg/yr)
American Canyon, City of	CA0038768	0.12	0.095
California Department of Parks and Recreation Angel Island State Park	CA0037401	0.013	0.013
Benicia, City of	CA0038091	0.088	0.088
Burlingame, City of	CA0037788	0.089	0.089
Calistoga, City of	CA0037966	0.016	0.016
Central Contra Costa Sanitary District	CA0037648	2.23	1.3
Central Marin Sanitation Agency	CA0038628	0.18	0.11
Delta Diablo Sanitation District	CA0038547	0.31	0.19
East Bay Dischargers Authority Dublin-San Ramon Services District (CA0037613) Hayward Shoreline Marsh (CA0038636) Livermore, City of (CA0038008) Union Sanitary District, wet weather (CA0038733)	CA0037869	3.6	2.2
East Bay Municipal Utility District	CA0037702	2.6[a]	1.5
Fairfield-Suisun Sewer District	**CA0038024**	**0.22**	**0.17**
Las Gallinas Valley Sanitary District	CA0037851	0.17	0.10
Marin County Sanitary District, Paradise Cove	CA0037427	0.00055	0.00055
Marin County Sanitary District, Tiburon	CA0037753	0.0099	0.0099
Millbrae, City of	CA0037532	0.052	0.052
Mt. View Sanitary District	**CA0037770**	**0.034**	**0.034**
Napa Sanitation District	CA0037575	0.28	0.17
Novato Sanitary District	CA0037958	0.079	0.079
Palo Alto, City of	**CA0037834**	**0.38**	**0.31**
Petaluma, City of	CA0037810	0.063	0.063
Pinole, City of	CA0037796	0.055	0.055
Crockett Community Services District, Port Costa Sanitary Dept.	CA0037885	0.00072	0.00072
Rodeo Sanitary District	CA0037826	0.060	0.060
Saint Helena, City of	CA0038016	0.047	0.047
San Francisco, City and County of, San Francisco Airport	CA0038318	0.032	0.032
San Francisco, City and County of, Southeast Plant	CA0037664	2.7	1.6

Permitted Entity	NPDES Permit	Current Initial Load Limit (kg/yr)	Final Allocation (kg/yr)
San Jose/Santa Clara WPCP	CA0037842	**1.0**	**0.80**
San Mateo, City of	CA0037541	0.32	0.19
Sausalito-Marin City Sanitary District	CA0038067	0.078	0.078
Sewerage Agency of Southern Marin	CA0037711	0.13	0.076
Sonoma Valley County Sanitary District	CA0037800	0.041	0.041
South Bayside System Authority	CA0038369	0.53	0.32
South San Francisco/San Bruno WQCP	CA0038130	0.29	0.18
Sunnyvale, City of	CA0037621	**0.15**	**0.12**
US Department of Navy, Treasure Island WWTP	CA0110116	0.026	0.026
Vallejo Sanitation & Flood Control District	CA0037699	0.57	0.34
West County Agency, Combined Outfall	CA0038539	0.38	0.23
Yountville, Town of	CA0038121	0.040	0.04
Total		***17*** [a]	***11*** [a]

Notes to Table F-8:
Bold text indicates advanced secondary treatment.
[a] Total differs slightly from the column sum due to rounding.

The San Francisco Bay mercury TMDL's wasteload allocations for Industrial Dischargers, summing to 1.3 kg/yr, are shown in Tables F-9 and F-10 below.

Table F-9. Mercury TMDL Wasteload Allocations for Industrial (Non-Petroleum Refinery)

Permitted Entity	NPDES Permit	Mercury Allocation (kg/yr)
C&H Sugar Co.[b]	CA0005240	0.045
Crockett Cogeneration	CA0029904	0.0047
Dow Chemical Company	CA0004910	0.041
General Chemical	CA0004979	0.21
GWF Power Systems, Site I	CA0029106	0.0016
GWF Power Systems, Site V	CA0029122	0.0025
Hanson Aggregates, Amador Street	CA0030139	0.000005
Hanson Aggregates, Olin Jones Dredge Spoils Disposal	CA0028321	0.000005
Hanson Aggregates, Tidewater Ave. Oakland	CAA030147	0.000005
Pacific Gas and Electric, East Shell Pond	CA0030082	0.00063
Pacific Gas and Electric, Hunters Point Power Plant	CA0005649	0.020
Rhodia, Inc.	CA0006165	0.011
San Francisco, City and Co., SF International Airport Industrial WWTP	CA0028070	0.051
GenOn Delta, Pittsburg Power Plant[b]	CA0004880	0.0078
Southern Energy Delta LLC, Potrero Power Plant[b]	CA0005657	0.0031
United States Navy, Point Molate	CA0030074	0.013
USS-Posco	CA0005002	0.045
Total[a]		**0.45**

Table F-10. Mercury TMDL Wasteload Allocations for Petroleum Refinery

Permitted Entity	NPDES Permit	Mercury Allocation (kg/yr)
Chevron Products Company	CA0005134	0.34
ConocoPhillips[b]	CA0005053	0.13
Martinez Refining Co. (formerly Shell)	CA0005789	0.22
Ultramar, Golden Eagle	CA0004961	0.11
Valero Refining Company	CA0005550	0.08
Total[a]		**0.9**

Notes to Tables F-9 and F-10:

[a] Total differs slightly from the column sum due to rounding.

[b] Wasteload allocations for industrial wastewater discharges do not include mass from once-through cooling water. The Regional Water Board will apply intake credits to once-through cooling water as allowed by law.

Because wastewater Dischargers regularly monitor and report their discharges, their combined loads can be estimated more precisely than any of the other loads estimated for the San Francisco Bay mercury TMDL. Available data are sufficient to allow statistical analyses that quantitatively characterize variations from year to year. The initial waste load allocations were based on current load estimates computed using available data on effluent mercury concentrations and effluent discharge volumes from 2000 through 2003.

In order to account for the inter-annual variability of discharge given the relatively short data period, current loading for the two wastewater discharge groups (municipal and industrial) was estimated as the upper 99% confidence intervals about the mean. At the time of TMDL development, the combined mercury load for all municipal wastewater discharges to San Francisco Bay and its tributaries was estimated to be about 17 kg/yr. The combined load of the Industrial Dischargers and petroleum refineries was estimated to be about 1.3 kg/yr. Together, these wastewater discharges were estimated to account for a load of about 18.3 kg/yr, or about 2% of the bay's total mercury load. As stated in the TMDL implementation plan, "if any aggregate mass limit is exceeded, the Regional Water Board will pursue enforcement actions against those individual dischargers whose mass discharges exceed their individual mass limits." With the mercury TMDL, Municipal Dischargers were granted a 20-year compliance schedule to ensure aggregate loads did not exceed a final limit of 11 kg/yr. However, since Municipal Dischargers are already well below this final limit, this Order imposes the final limit of 11 kg/yr because 40 CFR 122.47 requires compliance as soon as possible.

This Order does not contain requirements for the Dow Chemical Company, General Chemical, California Department of Parks and Recreation, Angel Island State Park, the PG&E Hunters Point facility, the US Navy Point Molate facility, GWF Power Systems Sites I and V, and the Potrero Power Plant because the wastewater discharges from these facilities have ceased, and the Regional Water Board has rescinded their NPDES permits. To account for these rescissions, this Order reduces the aggregate industrial allocation from 1.3 to 1.0 kg/yr. This Order also does not contain requirements for the

three Hanson Aggregates facilities that are covered under general NPDES permits. The Regional Water Board will revise the general NPDES permit for the three Hanson Aggregate facilities to be consistent with the TMDL. Finally, this Order does not contain requirements for the San Francisco International Airport industrial wastewater treatment plant because it will be regulated as one site (sanitary and industrial). Because flows to the San Francisco International Airport's treatment facility are now predominantly sanitary, it is appropriate to regulate this facility as a municipal wastewater treatment plant. These facilities comprise a very small portion of the total wastewater mercury load to San Francisco Bay.

Concentration-based WQBELs for Mercury

In addition to the mercury mass limits, which are based directly on the TMDL's wasteload allocations, this Order requires Dischargers to meet concentration effluent limitations. This is consistent with the assumptions and requirements of the TMDL, as well as the State Water Board's understanding in Resolution No. 2007-0045 approving the TMDL, which states in part "that any NPDES permit or permits that implement the San Francisco Bay mercury TMDL will include individual numeric effluent limitations consistent with the assumptions and requirements of waste load allocations for each wastewater discharger, that will be individually enforceable." A primary assumption and requirement of the TMDL is that wastewater dischargers maintain current treatment performance. This is stated in the TMDL and its supporting documents as follows:

- "The watershed NPDES permit for municipal facilities will put in place a set of triggered actions … intended … to ensure that municipal wastewater facilities maintain their ongoing operation, maintenance, and performance." (p. 75, Staff Report for the TMDL, September 2, 2004)
- The TMDL's "conditions are intended … to ensure that industrial wastewater facilities maintain proper operation, maintenance, and performance." (BPA-20, Basin Plan Amendment, August 9, 2006)

Moreover, the TMDL's initial wasteload allocations were calculated from actual discharge data from 2000 to 2003.

To set individual numeric limits consistent with this and the performance levels determined in the TMDL as necessary to attain water quality standards, Order No. R2-2007-0077 derived performance based concentration limits for three separate categories of performance using discharge data from the same time period (2000 through 2003) from representative sets of wastewater Dischargers. The calculations are described in Appendix F-2 of this Fact Sheet. The three categories of performance are municipal secondary treatment, municipal advanced secondary treatment, and industrial treatment based on petroleum refineries' performance.

The concentration limits for non-petroleum refinery Dischargers in Order No. R2-2007-0077 were determined using performance data from petroleum refineries (2000-2003). Though the manufacturing and treatment processes at those facilities differ from those at petroleum refineries, using petroleum refinery performance data is consistent with the way the performance based trigger levels were set for all industrial dischargers in the

TMDL. This Order includes the same performance-based concentration limits for mercury that were included in Order No. R2-2007-0077.

As required by 40 CFR 122.45(d), average monthly and average weekly effluent limits are set for "publically owned treatment plants"; these include the Municipal Dischargers. For Industrial Dischargers, this regulation requires average monthly and maximum daily effluent limits.

Individual mercury mass and concentration effluent limitations are shown in Tables F-11 and F-12 below. These limitations are intended to minimize the potential for adverse effects in the immediate vicinity of discharges and to ensure that wastewater facilities maintain proper operation, maintenance, and performance.

Table F-11. Municipal -- Individual Mercury Effluent Limitations

Permitted Entity	Average Annual Effluent Limit for Mercury[1] (kg/yr)	Average Monthly Effluent Limit for Mercury (µg/L)	Average Weekly Effluent Limit for Mercury (µg/L)
American Canyon, City of	0.095	0.025	0.027
Benicia, City of	0.088	0.066	0.072
Burlingame, City of	0.089	0.066	0.072
Calistoga, City of	0.016	0.066	0.072
Central Contra Costa Sanitary District	1.3	0.066	0.072
Central Marin Sanitation Agency	0.11	0.066	0.072
Delta Diablo Sanitation District	0.19	0.066	0.072
East Bay Dischargers Authority, including City of Hayward, City of San Leandro, Oro Loma Sanitary District, Castro Valley Sanitary District, Union Sanitary District, Livermore-Amador Valley Water Management Agency, Dublin San Ramon Services District, and City of Livermore	2.2	0.066	0.072
East Bay Municipal Utility District	1.5	0.066	0.072
Fairfield-Suisun Sewer District	0.17	0.025	0.027
Las Gallinas Valley Sanitary District	0.10	0.066	0.072
Marin County (Paradise Cove), Sanitary District No. 5 of	0.00055	0.066	0.072
Marin County (Tiburon), Sanitary District No. 5 of	0.0099	0.066	0.072
Millbrae, City of	0.052	0.066	0.072
Mt. View Sanitary District	0.034	0.025	0.027
Napa Sanitation District	0.17	0.066	0.072
Novato Sanitary District	0.079	0.066	0.072
Palo Alto, City of	0.31	0.025	0.027
Petaluma, City of	0.063	0.066	0.072
Pinole, City of	0.055	0.066	0.072
Crockett Community Services District, Port Costa Sanitary Dept.	0.00072	0.066	0.072

Permitted Entity	Average Annual Effluent Limit for Mercury[1] (kg/yr)	Average Monthly Effluent Limit for Mercury (µg/L)	Average Weekly Effluent Limit for Mercury (µg/L)
Rodeo Sanitary District	0.060	0.066	0.072
Saint Helena, City of	0.047	0.066	0.072
San Francisco, City and County of, San Francisco International Airport, Sanitary	0.032	0.066	0.072
San Francisco (Southeast Plant), City and County of	1.6	0.066	0.072
San Jose/Santa Clara, WPCP	0.80	0.025	0.027
San Mateo, City of	0.19	0.066	0.072
Sausalito-Marin City Sanitary District	0.078	0.066	0.072
Sewerage Agency of Southern Marin	0.076	0.066	0.072
Sonoma Valley County Sanitary District	0.041	0.066	0.072
South Bayside System Authority	0.32	0.066	0.072
South San Francisco and San Bruno, Cities of	0.18	0.066	0.072
Sunnyvale, City of	0.12	0.025	0.072
US Department of Navy, Treasure Island	0.026	0.066	0.072
Vallejo Sanitation and Flood Control District	0.34	0.066	0.072
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	0.23	0.066	0.072
Yountville, Town of	0.040	0.066	0.072
Aggregate Mass Emission Limit (kg/yr)	11[2]	Not Applicable	Not Applicable

Footnotes:

(1) Compliance with the Average Annual Effluent Limitations is determined annually for each Municipal Discharger each calendar year, and is attained if the sum of the individual Municipal Dischargers' mercury mass emissions, calculated as described below, is not greater than the Aggregate Mass Emission Limit of 11 kg/yr. If the sum of all individual Municipal Dischargers' mercury mass emission(s) is greater than 11 kg/yr, the Municipal Discharger(s) whose mercury mass emission(s) exceed(s) its (their) individual limitation(s) in Table F-11, shall be deemed to be in violation of its (their) mercury mass limitation(s). For compliance determination, mass emissions shall be determined as defined below:

a. The total annual aggregate mass emission shall be the sum of the individual annual mass emissions from each Municipal Discharger. The sum shall be rounded to the nearest kilogram for comparison with the Aggregate Mass Emission Limit.

b. The annual average mass emission for each Discharger shall be computed for the period January 1 through December 31, annually. Calendar timeframes for discharge limitations are consistent with federal regulations and USEPA guidance.

c. The annual average mass emission for each Discharger listed in Table F-11 above shall be the sum of monthly emissions on a calendar year basis and computed as follows:

$$Annual\ Mass\ Emission, kg/year = \sum (Monthly\ Mass\ Emission\ Rates, kg/month)$$

where

$$Monthly\ Mass\ Emission, kg = \left(\frac{0.003785}{N}\right) * \left(\sum_{i=1}^{N} Q_i C_i\right) * 30.5 = \frac{0.1154425}{N} * \left(\sum_{i=1}^{N} Q_i C_i\right)$$

and where

C_i = mercury concentration of each individual sample, µg/l
Q_i = Discharger flow rate on date of sample, millions of gallons per day (mgd)
N = number of samples collected during the month
0.003785 = conversion factor to convert (µg/l)*(mgd) into kg/day
30.5 = number of days in a standard month
0.1154425= product of (conversion factor)·(number of standard days per month)

(2) Total differs slightly from the column sum due to rounding to the nearest kilogram.

Table F-12. Industrial -- Individual Mercury Effluent Limitations

Permitted Entity	Annual Average Effluent Limit for Mercury[1] (kg/yr)	Monthly Average Effluent Limit for Mercury (µg/L)	Daily Maximum Effluent Limit for Mercury (µg/L)
Industrial Wastewater Discharger (Non-Petroleum Refinery):			
C&H Sugar and Crockett Community Services District, Crockett Sanitary Dept.	0.045	0.079	0.12
Crockett Cogeneration, LP, and Pacific Crockett Energy, Inc.	0.0047	0.079	0.12
Pacific Gas and Electric Company	0.00063	0.079	0.12
Rhodia, Inc.	0.011	0.079	0.12
GenOn Delta, LLC	0.0078	0.079	0.12
USS-Posco Industries	0.045	0.079	0.12
Industrial Wastewater Discharger (Petroleum Refinery):			
Chevron Products Company	0.34	0.079	0.12
Phillips 66 (formerly ConocoPhillips)	0.13	0.079	0.12
Shell Oil Products US and Equilon Enterprises LLC	0.22	0.079	0.12
Tesoro Refining & Marketing Co.	0.11	0.079	0.12
Valero Refining Company	0.08	0.079	0.12
Aggregate Mass Emission Limit[2] (kg/yr)	**1.0**	Not Applicable	Not Applicable

Footnotes:

(1) Compliance with the Average Annual Effluent Limitations is determined annually for each Industrial Discharger each calendar year, and is attained if the sum of the individual Industrial Dischargers' mercury mass emissions, calculated as described below, is not greater than the Aggregate Mass Emission Limit of 1.0 kg/yr. If the sum of the individual Industrial Dischargers' mercury mass emission(s) is greater than 1.0 kg/yr, the Industrial Discharger(s) whose mercury mass emission(s) exceed(s) its (their) individual limitation(s) in Table F-12, shall be deemed to be in violation of its (their) mercury mass limitation(s). For compliance determination, mass emissions shall be determined as defined below:

a. The total annual aggregate mass emission shall be the sum of the individual annual mass emissions from each Industrial Discharger. The sum shall be rounded to the nearest tenth of a kilogram for comparison with the 1.0 kg/yr.

b. The annual average mass emission for each Discharger shall be computed for the period January 1 through December 31, annually. Calendar timeframes for discharge limitations are consistent with federal regulations and USEPA guidance.

c. The annual average mass emission for each Discharger listed in Table F-12 above shall be the sum of monthly emissions on a calendar year basis and computed as follows:

$$Annual\ Mass\ Emission, kg/year = \sum \left(Monthly\ Mass\ Emission\ Rates, kg/month \right)$$

where

$$Monthly\ Mass\ Emission, kg = \left(\frac{0.003785}{N} \right) * \left(\sum_{i=1}^{N} Q_i C_i \right) * 30.5 = \frac{0.1154425}{N} * \left(\sum_{i=1}^{N} Q_i C_i \right)$$

and where

C_i = mercury concentration of each individual sample, µg/l
Q_i = Discharger flow rate on date of sample, millions of gallons per day (mgd)
N = number of samples collected during the month
0.003785 = conversion factor to convert (µg/l)*(mgd) into kg/day
30.5 = number of days in a standard month
0.1154425= product of (conversion factor)·(number of standard days per month)

(2) Total differs slightly from the column sum due to rounding, and from several industrial dischargers discontinuing their discharges.

5. Water Quality Based Effluent Limits - PCBs

The PCBs TMDL indicates that NPDES permits shall include effluent limits based on current performance. It also indicates that the Regional Water Board will implement wasteload allocations for PCBs via numeric WQBELs. In other words, NPDES permits must include numeric effluent limitations, based on current performance, that are consistent with the wasteload allocations in the TMDL.

This Order includes the same performance-based limits for PCBs that the Regional Water Board established in Order No. R2 2011-0012. To calculate PCBs performance-based limits that were consistent with the assumptions and requirements of the PCBs TMDL, Order No. R2-2011-0012 used PCBs data from 1999 to 2001 (included in Appendix F-4). These were the same data that were used in the development of the TMDL. Data were grouped into four categories (municipal secondary treatment, municipal advanced secondary treatment, petroleum refinery, and other industry). The purpose of pooling PCBs data was to calculate limits based on categories of treatment that are similar to reduce the likelihood of penalizing dischargers that have implemented effective control measures and are already performing well.

Order No. R2-2011-0012 established, as the performance limits, concentration-based average monthly effluent limits (AMEL) and maximum daily effluent limits (MDEL).

These limits were derived from the mean concentration of each discharge category (accounting for some uncertainty). Because the TMDL was also derived from these same mean concentrations, the performance limits calculated are consistent with the TMDL. The Regional Water Board chose these concentration limits because 40 CFR 122.45(d) requires, unless impracticable, that effluent limitations be expressed as (1) maximum daily and average monthly discharge limitations for all dischargers other than publicly owned treatment works (POTWs); and (2) average weekly and average monthly discharge limitations for POTWs. In the case of POTWs, this Order includes an MDEL instead of an average weekly limit (AWL). This is consistent with USEPA's Technical Support Document, which states: "in lieu of an AWL for POTWs, EPA recommends establishing an MDL for toxic pollutants and pollutant parameters in water quality permitting."

Order No. R2-2011-0012 did not establish mass limits since concentration limits are more directly related to the performance of a facility. This is because mass limits also rely on flows. Flows are highly influenced by rainfall, which is not within the Dischargers' control. Derivation of limits with longer averaging periods, as would be required to establish mass limits, requires frequent monitoring (e.g., monthly) to capture variability. Such frequent monitoring is not a reasonable or prudent use of resources, because wastewater discharges are a small source of PCBs to the Bay relative to the high cost of analysis (~$1,000 each).

To calculate performance based AMELs and MDELs for each discharge category, Order No. R2-2011-0012 equated the 99% upper confidence limit (UCL) on the mean of the concentrations of the TMDL data set for each discharge category with the long-term average for that discharge category. The reason for using a 99% UCL on the mean is because of the high level of uncertainty in the actual mean (or actual performance) from the very small data set for each discharge category (number of samples between 6 and 14) used to establish TMDL allocations. The Regional Water Board then multiplied the long-term average for each discharge category by the appropriate multiplier from the USEPA's Technical Support Document to calculate AMELs and MDELs. Table F-13 shows each step in the derivation of effluent limits.

Table F-13 Derivation of Effluent Limits for PCBs

DISCHARGE CATEGORY	Advanced Secondary	Secondary	Petroleum Refinery	Other Industry
Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**
No. of data points <10 or at least 80% of data reported non detect? (Y/N)	N	Y	N	Y
Mean of TMDL effluent data points	0.00211	0.003556	0.000272	0.003543
Std Dev of TMDL effluent data points	0.000066	0.002206	0.000199	0.001554
Coefficient of Variation (CV), calculated	0.31	0.62	0.73	0.44
CV, Selected – Final	0.31	0.60	0.73	0.60
99% UCL on the Mean = long term avg.	0.00025	0.005547	0.000402	0.005678
AMEL multiplier95 from USEPA TSD	1.58	2.13	2.37	2.13
MDEL multiplier99 from USEPA TSD	1.94	3.11	3.70	3.11

DISCHARGE CATEGORY	Advanced Secondary	Secondary	Petroleum Refinery	Other Industry
Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**
AMEL	0.00039	0.012	0.00095	0.012
MDEL	0.00049	0.017	0.0015	0.018

Finally, as in Order No. R2-2011-0012, the limits are based on data for 40 congeners that are representative surrogates for PCBs that are causing impairment. These 40 congeners are the same ones monitored in the Regional Monitoring Program (using Method 1668a) that formed the basis for the impairment. As some other congeners co-elute with these 40 congeners (using Method 1668c), the concentrations of as many as 66 congeners, if the laboratory uses a SB-Octyl column (shown in Table F-14 below), or as many as 59 congeners, if the laboratory uses a DB-1 column (shown in Table F-15 below), form the basis for the limits. Therefore, it would be reasonable and consistent with the PCBs TMDL (if USEPA Proposed Method 1668c is an approved method at the time of the next permit reissuance) that any future compliance with effluent limits be determined using the same congeners that were used in the derivation of the limits specified in this Order.

Table F-14
PCB Congeners, Including Co-Elution (IUPAC No.) with SB-Octyl Column for TMDL Development

PCB 005	PCB 061	PCB 099	PCB 149	PCB 181
PCB 008	PCB 066	PCB 101	PCB 151	PCB 182
PCB 018	PCB 070	PCB 105	PCB 153	PCB 183
PCB 020	PCB 073	PCB 106	PCB 156	PCB 187
PCB 021	PCB 074	PCB 110	PCB 158	PCB 190
PCB 028	PCB 076	PCB 115	PCB 160	PCB 194
PCB 031	PCB 080	PCB 116	PCB 163	PCB 195
PCB 033	PCB 086	PCB 118	PCB 164	PCB 196
PCB 043	PCB 087	PCB 127	PCB 168	PCB 201
PCB 044	PCB 089	PCB 128	PCB 169	PCB 203
PCB 049	PCB 090	PCB 132	PCB 170	
PCB 052	PCB 093	PCB 138	PCB 174	
PCB 056	PCB 095	PCB 139	PCB 177	
PCB 060	PCB 097	PCB 141	PCB 180	

Table F-15
PCB Congeners, Including Co-Elution (IUPAC No.) with DB-1 Column for TMDL Development

PCB 005	PCB 061	PCB 110	PCB 160	PCB 196
PCB 008	PCB 066	PCB 117	PCB 161	PCB 201
PCB 018	PCB 069	PCB 118	PCB 162	PCB 203
PCB 020	PCB 070	PCB 125	PCB 163	
PCB 021	PCB 074	PCB 128	PCB 164	
PCB 028	PCB 076	PCB 132	PCB 170	
PCB 031	PCB 087	PCB 138	PCB 174	
PCB 033	PCB 090	PCB 139	PCB 177	
PCB 043	PCB 095	PCB 141	PCB 180	
PCB 044	PCB 097	PCB 149	PCB 182	
PCB 049	PCB 099	PCB 151	PCB 183	
PCB 052	PCB 101	PCB 153	PCB 187	
PCB 056	PCB 105	PCB 156	PCB 194	
PCB 060	PCB 106	PCB 158	PCB 195	

6. Satisfaction of Anti-Backsliding Requirements

CWA Sections 402(o)(2) and 303(d)(4) and 40 CFR 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. All limitations and requirements of this Order are as stringent as those in the previous permit. Therefore, anti-backsliding requirements of the CWA and NPDES Regulations are satisfied.

7. Satisfaction of Antidegradation Policy

The Order's mercury and PCBs effluent limitations, which implement wasteload allocations, have been computed to satisfy the total maximum daily loads that will allow the San Francisco Bay to come into attainment with water quality objectives for mercury and PCBs. This Order includes requirements that are part of an overall comprehensive plan to restore mercury and PCBs levels in San Francisco Bay. Because the TMDLs for mercury and PCBs are consistent with protecting existing instream water uses and the level of water quality necessary to protect the existing uses, antidegradation requirements are satisfied. Furthermore, this Order specifies performance based effluent limits that will assure compliance with antidegredation.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

No additional receiving water limits beyond those already specified in the Dischargers' individual permits are necessary in this Order.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 authorize the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (MRP), Attachment E of this Order, establishes monitoring and reporting requirements to implement federal and state requirements. The following provides the rationale for the monitoring and reporting requirements contained in the MRP for this facility.

Consistent with the mercury and PCBs TMDLs, Dischargers are required by this Order to report mercury and PCBs discharge levels and trends. The monitoring frequencies specified in the MRP are dependent on each Discharger's contribution of mercury and PCBs, and its resources to conduct the monitoring. For example, those with larger flows are required to monitor more frequently. This Order retains the monitoring frequencies included in Order No. R2-2007-0077 as amended by Order No. R2-2011-0012 with a few exceptions noted below:

- This Order does not require monitoring for methylmercury, because the Dischargers do not appear to be a significant source of methylmercury to the Bay. The Dischargers have monitored their effluent for methylmercury since March 1, 2008, under the previous order. These data show that the portion of total mercury in the form of methylmercury is on average about 3 to 5 percent. Treatment systems with the highest percentage of methylmercury (up to 20 percent) tend to be ponds that have long residence times and such systems are rare with only two in the Bay Area. Additionally, studies[2] near the outfall of Municipal Dischargers suggest that treated wastewater tends to suppress methylation in near-field conditions possibly through biodilution.

- This Order reduces PCBs congener monitoring from all 209 congeners to the 40 (66 including co-elutions) that were used to develop the PCBs TMDL. This is because these additional congeners do not play a significant role in the amount of PCBs that bioaccumulate in fish. Therefore, monitoring for these additional congeners is unnecessary for evaluating compliance with the PCBs TMDL and for tracking PCBs loads to San Francisco Bay.

Compliance with effluent limits must be determined using an approved method under 40 CFR Part 136. In the case of PCBs, this is Method 608. Consistent with the TMDL, this Order also requires each Discharger to monitor and report PCBs using USEPA's proposed Method 1668c, which is capable of quantifying PCBs that are present at lower levels than Method 608. The Regional Water Board will use Method 1668c PCBs data to verify assumptions and evaluate the need to further refine wasteload allocations in the TMDL.

The Regional Water Board finds that these monitoring and reporting requirements bear a reasonable relationship to the Regional Water Board's need for and the benefits obtained from the reports.

[2] Driscoll, C.T., et al., *Nutrient supply and mercury dynamics in marine ecosystems: A conceptual model.* Environ. Res. (2012), http://dx.doi.org/10.1016/j.envres.2012.05.002.

VII. RATIONALE FOR PROVISIONS

A. Federal and Regional Standard Provisions

Standard Provisions, which apply to all NPDES permits in accordance with section 122.41, and additional conditions applicable to specified categories of permits in accordance with section 122.42, are provided in Attachment D of each dischargers individual permit. This Order also references Regional Standard Provisions (Attachment G of each dischargers individual permit), in part, to ensure that dischargers properly sample and report all analysis for mercury and PCBs.

B. Special Provisions

1. Triggers for Additional Mercury Control

Mass and concentration triggers were developed to allow for early required actions in the event an increasing trend in mercury discharge is observed by individual Dischargers. The purpose of the triggers is to evaluate the source of new mercury and identify a method for reduction before levels become elevated.

Consistent with the TMDL, mass triggers for Municipal and Industrial Dischargers are equivalent to the individual mass limits stated in the Order, but determined monthly, instead of annually, using a rolling 12-month average. This is necessary in order to capture any increases in a more timely fashion to allow development and implementation of reduction measures that may avoid an actual effluent limit violation.

For concentration triggers, there are two broad categories of municipal facilities—those that provide secondary treatment, and those that provide advanced treatment. Facilities providing advanced treatment have better performance, hence lower effluent concentrations than those providing secondary treatment, so the trigger concentrations for advanced facilities are lower than those for secondary treatment facilities.

Consistent with the TMDL implementation plan, the proposed effluent mercury concentration trigger values for municipal secondary treatment facilities are a daily maximum of 0.065 µg/l total mercury (derived from the 99th percentile concentration of effluent data collected from January 2000 to September 2002) and a monthly average of 0.041 µg/l total mercury (derived from the 95th percentile concentration of effluent data collected from January 2000 to September 2002). For facilities providing advanced treatment, the proposed concentration triggers are a daily maximum of 0.021 µg/l total mercury (the 99th percentile concentration) and a monthly average of 0.011 µg/l total mercury (the 95th percentile concentration).

Consistent with the TMDL implementation plan, the proposed effluent trigger concentrations for industrial Dischargers are a daily maximum of 0.062 µg/l total mercury (derived from the 99th percentile concentration of effluent data collected

from January 2000 to September 2002) and a monthly average of 0.037 µg/l total mercury (derived from the 95th percentile concentration of effluent data collected from January 2000 to September 2002).

Consistent with the TMDL if a Discharger exceeds either the mass or concentration trigger, the Order requires the Discharger to report the exceedance in its individual Self-Monitoring Report, and to submit a report that:

- Evaluates the cause of the trigger exceedances;
- Evaluates the effectiveness of existing pollution prevention or pretreatment programs and methods for preventing future exceedances;
- Evaluates the feasibility and effectiveness of technology enhancements to improve plant performance.

The Order provides for 130 days to provide this report, which allows for 30 days for standard laboratory turnaround on ultra clean samples, plus 40 days for accelerated monitoring to verify and better characterize trigger exceedances, and finally the 60-day timeframe from the TMDL implementation plan to submit the report. The Regional Water Board will pursue enforcement action against Dischargers that do not respond to exceedances of triggers or do not implement actions to correct and prevent trigger exceedances. Determination of appropriate actions will be based on an updated assessment of source control measures and wastewater treatment technologies applicable for the term of each issued or reissued permit.

The TMDL implementation plan requires the permit to specify that an exceedance of a trigger level would trigger the discharger to take corrective actions. The TMDL implementation plan explains that one of the concepts behind requiring triggered actions is to ensure that wastewater dischargers maintain ongoing operation, maintenance, and performance of their treatment facilities. Therefore, it is consistent with this concept for this Order to allow further characterization through accelerated monitoring to determine if ongoing performance was maintained before corrective measures must be taken. Accelerated weekly monitoring for at least six events that would span over two months would provide reasonable and convincing weight of evidence that the first initial trigger was either an anomaly or a spurious source and could be disregarded. These additional samples would also help to characterize the duration and magnitude of the exceedance and help with development of the action plan should one be necessary.

See Appendix F-1 for an example of actions required in response to initial trigger exceedances:

2. Mercury and PCBs Source Control Program

The mercury and PCBs TMDLs both require that Dischargers develop and implement programs to identify and control manageable sources of mercury and PCBs. Therefore, this Order requires Dischargers to implement source control programs to reduce mercury and PCBs loads to their respective treatment plants.

3. Risk Reduction Programs

The mercury and PCBs TMDLs require municipal and industrial wastewater dischargers to develop and implement effective programs to reduce mercury-related and PCBs-related risks to humans and wildlife and quantify risk reductions resulting from these activities. This provision is based on this requirement. The Dischargers identified risk management needs, measures to address those needs, and mechanisms to implement these measures in technical reports associated with Order No. R2-2007-0077. This Order requires Dischargers to continue to implement these measures to reduce mercury and PCB-related risks**.**

In this effort, the Regional Water Board will work with the California Office of Environmental Health Hazard Assessment, the California Department of Public Health, and other organizations including Dischargers that pursue risk management as part of their mercury and PCB-related programs. For an effective and efficient regional program, the Order allows that the activities may be performed by a third party if the Dischargers wish to provide funding for this purpose. The Regional Monitoring Program is one such vehicle because it has an equitable and accepted cost allocation system already in place along with an established stakeholder overview and participation process.

4. Effluent Discharge Adjustment for Recycled Wastewater Use by Industrial Dischargers

As dictated by California Water Code sections 13510 through 13512, the Regional Water Board should support and encourage water recycling facilities. The use of recycled wastewater preserves fresh potable water supply sources. The effluent discharge adjustment (or Adjustment) provided in this Order is to avoid penalizing Dischargers who produce recycled wastewater and Dischargers who use recycled wastewater in industrial processes, and is based on the principles outlined in the Basin Plan at 4.6.1.1. It is the same as the existing provision in Order No. R2-2007-0077 as amended by Order No. R2-2011-0012.

The Adjustment is only applicable if the mercury and/or PCBs in the recycled wastewater is ultimately discharged through an industrial discharger's outfall. The Adjustments are calculated based on mass balance principles and will thus not result in any net increase in mercury or PCBs loadings to the Bay. The Mass Adjustment subtracted from one industrial discharger is then added to the municipal discharger who supplied the recycled wastewater and who would have otherwise discharged that mercury and/or PCBs through its municipal treatment plant discharge outfall. Local impacts from this shifting in load will be minimal because the discharge locations for the two will be to the same receiving water body. This is because the cost of water transport between facilities that are very far apart would make the reuse project infeasible.

A Concentration Adjustment is also provided because a typical reuse project involves use of the recycled wastewater in cooling towers or boilers where the

concentration of mercury and/or PCBs increases through evaporative losses. The blowdown would go to the industrial discharger's sewer and potentially elevate its discharge concentration. Since the concentration limit is established based on past performance, future recycled wastewater use could impact the industrial discharger's compliance with the performance limit. Therefore, a Concentration Adjustment is provided. Unlike the Mass Adjustment, it is inappropriate to apply the Concentration Adjustment in reverse to the municipal discharger because the reason for the Adjustment is to account for evaporative losses. These losses occur at the industrial facility and do not affect the municipal discharger's performance.

However, it may be appropriate sometime in the future to provide a Concentration Adjustment when a municipal discharger installs advanced recycled wastewater treatment facilities at its treatment plant site (e.g., reverse osmosis) and blends the concentrated waste stream with its effluent prior to discharge. The mass discharged through the municipal discharger's outfall would not increase but the concentration would. No such projects currently exist in this region.

Currently, the only reuse project where an Adjustment would be applied is between Chevron Products Company (Chevron) and the West County Wastewater District (WCWD). Chevron currently uses about 4 million gallons per day of recycled wastewater. A reuse project that went online in 2009 brought the amount to approximately 7-8 million gallons per day. WCWD discharges through a joint outfall with the City of Richmond under the West County Agency NPDES permit. Based on this provision, any Mass Adjustment subtracted from Chevron would be added to the mass emission reported by the West County Agency prior to determining compliance with the average annual mass limit.

Under this two way Adjustment, for projects like the WCWD and Chevron recycled water project, the allowable mass of mercury discharged to the Bay under this Order would be the sum of the WCWD and Chevron individual mercury mass limits that were based on the wasteload allocations in the TMDL. Only if the sum of WCWD's and Chevron's mercury mass discharge exceed the sum of their individual mass limits would there be a real mass discharge greater than that allowed in the TMDL from these two dischargers. Therefore, this Order allows that a violation would only occur from an Adjustment if the sum of the mass discharge from both exceeds the sum of the individual mercury mass limits, and the adjusted mercury mass discharge from Municipal Dischargers as a group exceeds the aggregate mass limit for the Municipal Dischargers.

5. PCBs Discharge Adjustment for Urban Stormwater Treatment by Municipal Dischargers

The Regional Water Board recognizes that routing urban runoff through municipal wastewater treatment facilities may be an efficient means of reducing PCBs and other particle-associated contaminant loads to the Bay. For this reason, the PCBs TMDL includes a reserve allocation of one kg/year for municipal wastewater treatment plants to treat urban runoff. This provision provides a mechanism for

Municipal Dischargers to receive a credit for treating urban runoff that would otherwise be discharged directly to San Francisco Bay.

As with recycled water credits for Industrial Dischargers, Adjustments are calculated based on mass balance principles and will thus not result in any net increase in PCBs loadings to the Bay. Unlike the use of recycled water, urban runoff diversions will occur in pulses, most likely over a period of hours. For this reason, it's not possible to coordinate sampling of influent and effluent with the precision applied for recycled water credits. Additionally, the concentrations of PCBs in urban runoff are expected to be much more variable than those found in recycled water. For example, a study by East Bay Municipal Utility District entitled: *Characterization of Stormwater Flows, Diversion of Dry Weather and First Flush Flows to a Publicly-Owned Treatment Works*, dated July 2010, found the concentrations of PCBs in dry weather runoff to be almost an order of magnitude lower than those found in wet weather. As such, when determining credits for urban runoff diversions, this Order groups them into two categories: dry weather diversions and wet weather diversions.

During this permit term, the Municipal Discharger may use the entire influent PCBs mass for the concentration adjustment described in section V.C.5. In future permits, the Regional Water Board will revisit how to equitably apportion credit for the diverted PCBs mass in such a way that will preserve the incentive for municipal wastewater dischargers to accept such diversions, but also provide appropriate incentive for municipal stormwater dischargers cooperating on such diversion projects.

6. Reopener Provision

The reopener is to cover any changes or modifications to the mercury or PCBs TMDLs.

VIII. PUBLIC PARTICIPATION

The California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board) is considering the issuance of waste discharge requirements (WDRs) that will supersede mercury and PCBs requirements in Order No. R2-2007-0077 as amended by Order No. R2-2011-0012. As a step in the WDR adoption process, the Regional Water Board staff has developed this tentative WDRs. The Regional Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Water Board has notified the Dischargers and interested agencies and persons of its intent to prescribe waste discharge requirements for the discharges and has provided them with an opportunity to submit their written comments and recommendations. Notification was provided through the following: (a) electronic copies of this Order were relayed to the Dischargers and other interested parties, and (b) the Oakland Tribune published a notice in September 2012 that this item would appear before the Regional Water Board.

B. Written Comments

The staff determinations are tentative. Interested persons are invited to submit written comments concerning the revisions of this Tentative Order. Comments must be submitted either in person or by mail to the attention of **Robert Schlipf** at the Regional Water Board at the address above on the cover page of this Order.

To be fully responded to by staff and considered by the Regional Water Board, written comments should be received at the Regional Water Board offices by **5:00 p.m. on Monday, October 29, 2012.**

C. 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, 2012**
Time:	9:00 a.m.
Location:	Elihu Harris State Office Building 1515 Clay Street, 1st Floor Auditorium Oakland, CA 94612
Contact:	Robert Schlipf, (510) 622-2478, rschlipf@waterboards.ca.gov

Interested persons were invited to attend. At the public hearing, the Regional Water Board heard testimony pertinent to the discharges and Tentative Order. Oral testimony was heard; however, for accuracy of the record, important testimony was presented in writing.

Please be aware that dates and venues may change. Our Web address is www.waterboards.ca.gov/sanfranciscobay where you can access the current agenda for changes in dates and locations. Regional Water Board agenda material including staff's responses to written comments, and revisions to the Tentative Order was posted at this website one week prior to the hearing date, and Dischargers and interested parties were notified by email of their availability.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Board to review the decision of the Regional Water Board regarding the final Order. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The San Francisco Bay Mercury and PCBs TMDLs, Tentative Order, related documents, any comments received, and other information are available at www.waterboards.ca.gov/sanfranciscobay. These documents are also on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., except from noon to 1:00 p.m., Monday through Friday. Copying of documents may be arranged through the Regional Water Board by calling (510) 622-2300.

F. 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 permit, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this order should be directed to **Robert Schlipf** at **(510) 622-2478, or by email at rschlipf@waterboards.ca.gov.**

APPENDIX F-1 -- EXAMPLE OF WHEN REQUIRED ACTIONS ARE TRIGGERED

Facility X is subject to the following triggers:

Average Monthly Trigger = 0.041 μg/L
Maximum Daily Trigger = 0.065 μg/L
12-month Mass Emission Trigger = 0.91 kg/yr

A sample collected on May 4th is 0.046 μg/L, with the results received on May 30th by discharger X from its contract laboratory.

Discharger Action: Initiate accelerated monitoring (weekly or more frequent) as soon as practical (within 48 hours) after receipt of sample result above trigger level (0.046 μg/L is above the monthly trigger of 0.041 μg/L).

Discharger Action: Report this exceedance in its cover sheet for the May self-monitoring report (due June 30th), and continue to report mercury data on the cover sheet until successful completion.

Discharger Action: Continue accelerated monitoring until not less than a total of 6 new samples have been collected.

Discharger X's accelerated samples reveal the following results:

Sample Date	Sample Result, μg/L	12-month mass, kg/yr
(May 4)	**(0.046)**	0.80
June 1	0.031	0.79
June 5	0.059	0.82
June 14	0.023	0.81
June 18	0.055	0.82
June 30	0.040	0.82
July 5	0.029	0.81

Discharger Action: Initiate, no later than July 5, development of Action Plan for Mercury Reduction..

Note: Despite the fact that the one sample for July are below all three triggers, the average of the samples in June is above the monthly average trigger.

Discharger Action: Discharger may shift to monthly monitoring after collection of the 6th accelerated sample.

Additional monitoring results:

Sample Date	Sample Result, μg/L	12-month mass, kg/yr
August 11	**0.027**	0.80
September 14	0.042	0.78
October 5	0.042	0.075
October 7	ND (<0.0005)	
November 5	0.035	**0.81**
December 10	0.022	**0.93**
January 5	0.018	**0.94**
February 14	0.028	0.85

March 25	0.010	0.81
April 7	0.023	0.75

Discharger Action: Submit and implement Action Plan for Mercury Reduction (due 130 days after May 30).

Note: Despite the July and August samples being below both concentration triggers, three consecutive months below **all** triggers are necessary before the Action Plan activities are no longer required. The May sample is still above the monthly trigger.

Note: In September, though that sample is above the monthly concentration trigger, accelerated monitoring is not required again because discharger X has already been triggered into Action Plan mode.

Note: In December, though the concentrations have been below concentration triggers for 3 consecutive months, discharger X must continue with the Action Plan because its 12-month running average mass discharge exceeds the mass trigger.

Discharger Action: Report on current mercury reduction efforts in its Annual Self-Monitoring Report due February 1st.

In April, three consecutive months show successful completion of this effort. Discharger X is no longer required to further implement its Action Plan, and may thus return to routine monitoring. Discharger X reports its mercury reduction efforts in its Annual Self-Monitoring Report due next February 1st.

APPENDIX F-2 CALCULATION OF CONCENTRATION-BASED MERCURY LIMITS

Introduction

To calculate concentration-based mercury limits that are consistent with the assumptions and requirements of the Mercury TMDL, the Regional Water Board analyzed mercury data from 2000 to 2003. We grouped data into three categories (municipal secondary treatment, municipal advanced secondary treatment involving filtration, and industrial treatment). The statistical analysis used data from 17 secondary treatment plants, 7 advanced secondary treatment plants, and 5 petroleum refineries.

The purpose of pooling mercury data to calculate limits based on category of treatment and/or process that are similar to reduce the likelihood of penalizing plants that have implemented effective control measures and are already performing well, and rewarding other plants that may not have implemented similar measures.

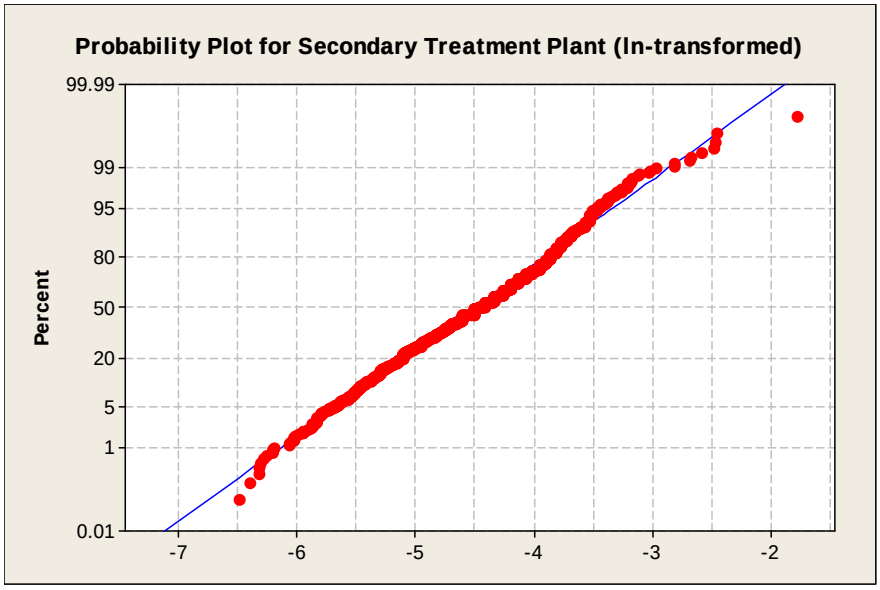
Data Analysis of Municipal Treatment Facilities

We analyzed mercury data from all POTWs that are using the Regional Water Board's electronic reporting system (ERS). Mercury data that did not appear to result from ultra-clean sampling because of high detection limits were removed (i.e., EBMUD data from January 2000 through May 2001, and San Francisco City and County Southeast from October 21, 2003). Additionally, when detection limits were very low (practical quantification limit (PQL) equaled 0.5 ng/L and method detection limit equaled 0.24 ng/L, we censored data at the PQL). Finally, we did not use data from the South Bayside System Authority because this treatment plant does not always filter treated wastewater, which makes it difficult to categorize this system as secondary or advanced secondary treatment.

Secondary Treatment Plants

Our analysis of secondary treatment plants indicates that mercury data fit a log-normal distribution since the data closely follow the line of normality, as shown in Figure 1 below:

Figure 1: Probability Plot of Mercury Data for Secondary Treatment Plants



Because natural log transformed mercury data for secondary treatment plants fits a normal distribution, it is possible to calculate performance-based limits based on select percentiles. For secondary treatment plants (sample size of 984), the mean and standard deviation in the natural log phase are -4.5212 and 0.7188, respectively. We calculated daily, weekly, and monthly mercury limits based on the 99.87th percentile (3 standard deviations above the mean), the 99.57th percentile (2.625 standard deviations above the mean), and the 99.38th percentile (2.5 standard deviations above the mean).

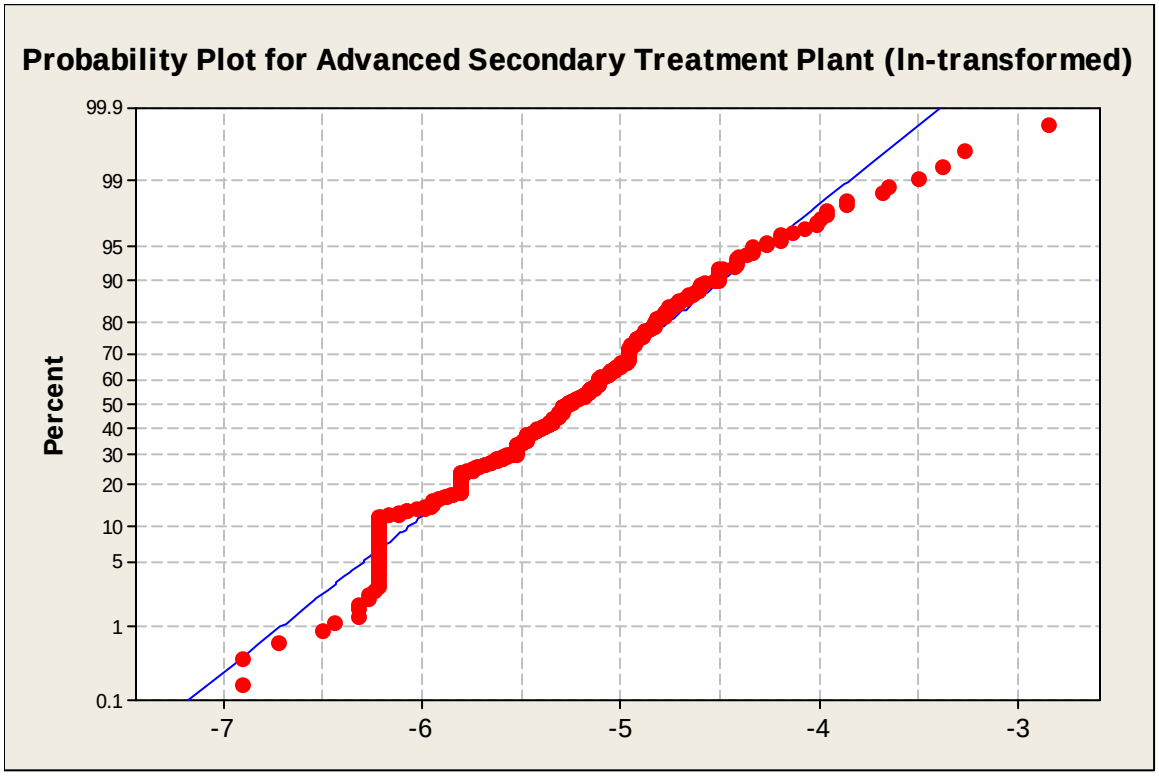
Table 1: Mercury Limits for Secondary Treatment Plants

Percentile	Averaging Period	Mercury Limit (ng/L)
99.87th	Daily	94
99.57th	Weekly	72
99.38th	Monthly	66

Advanced Secondary Treatment Plants

Our analysis of advanced secondary treatment plants indicates those data also fit a log-normal distribution since the data follow the line of normality, as shown in Figure 2 below:

Figure 2: Probability Plot of Mercury Data for Advanced Secondary Treatment Plants



Because natural log transformed mercury data for advanced secondary treatment plants fits a normal distribution, it is again possible to calculate performance-based limits based on select percentiles. For advanced secondary treatment plants (sample size of 434), the mean and standard deviation in the natural log phase are -5.3457 and 0.6664, respectively. We

calculated daily, weekly, and monthly mercury limits based on the 99.87th percentile, the 99.57th percentile, and the 99.38th percentile.

Table 2: Mercury Limits for Advanced Secondary Treatment Plants

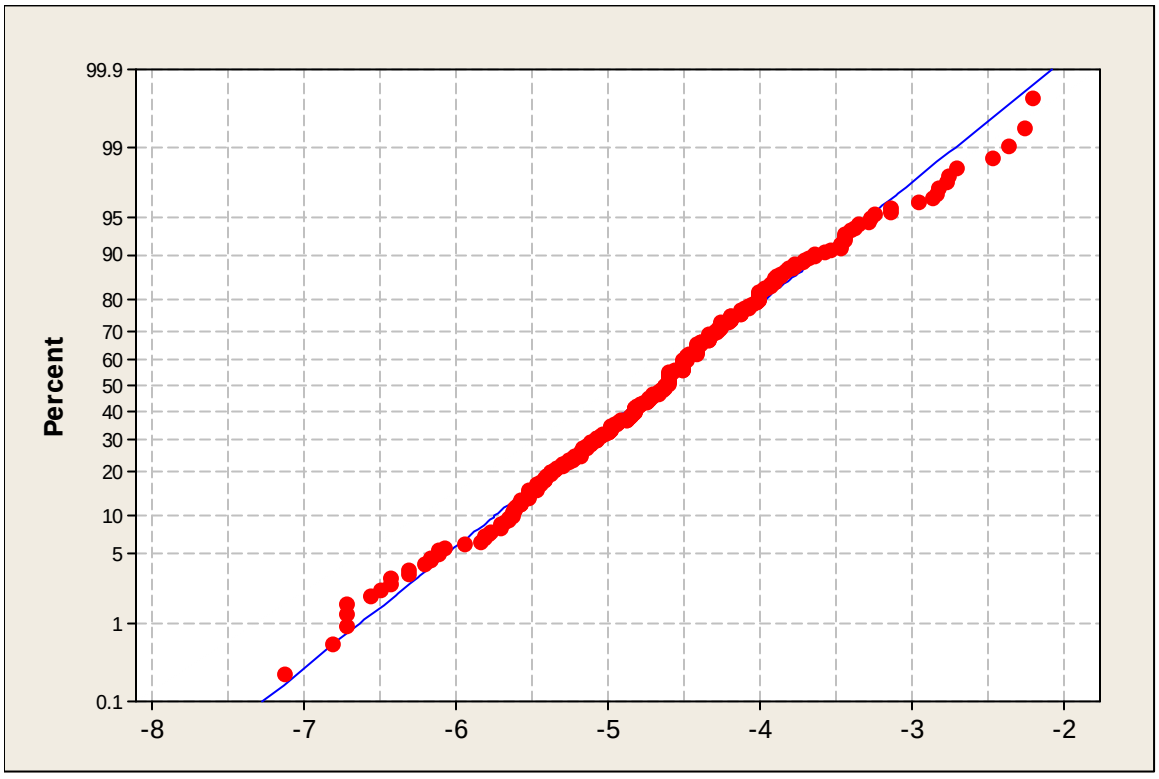
Percentile	Averaging Period	Mercury Limit (ng/L)
99.87th	Daily	35
99.57th	Weekly	27
99.38th	Monthly	25

Data Analysis of Industrial Treatment

We analyzed mercury data from five refineries that report data to the Water Board's electronic reporting system (ERS). As explained in the data tables, Regional Water Board staff determined that a number of data points from three of the refineries (i.e., Chevron, ConocoPhillips, and Shell) were not indicative of treatment plant performance, and therefore, should be removed. Additionally, when detection limits were very low (practical quantification limit (PQL) of 0.5 ng/L, we censored data at the PQL).

Our analysis of five Bay Area refineries indicates that mercury data fit a log-normal distribution since the data closely follow the line of normality, as shown in Figure 1 below:

Figure 3: Probability Plot of Mercury Data for Bay Area Refineries



Because natural log transformed mercury data fits a normal distribution, it is possible to calculate performance-based limits based on select percentiles. For refineries (sample size of

296), the mean and standard deviation in the natural log phase are -4.7000 and 0.8654, respectively. We calculated daily, weekly, and monthly mercury limits based on the 99.87th percentile (3 standard deviations above the mean), the 99.57th percentile (2.625 standard deviations above the mean), and the 99.38th percentile (2.5 standard deviations above the mean).

Table 3: Mercury Limits for Industries Using Petroleum Refinery Performance

Percentile	Averaging Period	Mercury Limit (ng/L)
99.87th	Daily	122
99.57th	Weekly	88
99.38th	Monthly	79

APPENDIX F-3 – SUMMARY OF PCBs LOADS[1]

Advanced Secondary Municipal Dischargers				
Discharger	**Date**	**PCBs (pg/L)**	**Flow (mgd)**	**Normalized (kg/yr)**
San Jose	4/11	223	108.38	0.00668
San Jose	6/11	200	98.49	0.00544
San Jose	9/11	136	90.23	0.00339
San Jose	12/11	187	95.34	0.00493
San Jose	3/12	189	98.56	0.00515
Palo Alto	5/11	1103	18.68	0.00712
Palo Alto	8/11	859	16.13	0.00479
Palo Alto	11/11	1645	21.28	0.01209
Palo Alto	2/12	1028	22.77	0.00809
Sunnyvale	8/11	787	8.13	0.00221
Sunnyvale	11/11	1509	13.63	0.00710
Sunnyvale	2/12	2097	11.25	0.00815
Sunnyvale	5/12	5176	12.35	0.02208
American Canyon	9/11	23	1.3	0.00002
American Canyon	1/12	0	N/A	0.00000
Faifield Suisun	4/11	959	8.75	0.00193
Faifield Suisun	9/11	718	2.92	0.00048
Faifield Suisun	10/11	454	12.64	0.00132
Faifield Suisun	12/11	619	12.87	0.00183
Faifield Suisun	1/12	668	14.46	0.00222
Faifield Suisun	4/12	686	18.9	0.00299
Mt. View Sanitary	7/11	278	1.59	0.00031
Mt. View Sanitary	2/12	261	1.52	0.00027
Total				**0.10859**

Secondary Municipal Dischargers				
Discharger	**Date**	**PCBs (pg/L)**	**Flow (mgd)**	**Normalized (kg/yr)**
EBMUD	5/11	1396	63	0.03038
EBMUD	8/11	2453	57	0.04830
EBMUD	11/11	1591	78	0.04286
EBMUD	2/12	4304	58	0.08622
Benicia	4/11	900	2.58	0.00107
Benicia	7/11	1349	2.17	0.00135
Benicia	1/12	1151	2.27	0.00120
Sonoma	9/11	74	2.46	0.00013
Sonoma	2/12	16	2.74	0.00003
Calistoga	12/11	117	0.59	0.00003
Calistoga	2/12	157	0.85	0.00006
Calistoga	3/12	721	0.73	0.00024
Central Marin	4/11	937	9.5	0.00307
Central Marin	9/11	1610	6.31	0.00351

Secondary Municipal Dischargers				
Discharger	**Date**	**PCBs (pg/L)**	**Flow (mgd)**	**Normalized (kg/yr)**
Central Marin	12/11	961	6.43	0.00213
Central Marin	3/12	1202	18.21	0.00756
Delta Diablo	5/11	973	11.08	0.00298
Delta Diablo	8/11	992	6.8	0.00186
Delta Diablo	12/11	1069	7.17	0.00212
Delta Diablo	1/12	1844	7.17	0.00365
Delta Diablo	4/12	1159	7.76	0.00249
Las Gallinas	11/11	4137	2.34	0.00446
Las Gallinas	2/12	1648	2.5	0.00190
Las Gallinas	4/12	1958	3.7	0.00334
Millbrae	5/11	1061	1.46	0.00071
Millbrae	11/11	1883	1.37	0.00119
Millbrae	5/12	1399	1.51	0.00097
Novato	4/11	960	5.3	0.00141
Novato	5/11	667	4.8	0.00088
Novato	10/11	1097	4.25	0.00129
Novato	1/12	762	4.99	0.00105
Novato	4/12	816	5.51	0.00124
Paradise Cove	7/11	708	0.014	0.00001
Petaluma	12/11	0	N/A	0.00000
Petaluma	3/12	6	6.79	0.00002
Petaluma	4/12	16	7.29	0.00005
Rodeo Sanitary	12/11	433	0.57	0.00034
San Mateo	6/11	1114	12.36	0.00380
San Mateo	9/11	1200	10.63	0.00352
San Mateo	11/11	866	10.84	0.00259
San Mateo	3/12	426	14.53	0.00171
San Mateo	5/12	558	11.14	0.00172
Sausalito-Marin	6/11	3202	1.52	0.00336
Sausalito-Marin	7/11	2232	1.4	0.00216
Central Contra Costa	7/11	764	35.2	0.00743
Central Contra Costa	8/11	512	34.1	0.00482
Central Contra Costa	10/11	418	33.2	0.00383
Central Contra Costa	2/12	369	35.6	0.00363
Central Contra Costa	5/12	507	36.83	0.00516
EBDA	5/11	1040	58.97	0.02118
EBDA	8/11	4729	54.83	0.08956
EBDA	11/11	2538	59.3	0.05199
EBDA	2/12	1308	56.12	0.02535
SF Intl Airport	5/11	600	1.22	0.00034
SF Intl Airport	8/11	1523	1.18	0.00083
SF Intl Airport	4/12	1426	1.32	0.00087
Pinole	11/11	972	2.78	0.00187
Pinole	3/12	705	4.24	0.00206

Secondary Municipal Dischargers				
Discharger	**Date**	**PCBs (pg/L)**	**Flow (mgd)**	**Normalized (kg/yr)**
SF Southeast	6/11	1824	54.5	0.02747
SF Southeast	8/11	2540	54.2	0.03804
SF Southeast	10/11	8356	53.8	0.12422
SF Southeast	2/12	1798	54.6	0.02713
SF Southeast	3/12	1381	53.8	0.02053
SBSA	6/11	493	13.25	0.00181
SBSA	8/11	204	12.64	0.00071
SBSA	11/11	590	13.03	0.00212
SBSA	2/12	292	14.21	0.00115
SBSA	5/12	481	13.6	0.00181
SF & San Bruno	5/11	477	8.51	0.00112
SF & San Bruno	8/11	991	8.49	0.00232
SF & San Bruno	11/11	1194	8.86	0.00292
SF & San Bruno	2/12	561	15.61	0.00242
SF & San Bruno	5/12	699	15.42	0.00298
Tiburon	6/11	731	0.63	0.00032
Tiburon	7/11	808	0.56	0.00031
Treasure Island	6/11	14448	0.35	0.00175
Treasure Island	10/11	25262	0.32	0.00279
Treasure Island	2/12	11740	0.32	0.00130
Treasure Island	4/12	10528	0.42	0.00153
Vallejo	4/11	1452	11.48	0.00461
Vallejo	7/11	2709	10	0.00749
Vallejo	10/11	2931	9.2	0.00745
Vallejo	1/12	2509	10.2	0.00707
Vallejo	4/12	1997	13	0.00717
West County Agency	5/11	682	7.19	0.00135
West County Agency	9/11	1488	6.57	0.00270
West County Agency	11/11	506	7.76	0.00109
West County Agency	2/12	4195	7.5	0.00869
West County Agency	5/12	1233	7.8	0.00266
Yountville	2/12	214	0.426	0.00006
Yountville	5/12	1102	0.37	0.00028
Burlingame	1/12	914	3.24	0.00205
Burlingame	4/12	1090	18.82	0.01417
Napa	4/11	93	17.13	0.00055
Napa	10/11	20	8.44	0.00006
Napa	1/12	0	N/A	0.00000
Napa	3/12	79	13.46	0.00037
SASM	6/11	4228	2.46	0.00479
SASM	8/11	3042	2.03	0.00284
SASM	2/12	5594	2.64	0.00680
Total				**0.84492**

Petroleum Refinery				
Discharger	**Date**	**PCBs (pg/L)**	**Flow (mgd)**	**Normalized (kg/yr)**
Tesoro	6/11	0	N/A	0.00000
Tesoro	9/11	0	N/A	0.00000
Tesoro	11/11	0	N/A	0.00000
Tesoro	2/12	20	6.01	0.00004
Phillips 66	6/11	257	2.77	0.00020
Phillips 66	8/11	0	N/A	0.00000
Phillips 66	10/11	0	N/A	0.00000
Phillips 66	1/12	0	N/A	0.00000
Phillips 66	5/12	0	N/A	0.00000
Shell	5/11	0	N/A	0.00000
Shell	8/11	0	N/A	0.00000
Shell	11/11	0	N/A	0.00000
Shell	2/12	0	N/A	0.00000
Shell	4/12	13	6.67	0.00002
Valero	9/11	9	2.29	0.00001
Valero	4/12	0	N/A	0.00000
Chevron	4/11	514	7.32	0.00104
Chevron	7/11	2619	5.74	0.00415
Chevron	10/11	431	5.48	0.00065
Chevron	1/12	128	6.58	0.00023
Chevron	4/12	348	9.15	0.00088
Total				**0.00724**

Other Industry				
Discharger	**Date**	**PCBs (pg/L)**	**Flow (mgd)**	**Normalized (kg/yr)**
USS Posco	9/11	0	N/A	0.00000
USS Posco	10/11	0	N/A	0.00000
USS Posco	1/12	0	N/A	0.00000
USS Posco	4/12	25	5.4	0.00005
C&H Sugar	7/11	82	0.8	0.00005
C&H Sugar	1/12	201	0.72	0.0001
Rhodia	6/11	139	0.1	0.00001
Rhodia	10/11	554	0.07	0.00002
Rhodia	1/12	477	0.081	0.00002
Total				**0.00023**

[1] Some of the PCBs data included in Appendix F-3, such as from the City of Palo Alto, contained high levels of blank contamination that may have resulted in the Regional Water Board overestimating PCB loads.

APPENDIX F-4 - DATA SUPPORTING PERFORMANCE-BASED PCBs LIMITS

Discharge Category – PCBs Data (µg/L)			
Advanced Secondary	Secondary	Petroleum Refinery	Other Industry
0.000250	0.0079	0.000650	0.000860
0.000310	0.0011	0.000570	0.003700
0.000190	0.0047	0.000170	0.005600
0.000200	0.0022	0.000380	0.004300
0.000310	0.0057	0.000280	0.003400
0.000170	0.0014	0.000150	0.003400
0.000190	0.0037	0.000110	
0.000130	0.0027	0.000150	
0.000320	0.0026	0.000170	
0.000170		0.000085	
0.000120			
0.000240			
0.000190			
0.000160			

APPENDIX F – NUTRIENTS WATERSHED PERMIT

ORDER No. R2-2014-0014
NPDES No. CA0038873

WASTE DISCHARGE REQUIREMENTS FOR NUTRIENTS FROM MUNICIPAL WASTEWATER DISCHARGES TO SAN FRANCISCO BAY

The following dischargers are subject to waste discharge requirements (WDRs) set forth in this Order, for the purpose of regulating nutrient discharges to San Francisco Bay and its contiguous bay segments:

Table 1. Discharger Information

Discharger	Facility Name	Facility Address	Minor/ Major
American Canyon, City of	Wastewater Treatment and Reclamation Facility	151 Mezzetta Court American Canyon, CA 94503 Napa County	Major
Benicia, City of	Benicia Wastewater Treatment Plant	614 East Fifth Street Benicia, CA 94510 Solano County	Major
Burlingame, City of	Burlingame Wastewater Treatment Plant	1103 Airport Boulevard Burlingame, CA 94010 San Mateo County	Major
Central Contra Costa Sanitary District	Central Contra Costa Sanitary District Wastewater Treatment Plant	5019 Imhoff Place Martinez, CA 94553 Contra Costa County	Major
Central Marin Sanitation Agency	Central Marin Sanitation Agency Wastewater Treatment Plant	1301 Andersen Drive San Rafael, CA 94901 Marin County	Major
Crockett Community Services District	Port Costa Wastewater Treatment Plant	End of Canyon Lake Drive Port Costa, CA 94569 Contra Costa County	Minor
Delta Diablo	Wastewater Treatment Plant	2500 Pittsburg-Antioch Highway Antioch, CA 94509 Contra Costa County	Major
East Bay Dischargers Authority (EBDA), City of Hayward, City of San Leandro, Oro Loma Sanitary District, Castro Valley Sanitary District, Union Sanitary District, Livermore-Amador Valley Water Management Agency, Dublin San Ramon Services District, and City of Livermore	EBDA Common Outfall	EBDA Common Outfall 14150 Monarch Bay Drive San Leandro, CA 94577 Alameda County	Major
	Hayward Water Pollution Control Facility		
	San Leandro Water Pollution Control Plant		
	Oro Loma/Castro Valley Sanitary Districts Water Pollution Control Plant		
	Raymond A. Boege Alvarado Wastewater Treatment Plant		
	Livermore-Amador Valley Water Management Agency Export and Storage Facilities		

Discharger	Facility Name	Facility Address	Minor/ Major
	Dublin San Ramon Services District Wastewater Treatment Plant City of Livermore Water Reclamation Plant		
East Bay Municipal Utility District	East Bay Municipal Utility District, Special District No. 1 Wastewater Treatment Plant	2020 Wake Avenue Oakland, CA 94607 Alameda County	Major
Fairfield-Suisun Sewer District	Fairfield-Suisun Wastewater Treatment Plant	1010 Chadbourne Road Fairfield, CA 94534 Solano County	Major
Las Gallinas Valley Sanitary District	Las Gallinas Valley Sanitary District Sewage Treatment Plant	300 Smith Ranch Road San Rafael, CA 94903 Marin County	Major
Marin County (Paradise Cove), Sanitary District No. 5 of	Paradise Cove Treatment Plant	3700 Paradise Drive Tiburon, CA 94920 Marin County	Minor
Marin County (Tiburon), Sanitary District No. 5 of	Wastewater Treatment Plant	2001 Paradise Drive Tiburon, CA 94920 Marin County	Minor
Millbrae, City of	Water Pollution Control Plant	400 East Millbrae Avenue Millbrae, CA 94030 San Mateo County	Major
Mt. View Sanitary District	Mt. View Sanitary District Wastewater Treatment Plant	3800 Arthur Road Martinez, CA 94553 Contra Costa County	Major
Napa Sanitation District	Soscol Water Recycling Facility	1515 Soscol Ferry Road Napa, CA 94558 Napa County	Major
Novato Sanitary District	Novato Sanitary District Wastewater Treatment Plant	500 Davidson Street Novato, CA 94945 Marin County	Major
Palo Alto, City of	Palo Alto Regional Water Quality Control Plant	2501 Embarcadero Way Palo Alto, CA 94303 Santa Clara County	Major
Petaluma, City of	Ellis Creek Water Recycling Facility	3890 Cypress Drive Petaluma, CA 94954 Sonoma County	Major
Pinole, City of	Pinole-Hercules Water Pollution Control Plant	11 Tennent Avenue Pinole, CA, 94564 Contra Costa County	Major
Rodeo Sanitary District	Rodeo Sanitary District Water Pollution Control Facility	800 San Pablo Avenue Rodeo, CA 94572 Contra Costa County	Major
San Francisco (San Francisco International Airport), City and County of	Mel Leong Treatment Plant, Sanitary Plant	918 Clearwater Drive San Francisco International Airport San Francisco, CA 94128 San Mateo County	Major
San Francisco (Southeast Plant), City and County of	Southeast Water Pollution Control Plant	750 Phelps Street San Francisco, CA 94124 San Francisco County	Major

Discharger	Facility Name	Facility Address	Minor/ Major
San Jose/Santa Clara Water Pollution Control Plant and Cities of San Jose and Santa Clara	San Jose/Santa Clara Water Pollution Control Plant	4245 Zanker Road San Jose, CA 95134 Santa Clara County	Major
San Mateo, City of	City of San Mateo Wastewater Treatment Plant	2050 Detroit Drive San Mateo, CA 94404 San Mateo County	Major
Sausalito-Marin City Sanitary District	Sausalito-Marin City Sanitary District Wastewater Treatment Plant	#1 Fort Baker Road Sausalito, CA 94965 Marin County	Major
Sewerage Agency of Southern Marin	Wastewater Treatment Plant	450 Sycamore Avenue Mill Valley, CA 94941 Marin County	Major
Sonoma Valley County Sanitary District	Municipal Wastewater Treatment Plant	22675 8th Street East Sonoma, CA 95476 Sonoma County	Major
South Bayside System Authority	South Bayside System Authority Wastewater Treatment Plant	1400 Radio Road Redwood City, CA 94065 San Mateo County	Major
South San Francisco and San Bruno, Cities of	South San Francisco and San Bruno Water Quality Control Plant	195 Belle Air Road South San Francisco, CA 94080 San Mateo County	Major
Sunnyvale, City of	Sunnyvale Water Pollution Control Plant	1444 Borregas Avenue, Sunnyvale, CA 94089 Santa Clara County	Major
U.S. Department of Navy (Treasure Island)	Wastewater Treatment Plant	681 Avenue M, Treasure island San Francisco, CA 94130-1807 San Francisco County	Major
Vallejo Sanitation and Flood Control District	Vallejo Sanitation and Flood Control District Wastewater Treatment Plant	450 Ryder Street Vallejo, CA 94590 Solano County	Major
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	West County Agency Combined Outfall	601 Canal Blvd. Richmond, CA 94804 Contra Costa County	Major

Table 2. Discharge Locations

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
Discharge locations are specified in individual NPDES permits listed in Attachment B.				

Table 3. Administrative Information

This Order was adopted by the Regional Water Quality Control Board on:	**April 9, 2014**
This Order shall become effective on:	**July 1, 2014**
This Order shall expire on:	**June 30, 2019**

I, Bruce H. Wolfe, 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, San Francisco Bay Region, on the date indicated above.

_____
Bruce H. Wolfe, Executive Officer

Contents

I. Facility Information 2
II. Findings 2
III. Discharge Prohibitions 3
IV. Discharge Specifications 3
V. Receiving Water Limitations 3
VI. Provisions 3
A. Federal and Regional Standard Provisions 3
B. Monitoring and Reporting Program Requirements 3
C. Special Provisions 3
1. Evaluation of Potential Nutrient Discharge Reduction by Treatment Optimization and Side-stream Treatment 3
2. Evaluation of Potential Nutrient Discharge Reduction by Treatment Upgrades or Other Means 4
3. Monitoring, Modeling, and Embayment Studies 6
4. Reopener Provisions 7

Tables

Table 1. Discharger Information i
Table 2. Discharge Locations iv
Table 3. Administrative Information iv

Attachments

Attachment A – Not used
Attachment B – Individual Order and NPDES Permit Numbers B-1
Attachment C – Discharger Location Map C-1
Attachment D – Federal Standard Provisions (not included, see individual permits)
Attachment E – Monitoring and Reporting Program (MRP) E-1
Attachment F – Fact Sheet F-1
Attachment G – Regional Standard Provisions (not included, see individual permits)

I. FACILITY INFORMATION

Information describing the facilities subject to this Order is summarized in Table 1 and in Fact Sheet (Attachment F) sections I and II.

II. FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board), finds:

A. Legal Authorities. This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by U.S. EPA, and Water Code chapter 5.5, division 7 (commencing with § 13370). It shall serve as an NPDES permit for point source discharges from the Dischargers' facilities to surface waters.

B. Background and Rationale for Requirements. The Regional Water Board developed the requirements in this Order based on information the Dischargers submitted, information obtained through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F) contains background information and rationale for the requirements in this Order and is hereby incorporated into and constitutes findings for this Order. Attachments B, C, and E are also incorporated into this Order.

C. Provisions and Requirements Implementing State Law. No provisions or requirements in this Order are included to implement State law only.

D. Notification of Interested Parties. The Regional Water Board notified the Dischargers and interested agencies and persons of its intent to prescribe these WDRs and provided an opportunity to submit written comments and recommendations. The Fact Sheet provides details regarding the notification.

E. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharges. The Fact Sheet provides details regarding the public hearing.

THREFORE, IT IS HEREBY ORDERED that, in order to meet the provisions of Water Code division 7 (commencing with § 13000) and regulations adopted thereunder, and the provisions of the CWA and regulations and guidelines adopted thereunder, the Dischargers shall comply with the requirements in this Order. This Order supersedes nutrient-related requirements in the individual NPDES permits listed in Attachment B, with the exception of effluent limitations for ammonia as well as special studies the Central Contra Costa Sanitary District is to conduct pursuant to Order No. R2-2012-0016 (Provision C.5c).

III. DISCHARGE PROHIBITIONS

This Order does not establish additional discharge prohibitions.

IV. DISCHARGE SPECIFICATIONS

This Order does not establish additional discharge specifications.

V. RECEIVING WATER LIMITATIONS

This Order continues receiving water limitations that are applicable to nutrients that are specified in the individual NPDES permits listed in Attachment B.

VI. PROVISIONS

A. Federal and Regional Standard Provisions

Federal and Regional Standard Provisions are specified in Attachments D and G in, and as modified by, each Discharger's individual NPDES Permits (see Attachment B).

B. Monitoring and Reporting Program Requirements

Dischargers shall comply with the Monitoring and Reporting Program (MRP), and future revisions thereto, in Attachment E of this Order.

C. Special Provisions

1. Evaluation of Potential Nutrient Discharge Reduction by Treatment Optimization and Side-stream Treatment

The major Dischargers listed in Table 1 shall, individually or in collaboration with other Dischargers, evaluate options and costs for nutrient discharge reduction by optimization of current treatment works. The evaluation shall include the following:

- Describe the treatment plant, treatment plant process, and service area;
- Evaluate site-specific alternatives, along with associated nitrogen and phosphorus removal levels, to reduce nutrient discharges through methods such as operational adjustments to existing treatment systems, process changes, or minor upgrades;
- Evaluate side-stream treatment opportunities along with associated nitrogen and phosphorus removal levels;
- Describe where optimization, minor upgrades, and sidestream treatment have already been implemented;
- Evaluate beneficial and adverse ancillary impacts associated with each optimization proposal, such as changes in the treatment plant's energy usage, greenhouse gas emissions, or sludge and biosolids treatment or disposal;
- Identify planning level costs of each option evaluated; and

- Evaluate the impact on nutrient loads due to treatment plant optimization implemented in response to other regulations or requirements.

Dischargers that have recently completed optimization evaluations may use previously completed reports.

a. Submit and Implement Scoping and Evaluation Plans

By December 1, 2014, the major Dischargers listed in Table 1 shall, individually or in collaboration with other Dischargers, submit a Scoping Plan that defines the level of work for the proposed optimization evaluation. The Scoping Plan shall be acceptable to the Executive Officer.

By July 1, 2015, the major Dischargers listed in Table 1 shall, individually or in collaboration with other Dischargers, submit an Evaluation Plan that includes a schedule describing how they will conduct the evaluation of potential nutrient discharge reduction by treatment optimization. The Evaluation Plan shall include sampling, as necessary, to support proposed optimization studies. The Evaluation Plan shall be acceptable to the Executive Officer.

The Dischargers shall proceed with implementation of the Evaluation Plan within 45 days of submittal.

b. Submit Status Report

By July 1, 2016, and subsequently by July 1, 2017, major Dischargers listed in Table 1 shall submit, or cause to be submitted, a report describing the tasks completed, preliminary findings, and tasks to be completed, highlighting any adaptive changes to be made to the Evaluation Plan submitted in accordance with task a, above.

c. Submit Final Report

By July 1, 2018, the major Dischargers listed in Table 1 shall submit, or cause to be submitted, the results of their evaluations with planning level cost estimates for each optimization option studied.

2. Evaluation of Potential Nutrient Discharge Reduction by Treatment Upgrades or Other Means

The major Dischargers listed in Table 1 shall, individually or in collaboration with other Dischargers, conduct an evaluation to identify options and costs for potential treatment upgrades for nutrient removal.

The evaluation shall be conducted for each Discharger's treatment works or categories of like treatment works (e.g., high purity oxygen plants, conventional activated sludge plants, plants without anaerobic digestion). The evaluation must estimate nutrient reductions from treatment upgrades and, at a minimum, shall entail the following:

- Describe the treatment plant, treatment plant process, and service area;

- Identify potential upgrade technologies for each treatment plant category along with associated nitrogen and phosphorous removal levels;
- Identify site-specific constraints or circumstances that may cause implementation challenges or eliminate any specific technologies from consideration;
- Include planning level capital and operating cost estimates associated with the upgrades and for different levels of nutrient reduction, applying correction factors associated with site-specific challenges and constraints;
- Describe where Dischargers have already upgraded existing treatment systems or implemented pilot studies for nutrient removal. As part of this description, document the level of nutrient removal the upgrade or pilot study is achieving for total nitrogen and phosphorus;
- Evaluate the impact on nutrient loads due to treatment plant upgrades implemented in response to other regulations and requirements; and
- Evaluate beneficial and adverse ancillary impacts associated with each upgrade, such as changes in the treatment plant's energy use, changes in greenhouse gas emissions, changes in sludge and biosolids treatment or disposal, and reduction of other pollutants (e.g., pharmaceuticals) through advanced treatment.

Dischargers that have recently completed upgrade evaluations may use previously completed reports.

Dischargers who have planned or are implementing facility upgrades or modifications to address the impacts of sea level rise and climate change alone, or as part of infrastructure renewal, shall also include in its nutrient removal evaluation consideration of the impacts of sea level rise and climate change on identified nutrient upgrade options.

In addition to the above upgrade evaluation, Dischargers may evaluate ways to reduce nutrient loading through alternative discharge scenarios, such as water recycling or use of wetlands, in combination with, or in-lieu of, the upgrades to achieve similar levels of nutrient load reductions. This evaluation shall identify any institutional barriers to water recycling along with proposals for overcoming such barriers and include ancillary benefits and adverse impacts associated with such alternative discharge scenarios such as the following:

- Reduction in potable water use through enhanced reclamation;
- Creation of additional wetland or upland habitat;
- Changes in energy use, greenhouse gas emissions, sludge and biosolids quality and quantities;
- Reduction of other pollutant discharges;
- Impacts to existing permit requirements related to alternative discharge scenarios; and
- Implications related to discharge of brine or other side-streams associated with advanced recycling technologies.

a. Submit and Implement Scoping and Evaluation Plans

By December 1, 2014, the major Dischargers listed in Table 1 shall, individually or in collaboration with other Dischargers, submit a Scoping Plan that defines the

level of work for the proposed upgrade evaluation. The Scoping Plan shall be acceptable to the Executive Officer.

By July 1, 2015, the major Dischargers listed in Table 1 shall, individually or in collaboration with other Dischargers, submit an Evaluation Plan and schedule describing how they will conduct the evaluation of potential nutrient discharge reduction by treatment upgrades or other means. The Evaluation Plan shall define the categories of treatment works that will be evaluated to support potential upgrades and alternative discharge scenarios. The Evaluation Plan shall be acceptable to the Executive Officer.

The Dischargers shall proceed with implementation of the Evaluation Plan within 45 days of submittal.

b. Submit Status Report

By July 1, 2016, and subsequently by July 1, 2017, major Dischargers listed in Table 1 shall submit, or cause to be submitted, a report describing the tasks completed, preliminary findings, and tasks to be completed, highlighting any adaptive changes to be made to the Evaluation Plan submitted in accordance with task a, above.

c. Submit Final Report

By July 1, 2018, major Dischargers listed in Table 1 shall submit, or cause to be submitted, the results of their evaluations with planning level cost estimates for each upgrade option studied.

3. Monitoring, Modeling, and Embayment Studies

Each Discharger shall conduct, or cause to be conducted, studies to address the potential adverse impacts of nutrients on San Francisco Bay beneficial uses. The studies shall include efforts described below:

a. Support Science Plan Development and Implementation

The Dischargers shall collaborate with other regional stakeholders to support development and implementation of a science plan of necessary studies to implement the San Francisco Bay Nutrient Management Strategy and support consideration of future management actions, including the development of nutrient water quality objectives, both informed through modeling. The science plan shall include studies necessary for San Francisco Bay as a whole and also on issues identified for specific subembayments.

By February 1, 2015, the Dischargers shall cause to be submitted an implementation plan and schedule for proposed studies acceptable to the Executive Officer and update and revise it as necessary annually by February 1 of each subsequent year.

b. Support Receiving Water Monitoring for Nutrients

The Dischargers shall collaborate with other regional stakeholders to support receiving water monitoring for nutrients, as necessary, that go beyond the monitoring already provided by the Regional Monitoring Program and others, by providing the following:

i. A network of nutrient monitoring locations to track nutrient concentrations, dissolved oxygen, and phytoplankton biomass in San Francisco Bay;
ii. Adequate data to support modeling of nutrient fate and transport in San Francisco Bay; and
iii. Studies furthering the understanding of harmful algae bloom development, including, at a minimum, monitoring for algae species and toxins.

4. Reopener Provisions

The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law:

a. If the discharges governed by this Order have or will have a reasonable potential to cause or contribute to, or will cease to have, adverse impacts on water quality or beneficial uses of the receiving waters;

b. If new or revised water quality objectives or total maximum daily loads (TMDLs) come into effect for San Francisco Bay and contiguous water bodies (whether statewide, regional, or site-specific);

c. If State Water Board precedential decisions, new policies, new laws, or new regulations are adopted;

d. If an administrative or judicial decision on a separate NPDES permit or WDRs addresses requirements similar to those in this Order; or

f. As otherwise authorized by law.

Any Discharger may request a permit modification based on any of the circumstances above. With any such request, the Discharger shall include antidegradation and anti-backsliding analyses.

ATTACHMENT B – INDIVIDUAL ORDER AND NPDES PERMIT NUMBERS

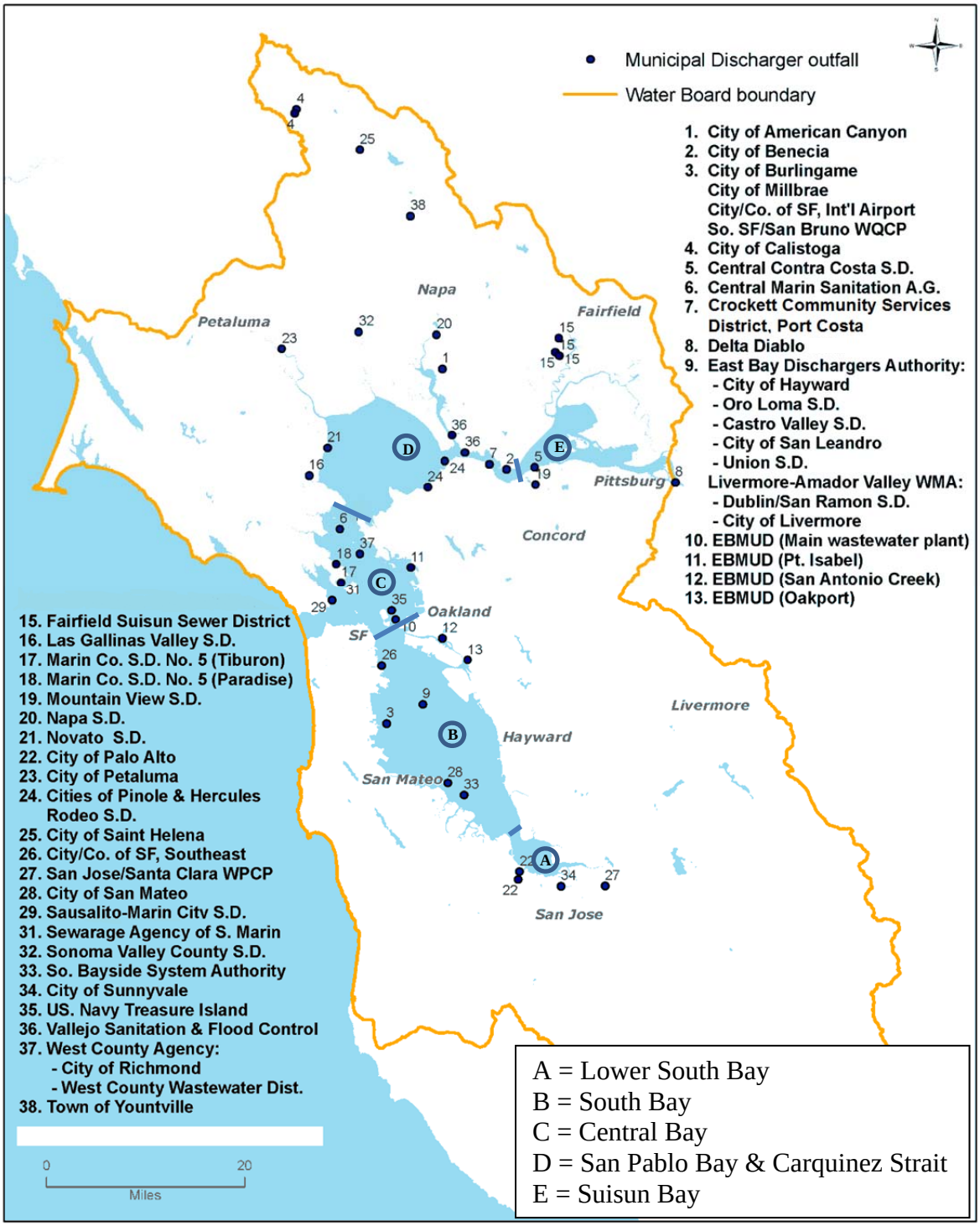
Municipal Dischargers:

Discharger	NPDES Permit No.	Existing Order No.[1]	Existing Order Adoption Date	Existing Order Expiration Date
American Canyon, City of	CA0038768	R2-2011-0046	7/13/11	8/31/16
Benicia, City of	CA0038091	R2-2008-0014	3/12/08	5/30/13
Burlingame, City of	CA0037788	R2-2013-0015	5/08/13	6/30/18
Central Contra Costa Sanitary District	CA0037648	R2-2012-0016	2/08/12	3/31/17
Central Marin Sanitation Agency	CA0038628	R2-2012-0051	6/13/12	7/31/17
Crockett Community Services District, Port Costa Sanitary Dept.	CA0037885	R2-2013-0035	10/09/13	11/30/18
Delta Diablo	CA0038547	R2-2009-0018	3/11/09	4/30/14
East Bay Dischargers Authority	CA0037869	R2-2012-0004	1/18/12	2/28/17
Union S.D. Wet Weather Outfall	CA0038733	R2-2010-0097	7/14/10	8/31/15
Dublin San Ramon Services District	CA0037613	R2-2012-0005	1/18/12	2/28/17
City of Livermore	CA0038008	R2-2012-0006	1/18/12	2/28/17
LAVWMA Wet Weather Outfall	CA0038679	R2-2011-0028	5/11/11	6/30/16
East Bay Municipal Utility Dist. WWTP	CA0037702	R2-2010-0060	3/10/10	4/30/15
Fairfield-Suisun Sewer District	CA0038024	R2-2009-0039	4/08/09	5/31/14
Las Gallinas Valley Sanitary District	CA0037851	R2-2009-0070	10/14/09	11/30/14
Marin County (Paradise Cove), Sanitary District No. 5 of	CA0037427	R2-2011-0016	4/13/11	5/31/16
Marin County (Tiburon), Sanitary District No. 5 of	CA0037753	R2-2013-0027	8/14/13	9/30/18
Millbrae, City of	CA0037532	R2-2013-0037	12/11/13	1/31/19
Mt. View Sanitary District	CA0037770	R2-2010-0114	11/10/10	12/31/15
Napa Sanitation District	CA0037575	R2-2011-0007	2/09/11	3/31/16
Novato Sanitary District	CA0037958	R2-2010-0074	5/12/10	6/30/15
Palo Alto, City of	CA0037834	R2-2009-0032	4/08/09	5/31/14
Petaluma, City of	CA0037810	R2-2011-0003	1/12/11	2/28/16
Pinole, City of	CA0037796	R2-2012-0059	8/08/12	9/30/17
Rodeo Sanitary District	CA0037826	R2-2012-0027	4/11/12	5/31/17
San Francisco, City and County of, San Francisco International Airport	CA0038318	R2-2013-0011	5/08/13	6/30/18
San Francisco (Southeast Plant), City and County of	CA0037664	R2-2013-0029	8/14/13	9/30/18
San Jose/Santa Clara Water Pollution Control Plant and Cities of San Jose and Santa Clara	CA0037842	R2-2009-0038	4/08/09	5/31/14
San Mateo, City of	CA0037541	R2-2013-0006	3/13/13	4/30/18
Sausalito-Marin City Sanitary District	CA0038067	R2-2012-0083	11/14/12	12/31/17
Sewerage Agency of Southern Marin	CA0037711	R2-2012-0094	12/12/12	1/31/18
Sonoma Valley County Sanitary District	CA0037800	R2-2008-0090	10/08/08	11/30/13
South Bayside System Authority	CA0038369	R2-2012-0062	8/08/12	9/30/17
South San Francisco and San Bruno, Cities of	CA0038130	R2-2008-0094	11/12/08	12/31/13
Sunnyvale, City of	CA0037621	R2-2009-0061	8/12/09	9/30/14
US Department of Navy, Treasure Island	CA0110116	R2-2010-0001	1/13/10	2/28/15
Vallejo Sanitation and Flood Control District	CA0037699	R2-2012-0017	2/08/12	3/31/17
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	CA0038539	R2-2013-0016	5/08/13	6/30/18

[1] The orders shown are for the primary permit reissuance and do not include permit amendments.

ATTACHMENT C – DISCHARGER LOCATION MAP

Municipal Discharger outfall locations



ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Contents

I. General Monitoring Provisions 2
II. Monitoring Locations 2
III. Effluent Monitoring Requirements 2
IV. Reporting Requirements 3
A. General Monitoring and Reporting Requirements 3
B. Individual Reporting in Self-Monitoring Reports (SMRs) 3
C. Discharge Monitoring Reports (DMRs) 5

Tables

Table E-1. Monitoring Station Locations 2
Table E-2. Effluent Monitoring Requirements 2
Table E-3. Minimum Sampling Frequency 3
Table E-4. Monitoring Periods 4

ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

The Code of Federal Regulations (40 C.F.R. § 122.48) requires that all NPDES permits specify monitoring and reporting requirements. Water Code section 13383 also authorizes the Regional Water Board to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements that implement the federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. Dischargers shall comply with this MRP and all requirements contained in the Regional Standard Provisions (Attachment G of individual permits). The Executive Officer may amend this MRP pursuant to 40 C.F.R. sections 122.62, 122.63, and 124.5. If any discrepancies exist between this MRP and the Regional Standard Provisions, this MRP shall prevail.

B. Sampling is required during the entire year when discharging. The Discharger shall conduct all monitoring in accordance with the Federal Standard Provisions (Attachment D of individual permits), as supplemented by Attachment G. Equivalent test methods must be more sensitive than those specified in 40 C.F.R. section 136 and must be specified in this permit.

II. MONITORING LOCATIONS

Dischargers shall establish the following monitoring locations to characterize loads and comply with other requirements in this Order:

Table E-1. Monitoring Station Locations

Discharge Point Name	Monitoring Location Description
Effluent sampling shall be at the compliance monitoring location for ammonia specified in the Discharger's NPDES permit. For San Francisco (Southeast Plant) this shall be E-001.	Monitoring locations are described in individual NPDES permits.

III. EFFLUENT MONITORING REQUIREMENTS

Dischargers shall monitor effluent for nutrients as shown in Tables E-2 and E-3 below and report as described in the next section:

Table E-2. Effluent Monitoring Requirements

Parameter	Units	Sample Type[(1)]
Ammonia	mg/L and kg/day as N	C-24
Total Kjeldahl Nitrogen	mg/L and kg/day as N	C-24
Nitrate-Nitrite	mg/L and kg/day as N	C-24
Total Phosphorus	mg/L and kg/day as P	C-24
Soluble Reactive Phosphorus	mg/L and kg/day as P	C-24
Total Nitrogen	mg/L and kg/day as N	Calculated

Unit Abbreviations:

mg/L = milligrams per liter
kg/day as N = kilograms per day as nitrogen
kg/day as P = kilograms per day as phosphorus

Sample Type:

C-24 = 24-hour composite sample

Footnote:

(1) 24-hour composite samples (C-24) may be made up of a minimum of four discrete grab samples, collected over the course of 24 hours, and volumetrically or mathematically flow-weighted. During a 24-hour period, the samples may be collected only when the plant is staffed, if necessary.

Table E-3. Minimum Sampling Frequency

Discharger Type	Minimum Sampling Frequency[1,2,3]
Major municipal discharger (Flow ≥ 10 mgd)	Twice per month
Major municipal discharger (Flow < 10 mgd)	Once per month
Minor municipal discharger (Flow < 1 mgd)	Twice per year

Footnotes:

[1] Samples need only be collected when discharging (i.e., seasonal dischargers shall collect samples only during the discharge season).

[2] After two years of data collection, the Discharger may reduce or eliminate the frequency for parameters specified in Table E.2 if it has collected adequate data for modeling and load characterization. The Discharger must request and then obtain written approval from the Executive Officer prior to monitoring reduction.

[3] For municipal wastewater treatment plants that discharge via the EBDA outfall, individual treatment plant monitoring shall occur twice per year.

IV. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

Dischargers shall comply with all Federal Standard Provisions (Attachment D) and Regional Standard Provisions (Attachment G) related to monitoring, reporting, and recordkeeping, as modified in individual permits.

B. Individual Reporting in Self-Monitoring Reports (SMRs)

1. Reporting of Nutrients Data

a. Routine SMRs

Dischargers shall submit nutrients data collected as part of this Order in the regular monthly or quarterly SMRs required in each Discharger's individual permit. If a Discharger monitors nutrients more frequently than required by this Order at the monitoring location described in Table E-1, the Discharger shall include the results of this monitoring in the calculations and reporting for the SMR.

b. Annual Nutrients Report

Starting in 2015, by September 1 of each year, each Discharger shall provide its nutrient information in a separate annual report or state that it is participating in a group report that will be submitted by the Bay Area Clean Water Agencies (BACWA) under section B.1.c below. Each Discharger shall submit the following:

i. Documentation that it is complying with Provision C.3. Or if group annual reporting pursuant to B.1.c, below, then certification that each Discharger

has provided adequate support or contributed its portion of the required contribution under Provision C.3.

ii. Summary tables depicting the Discharger's annual and monthly flows, nutrient concentrations, and nutrient mass loads, calculated as described in Section VIII.1 Arithmetic Calculations of Standard Provisions (Attachment G of individual permits) covering July 1 through June 30 of the preceding year. Each individual Discharger shall document its nutrient loads relative to other facilities covered by this Order that discharge to the same subembayment, i.e., Suisun Bay, San Pablo Bay, Central Bay, South Bay, and Lower South Bay. Nutrient information from other Dischargers may be obtained from the State Water Board's California Integrated Water Quality System (CIWQS) Program website (http://www.waterboards.ca.gov/ciwqs/index.html).

iii. An analysis of nutrient trends, load variability, and an assessment as to whether or not nutrient mass discharges are increasing or decreasing.

iv. If trend analysis shows a significant change in load, the Discharger shall investigate the cause and shall report its results, or status, or plans for investigation, in the annual report or in subsequent annual reports. This investigation shall include, at a minimum, whether treatment process changes have reduced or increased nutrient discharges, changes in nutrient loads related to water reclamation (increasing or decreasing), and changes in total influent flow related to water conservation, population growth, transient work community, new industry, and/or changes in wet weather flows.

c. Optional Group Report for Annual Nutrients Report

As an alternative to submitting an individual Annual Nutrients Report, each Discharger may instead be part of a group report provided by BACWA. Starting 2015, by October 1 of each year, the Annual Group Nutrients Report shall include the information detailed in B.1.b above.

2. **Monitoring Periods**

Monitoring periods for all required monitoring shall be completed according to the following schedule:

Table E-4. Monitoring Periods

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Monthly	First day of calendar month following permit effective date or on permit effective date if on first day of month	First day of calendar month through last day of calendar month
Quarterly	Closest 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

Twice per year	Closest May 1 or November 1 following (or on) permit effective date	November 1 through April 30 May 1 through October 31
Annually	As specified in EO concurrence describe in section III.	January 1 through December 31

C. Discharge Monitoring Reports (DMRs)

1. At any time during the term of this Order, the State Water Board or Regional Water Board may notify the Discharger to electronically submit DMRs. Until such notification is given, the Discharger shall submit DMRs in accordance with the requirements described below.
2. Once notified by the State Water Board or Regional Water Board, the Discharger shall submit hard copy DMRs. The Discharger shall sign and certify DMRs as Attachment D requires. The Discharger shall submit original DMRs to one of the addresses listed below:

Standard Mail	**FedEx/UPS/ Other Private Carriers**
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO 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

3. All discharge monitoring results must be reported on the official U.S. EPA pre-printed DMR forms (EPA Form 3320-1) or self-generated forms that follow the exact same format of EPA Form 3320-1.

ATTACHMENT F – FACT SHEET

Contents

I. Permit Information 2
II. Facilities Description 9
A. Description of Wastewater Treatment 9
B. Discharge Points and Receiving Waters 9
C. Existing Nutrient Discharge Data 9
III. Applicable Plans, Policies, and Regulations 11
A. Legal Authorities 11
B. California Environmental Quality Act (CEQA) 11
C. State and Federal Regulations, Policies, and Plans 11
D. Impaired Waters on CWA 303(d) List 12
IV. Rationale for Discharge Prohibitions and Specifications 13
A. Anti-backsliding 13
B. Antidegradation 13
C. Stringency of Requirements for Individual Pollutants 14
V. Rationale for Receiving Water Limits 14
VI. Rationale for Provisions 14
A. Standard Provisions 14
B. Monitoring and Reporting Program 14
C. Special Provisions 15
VII. Rationale for Monitoring and Reporting Program (MRP) 18
VIII. Public Participation 19

ATTACHMENT F – FACT SHEET

This Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order. As described in section II.B of the Order, the Regional Water Board incorporates this Fact Sheet as its findings supporting the issuance of the Order.

I. PERMIT INFORMATION

The following tables summarize administrative information related to the facility:

Table F-1. Facility Information

Discharger	Facility Contact, Title, and Phone Number	Mailing Address	Effluent Description	Facility Design Flow (mgd)
American Canyon, City of	Peter Lee Wastewater Systems Manager (707) 647-4525	Same as Facility Address	Advanced Secondary	2.5
Benicia, City of	Jeff Gregory Wastewater Treatment Plant Superintendent (707) 746- 4790	Same as Facility Address	Secondary	4.5
Burlingame, City of	William Toci Plant Manager (650) 342-3727	501 Primrose Burlingame, CA 94010	Secondary	5.5
Central Contra Costa Sanitary District	Curt Swanson Director of Operations (925) 229-7336	Same as Facility Address	Secondary	53.8
Central Marin Sanitation Agency	Robert Cole Environmental Services Manager (415) 459-1455	Same as Facility Address	Secondary	10
Crockett Community Services District	Michael Kirker Port Costa Dept. Manager (510) 787-2992	Crockett Community Services District, Port Costa Sanitary Department P.O. Box 578 Crockett, CA 94525	Secondary	0.033
Delta Diablo	Gary W. Darling General Manager (925) 756-1920	Same as Facility Address	Secondary	16.5
East Bay Dischargers Authority: EBDA Common Outfall	Michael S. Connor General Manager (510) 278-5910	2651 Grant Avenue San Lorenzo, CA 94580	Secondary	107.8
Hayward Water Pollution Control Facility				
San Leandro Water Pollution Control Plant				
Oro Loma/Castro Valley Sanitary Districts Water Pollution Control Plant				
Raymond A. Boege Alvarado Wastewater Treatment Plant				

Discharger	Facility Contact, Title, and Phone Number	Mailing Address	Effluent Description	Facility Design Flow (mgd)
Livermore-Amador Valley Water Management Agency (LAVWMA) Export and Storage Facilities				
Dublin San Ramon Services District Wastewater Treatment Plant				
City of Livermore Water Reclamation Plant				
East Bay Municipal Utility District Main Wastewater Treatment Plant	Kurt H. Haunschild Manager of Wastewater Treatment (510) 287-1407	EBMUD WW Treatment P.O. Box 24055, MS 59 Oakland, CA 94623	Secondary	120
Fairfield-Suisun Sewer District	Greg Baatrup General Manager (707) 429-8930	Same as Facility Address	Advanced Secondary	23.7
Las Gallinas Valley Sanitary District	Mark Williams District Manager (415) 472-1734	300 Smith Ranch Rd San Rafael, CA 94903-1929	Secondary	2.92
Marin County (Paradise Cove), Sanitary District No. 5 of	Tony Rubio Chief Plant Operator (415) 435-1501	P.O. Box 227 Tiburon, CA 94920	Secondary	0.04
Marin County (Tiburon), Sanitary District No. 5 of	Tony Rubio Chief Plant Operator (415) 435-1501	2001 Paradise Drive Tiburon, CA 94920	Secondary	0.98
Millbrae, City of	Joseph Magner Superintendent (650) 259-2388	621 Magnolia Avenue Millbrae, CA 94030	Secondary	3
Mt. View Sanitary District	Michael D. Roe District Manager (925) 228-5635 ext. 32	P. O. Box 2757 Martinez, CA 94553	Advanced Secondary	3.2
Napa Sanitation District	Tim Healy General Manager (707) 258-6000	P.O. Box 2480 Napa, CA 94558	Secondary	15.4
Novato Sanitary District	Beverly James Manager-Engineer (415) 892-1694 x111	500 Davidson Street Novato, CA 94945	Secondary	7.05
Palo Alto, City of	Ken Torke Environmental Compliance Manager (650) 329-2243	2501 Embarcadero Way, Palo Alto, CA 94303	Advanced Secondary	39
Petaluma, City of	Leah Walker Environmental Services Manager (707) 776-3777	3890 Cypress Drive Petaluma, CA 94954	Secondary	6.7
Pinole, City of	Ron Tobey Plant Manager (510) 724-8963	2131 Pear Street, Pinole, CA 94564	Secondary	4.06
Rodeo Sanitary District	Steven S. Beall Engineer-Manager (510) 799-2970	Same as Facility Address	Secondary	1.14

Discharger	Facility Contact, Title, and Phone Number	Mailing Address	Effluent Description	Facility Design Flow (mgd)
San Francisco (San Francisco International Airport), City and County of	Mark Costanzo Utilities Manager (650) 821-7809	P.O. Box 8097 San Francisco, CA 94128	Secondary	2.2
San Francisco (Southeast Plant), City and County of	Tommy Moala Assistant General Manager of Wastewater (415) 554-2465	1155 Market St., 11th Floor San Francisco, CA 94103	Secondary	150
San Jose/Santa Clara, Cities of	James Ervin Acting Environmental Compliance Officer (408) 945-5124	700 Los Esteros Road San Jose, CA 95134	Advanced Secondary	167
San Mateo, City of	Ramon Towne Interim Director of Public Works (650) 522-7300	330 West 20th Avenue San Mateo, CA 94403	Secondary	15.7
Sausalito-Marin City Sanitary District	Craig Justice General Manager (415) 332-0244	P.O. Box 39 Sausalito, CA 94966-0039	Secondary	1.8
Sewerage Agency of Southern Marin	Mark Grushayev General Manager (415) 388-2402	26 Corte Madera Ave. Mill Valley, CA 94941	Secondary	3.6
Sonoma Valley County Sanitary District	Pam Jeane Deputy Chief Engineer (707) 521-1864	Sonoma County Water Agency 404 Aviation Blvd. Santa Rosa, CA 95403	Secondary	3
South Bayside System Authority	Daniel Child Manager (650) 591-7121	Same as Facility Address	Secondary	29
South San Francisco and San Bruno, Cities of	Brian Schumacker Plant Superintendent (650) 877-8555	South San Francisco-San Bruno Water Pollution Control Plant 195 Belle Air Road South San Francisco, CA 94080	Secondary	13
Sunnyvale, City of	Melody Tovar Division Manager (408) 730-7808	Sunnyvale Water Pollution Control Plant P.O. Box 3707 Sunnyvale, CA 94088-3707	Advanced Secondary	29.5
U.S. Department of Navy (Treasure Island)	Patricia A. McFadden BRAC Field Team Leader San Francisco Bay Area (415) 743-4720	Navy BRAC PMOW 410 Palm Avenue, Bldg 1, Suite 161 Treasure Island, San Francisco, CA 94130-1807	Secondary	2
Vallejo Sanitation and Flood Control District	Melissa Morton District Manager (707) 644-8949 X211	Same as Facility Address	Secondary	15.5
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	E.J. Shalaby District Manager (510) 222-6700	2910 Hilltop Drive Richmond, CA 94806	Secondary	28.5

Table F-2. Additional Facility Information

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Pretreatment Program	Receiving Water Type
American Canyon, City of	Same as Contact	Same as mailing address	Y	Estuarine
Benicia, City of	Same as Contact	Same as mailing address	Y	Estuarine
Burlingame, City of	Same as contact	Same as mailing address	Y	Marine
Central Contra Costa Sanitary District	Same as contact	Same as mailing address	Y	Estuarine
Central Marin Sanitation Agency	Same as contact	Same as mailing address	Y	Estuarine
Crockett Community Services District	Same as contact	Same as mailing address	N	Estuarine
Delta Diablo	Steve Dominguez Plant Manager (925) 756-1967	Same as mailing address	Y	Estuarine
East Bay Dischargers Authority	Same as contact	Same as mailing address	Y	Estuarine
Hayward Water Pollution Control Facility				
San Leandro Water Pollution Control Plant				
Oro Loma/Castro Valley Sanitary Districts Water Pollution Control Plant				
Raymond A. Boege Alvarado Wastewater Treatment Plant				
LAVWMA Export and Storage Facilities				
Dublin San Ramon Services District Wastewater Treatment Plant				
City of Livermore Water Reclamation Plant				
East Bay Municipal Utility District	Ben Horenstein Director of Wastewater (510) 287-1846	EBMUD Accounts Payable P.O. Box 24055, MS #5 Oakland, CA 94623-2306	Y	Marine
Fairfield-Suisun Sewer District	Same as contact	Same as mailing address	Y	Estuarine
Las Gallinas Valley Sanitary District	Same as contact	Same as mailing address	N	Estuarine
Marin County (Paradise Cove), Sanitary District No. 5 of	Same as contact	Same as mailing address	N	Marine
Marin County (Tiburon), Sanitary District No. 5 of	Same as contact	Same as mailing address	N	Marine
Millbrae, City of	Same as contact	Same as mailing address	N	Marine
Mt. View Sanitary District	Same as contact	Same as mailing address	N	Estuarine
Napa Sanitation District	James Keller Plant Manager (707) 258-6020	Same as mailing address	Y	Estuarine
Novato Sanitary District	Same as contact	Same as mailing address	Y	Estuarine
Palo Alto, City of	Same as contact	Same as mailing address	Y	Estuarine

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Pretreatment Program	Receiving Water Type
Petaluma, City of	Matthew Pierce Operations Supervisor (707) 776-3777	Same as mailing address	Y	Estuarine
Pinole, City of	Same as contact	Same as mailing address	N	Marine
Rodeo Sanitary District	Same as contact	Same as mailing address	N	Estuarine
San Francisco (San Francisco International Airport), City and County of	Peter Acton Deputy Airport Director (650) 821-5000	Same as mailing address	Y	Marine
San Francisco (Southeast Plant), City and County of	George Engel Superintendent (415) 920-4944	Same as mailing address	Y	Marine
San Jose/Santa Clara Water Pollution Control Plant and Cities of San Jose and Santa Clara	Joanna De Sa Acting Deputy Director (408) 535-8560	Same as mailing address	Y	Estuarine
San Mateo, City of	Same as contact	Same as mailing address	Y	Marine
Sausalito-Marin City Sanitary District	Same as contact	Same as mailing address	N	Marine
Sewerage Agency of Southern Marin	Same as contact	Same as mailing address	N	Marine
Sonoma Valley County Sanitary District	Brian Anderson Operations Coordinator (707) 526-5370	Same as mailing address	N	Estuarine
South Bayside System Authority	Same as contact	Same as mailing address	Y	Marine
South San Francisco and San Bruno, Cities of	Same as contact	Same as mailing address	Y	Marine
Sunnyvale, City of	Same as contact	Same as mailing address	Y	Estuarine
U.S. Department of Navy (Treasure Island)	Same as contact	Same as mailing address	N	Marine
Vallejo Sanitation and Flood Control District	Same as contact	Same as mailing address	Y	Estuarine
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	E.J. Shalaby District Manager (510) 222-6700	Same as mailing address	Y	Estuarine

A. The Dischargers listed in Table 1 of the Order own and operate secondary and advanced secondary wastewater treatment facilities as described in their individual permits. Wastewater is discharged to San Francisco Bay and its tributaries, which are waters of the United States within the San Francisco Bay watershed. Attachment C shows a map of the Dischargers subject to this Order.

This Order supersedes nutrient-related requirements in the individual NPDES permits listed in Attachment B, with the exception of effluent limitations for ammonia as well as special studies the Central Contra Costa Sanitary District is to conduct pursuant to Order No. R2-2012-0016 (Provision C.5c). 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 Dischargers herein.

B. The San Francisco Bay estuary has long been recognized as nutrient-enriched. Despite this, the abundance of phytoplankton in the estuary is lower than would be expected due to a number of factors, including strong tidal mixing; high turbidity, which limits light penetration; and high filtration by clams. However, recent data indicate an increase in phytoplankton biomass and a small decline in dissolved oxygen concentrations in many areas of the estuary, suggesting that its historic resilience to the effects of nutrient enrichment may be weakening. The contributing factors for this include (1) natural oceanic oscillations that have increased benthic predators, thus reducing South San Francisco Bay's clam population and clam grazing; and (2) decreases in suspended sediment that have resulted in a less turbid environment and increased light penetration.

South San Francisco Bay's clam population filters phytoplankton biomass. However, beginning in the late 1990s, gross primary production in the South San Francisco Bay has increased sharply.[1] This increase appears to be due to a decrease in bivalve grazing because predators (fish, shrimp, and crabs) of benthic feeders have increased significantly. The increase in predator abundance has been attributed to a change in natural oceanic oscillations that is bringing colder waters to San Francisco Bay and has allowed these predators to feed on bivalves.

San Francisco Bay is turbid due to high suspended sediment concentrations. However, recent studies show that the Bay may be clearing, with Bay-wide decreases in turbidity. In certain areas (e.g., Suisun Bay) decreases in turbidity of up to 50% have occurred since 1975.[2] The reasons appear to be related to decreases in (1) sediment loads from the Sierra Nevada Mountains and Central Valley, and (2) the amount of erodible material within San Francisco Bay. Even with a significant decrease in turbidity, phytoplankton biomass production continues to be suppressed in Suisun Bay. This needs to be further studied as described on page F-16.

[1] Cloern, J. E., and A. D. Jassby (2012), "Drivers of change in estuarine-coastal ecosystems: Discoveries from four decades of study in San Francisco Bay," *Reviews of Geophysics,* 50, RG4001, page 21.
[2] San Francisco Estuary Institute (SFEI), Nutrient Conceptual Model Draft, May 1, 2013, page 14.

Spring phytoplankton blooms are relatively frequent in San Francisco Bay, and fall blooms have been occurring with increased frequency. The reasons are unknown, but the increase could be the result of a less turbid environment and lower grazing pressure from clams. San Francisco Bay experiences strong tidal mixing, which breaks down stratification in the water column.[3] However, there are two periods each year (March/April and September/October) that are low points for tidal energy. During these low-energy periods, stratification develops if there are sufficient freshwater inputs (salinity stratification is more typical in the spring) or calm clear days (temperature stratification is more typical in the fall). Under these conditions, phytoplankton can remain in the light-rich zone and grow rapidly. Typically, these blooms are short-lived, lasting 10 to 14 days, with blooms ending when increased tidal energy re-mixes the water column.

Under current conditions, phytoplankton growth and biomass accumulation are limited much of the time by lack of light, and biomass accumulation is further controlled by clam grazing. If these constraints continue to shift, increases in phytoplankton biomass could follow. Under this scenario, it may be necessary to limit the availability of essential nutrients. This Order establishes new information collection requirements because municipal wastewater treatment plants are a significant source of nutrients to San Francisco Bay. Municipal wastewater treatment plants account for about 63 percent of the annual average total nitrogen load to San Francisco Bay. Their contribution varies, depending on embayment, as shown in the table below:

Table F-3. Annual Average Loads for Dissolved Inorganic Nitrogen, kg/day

Embayment	Municipal	Refinery	Stormwater	Delta	Total	POTW %
Lower South Bay	6,805	n/a	539	n/a	7,344	93
South Bay	19,401	n/a	670	n/a	20,071	97
Central Bay	11,667	n/a	159	n/a	11,826	99
San Pablo Bay & Carquinez Strait	2,721	842	7,484	n/a	11,047	25
Suisun Bay	5,618	130	1,968	15,930	23,646	24
Baywide	46,212	972	10,820	15,930	73,934	63

SFEI, External Nutrient Loads to San Francisco Bay, Table 6, Draft, April 9, 2013.

C. Several years may be needed to determine an appropriate level of nutrient control and to identify management actions necessary to protect San Francisco Bay beneficial uses. This Order is the first phase of what the Regional Water Board expects to be a multi-permit effort. It sets forth a regional framework to facilitate collaboration on studies that will inform future management decisions and regulatory strategies. The overall purpose of this phase is to track and evaluate treatment plant performance, fund nutrient monitoring programs, support load response modeling, and conduct treatment plant optimization and upgrade studies for nutrient removal. These studies will increase the understanding of external nutrient loads, improve load response models, support development of nutrient objectives, and increase the certainty that any required nutrient removal at treatment plants will produce the desired outcome. In the 2019 permit

[3] SFEI, Nutrient Conceptual Model Draft, May 1, 2013, page 14.

reissuance, the Regional Water Board anticipates considering establishment of performance-based effluent limits for nutrients and may require implementation of treatment optimization or other means to reduce loads or increase assimilative capacity if scientific studies show results that warrant such activities. The Regional Water Board will also consider load offsets between Dischargers within and between subembayments if permissible. The 2019 permit reissuance will also continue efforts to evaluate control measure scenarios as informed by load response modeling. In the 2024 and 2029 permit reissuances, the Regional Water Board anticipates using the information from studies conducted under earlier orders and the Nutrient Management Strategy to require implementation of additional management actions, as needed, and may allow load offsets as appropriate.

II. FACILITIES DESCRIPTION

A. Description of Wastewater Treatment

Municipal wastewater treatment plants provide secondary treatment, which includes screening, skimming, settling, and biological treatment. Some plants also provide advanced treatment that “nitrifies” ammonia to make nitrate-nitrogen. Municipal wastewater treatment plants generally remove around 20 to 30 percent of the total nitrogen load in their influent. The primary source of nutrients in municipal wastewater is human waste; therefore, most dischargers have no practical way of controlling influent nutrient levels.

B. Discharge Points and Receiving Waters

Discharge points and receiving waters are identified in the individual permits listed in Attachment B.

C. Existing Nutrient Discharge Data

Dischargers have been collecting nutrient data since the Executive Officer of the Regional Water Board issued a Water Code section 13267 order on March 2, 2012. These data show that about 90 percent of municipal wastewater treatment plant nutrient discharges are from facilities that have a permitted design flow of 10 mgd or greater. These data are summarized below:

Table F-4. Nutrient Loads (July 2012 to June 2013)

Discharger	Average Annual Total Nitrogen Load (kg/day)	Average Annual Total Phosphorus Load (kg/day)	Design Flow (mgd)
American Canyon, City of	66	26	2.5
Benicia, City of	223	27	4.5
Burlingame, City of	459	95	5.5
Calistoga, City of	58	6.6	0.84
Central Contra Costa Sanitary District	4187	138	53.8
Central Marin Sanitation Agency	903	89	10
Crockett Community Services District			0.033
Delta Diablo	1725	33	16.5

Discharger	Average Annual Total Nitrogen Load (kg/day)	Average Annual Total Phosphorus Load (kg/day)	Design Flow (mgd)
East Bay Dischargers Authority, including City of Hayward, City of San Leandro, Oro Loma Sanitary District, Castro Valley Sanitary District, Union Sanitary District, Livermore-Amador Valley Water Management Agency, Dublin San Ramon Services District, and City of Livermore	8641	555	107.8
East Bay Municipal Utility District	10583	973	120
Fairfield-Suisun Sewer District	1327	196	23.7
Las Gallinas Valley Sanitary District	261	40	2.92
Marin County (Paradise Cove), Sanitary District No. 5 of	2.1	0.27	0.04
Marin County (Tiburon), Sanitary District No. 5 of	61	8.2	0.98
Millbrae, City of	251	16	3
Mt. View Sanitary District	134	18	3.2
Napa Sanitation District	509	48	15.4
Novato Sanitary District	253	23	7.05
Palo Alto, City of	2341	336	39
Petaluma, City of	71	50	5.2
Pinole, City of	347	34	4.06
Rodeo Sanitary District	41	9.3	1.14
Saint Helena, City of	114	36	0.5
San Francisco (San Francisco International Airport), City and County of	236	15	2.2
San Francisco (Southeast Plant), City and County of	8307	101	150
San Jose/Santa Clara WPCP	5233	332	167
San Mateo, City of	1501	124	15.7
Sausalito-Marin City Sanitary District	158	25	1.8
Sewerage Agency of Southern Marin	241	42	3.6
Sonoma Valley County Sanitary District	119	40	3.0
South Bayside System Authority	2118	171	29
South San Francisco and San Bruno, Cities of	1165	153	13
Sunnyvale, City of	1086	213	29.5
U.S. Department of Navy (Treasure Island)	13	1.8	2.0
Vallejo Sanitation and Flood Control District	845	128	15.5
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	850	57	28.5
Yountville, Town of	23	3.8	0.55
Aggregate Mass Load (kg/day)	**54,500**[4]	**4,160**	
Load from design flow ≥ 10 mgd	**51,300 (94%)**	**3,650 (88%)**	

[4] The aggregate nitrogen loads in Table F-4 are about 20% higher than those noted in Table F-3. This is because Table F-4 represents total nitrogen whereas Table F-3 only represents the dissolved inorganic form.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements in the Order are based on the requirements and authorities described below:

A. Legal Authorities

This Order serves as WDRs pursuant to California Water Code article 4, chapter 4, division 7 (commencing with § 13260). This Order is also issued pursuant to federal Clean Water Act (CWA) section 402 and its implementing regulations adopted by U.S. EPA and Water Code chapter 5.5, division 7 (commencing with § 13370). It shall serve as an NPDES permit for point source discharges from the named facilities to surface waters.

B. California Environmental Quality Act (CEQA)

Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of the California Environmental Quality Act, Public Resources Code division 13, chapter 3 (commencing with § 21100).

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plan.** The Regional Water Board adopted the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), which designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. The Basin Plan specifies numeric and narrative water quality objectives. The narrative biostimulatory substances objective states, “Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.” Requirements in this Order implement the Basin Plan.

   This Order is consistent with State Water Board Resolution No. 88-63, which established State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Beneficial uses for the discharges’ receiving waters are listed below:

Table F-5. Basin Plan Beneficial Uses

Receiving Water	Beneficial Uses
San Francisco Bay and its Tidally-Influenced Tributaries	Ocean, Commercial, and Sport Fishing (COMM) Estuarine habitat (EST) Industrial Service Supply (IND) Marine Habitat (MAR), Fish Migration (MIGR) Navigation (NAV) Preservation of Rare and Endangered Species (RARE) Water Contact Recreation (REC1) Noncontact Water Recreation (REC2) Shellfish Harvesting (SHELL) Fish Spawning (SPWN) Wildlife Habitat (WILD)

2. **Anti-Backsliding Requirements.** CWA sections 402(o) and 303(d)(4) and 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 be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

3. **Antidegradation Policy.** Federal regulations at 40 C.F.R. section 131.12 requires that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, which 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 Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. Permitted discharges must be consistent with the antidegradation provisions of 40 C.F.R. section 131.12 and State Water Board Resolution 68-16.

4. **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 contains requirements to protect the beneficial uses of waters of the State, including protecting rare, threatened, or endangered species. Each Discharger is responsible for meeting all applicable endangered species act requirements.

D. Impaired Waters on CWA 303(d) List

In October 2011, U.S. EPA approved a revised list of impaired waters prepared pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Regional Water Board plans to adopt Total Maximum Daily Loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources

and load allocations for non-point sources, and are established to achieve the water quality standards for the impaired waters. San Francisco Bay is not listed as impaired by nutrients.

IV. RATIONALE FOR DISCHARGE PROHIBITIONS AND SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through NPDES permit requirements. There are two principal bases for effluent limitations: 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 to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of receiving waters.

This Order continues the receiving water limits that apply to biostimulatory substances from the individual NPDES permits listed in Attachment B. At this time, the Regional Water Board has determined that there is insufficient evidence to conclude that nutrients cause or contribute to excursions of the narrative water quality objective for biostimulatory substances. Therefore, this Order does not include water quality-based effluent limits for nutrients. The individual NPDES permits listed in Attachment B contain other discharge prohibitions, technology-based limitations, and water quality-based specifications, including ammonia effluent limitations.

A. Anti-backsliding

This Order does not backslide because existing permits do not include effluent limitations for nutrients based on the narrative biostimulatory substances water quality objective.

B. Antidegradation

Federal regulations at 40 C.F.R. section 131.12 require that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution No. 68-16. This Order covers existing discharges, all of which have been covered by individual NPDES permits adopted in accordance with antidegradation policies. According to a State Water Board guidance memorandum (William Attwater, Chief Counsel, October 7, 1987), "…the federal antidegradation policy ordinarily does not apply to consideration of existing discharges, even if exceptions or variances from other applicable water quality objectives or effluent guidelines are required to permit the discharge to continue." According to the memorandum, considerations in determining whether to perform an antidegradation analysis include the following:

1. whether there are new discharges or an expansion of existing facilities,
2. whether there would be a reduction in the level of treatment of an existing discharge,
3. whether an existing outfall has been relocated,

4. whether there has been a substantial increase in mass emissions, and
5. whether there has been a change in water quality from a point source or non-point source discharge or water diversion.

None of these conditions apply to this Order.

Moreover, no antidegradation analysis is required when the Regional Water Board has no reason to believe that baseline water quality will be reduced. Baseline quality is the best quality of the receiving water that has existed since 1968 when considering Resolution 68-16, or since 1975 under the federal policy, unless subsequent lowering was due to regulatory action consistent with State and federal antidegradation policies. If poorer water quality was permitted, the most recent water quality resulting from permitted action is the baseline water quality to be considered in any antidegradation analysis.

Because all the individual NPDES permits were adopted in accordance with the antidegradation policies, the baseline for evaluating antidegradation is the existing water quality resulting from the individual permits. This Order does not allow for any increase in permitted design flow or allow for any reduction in treatment; therefore, no increase in nutrient discharge beyond the discharges already taking place are foreseeable, and no findings justifying degradation are necessary.

C. Stringency of Requirements for Individual Pollutants

This Order's discharge specifications are no more stringent than required to implement CWA requirements.

V. RATIONALE FOR RECEIVING WATER LIMITS

This Order continues receiving water limits that apply to biostimulatory substances from the individual NPDES permits listed in Attachment B. These limits are based on the Basin Plan water quality objectives. This continuance is necessary, because this Order supercedes nutrient-related requirements in the individual NPDES permits. No other additional limitations are necessary.

VI. RATIONALE FOR PROVISIONS

A. Standard Provisions

The individual NPDES permits listed in Attachment B contain all standard provisions.

B. Monitoring and Reporting Program

Pursuant to 40 C.F.R. section 122.48, NPDES permits must specify requirements for recording and reporting monitoring results. Water Code section 13383, and 40 C.F.R. sections 122.41(h) and (j), authorize the Regional Water Board to require technical and monitoring reports. This Order establishes monitoring and reporting requirements, contained in the Monitoring and Reporting Program (Attachment E), that implement

federal and State requirements. For more background regarding these requirements, see section VII of this Fact Sheet.

C. Special Provisions

1. Evaluation of Potential Nutrient Discharge Reduction by Treatment Optimization and Side-Stream Treatment

This Order requires major Dischargers to study how existing treatment can be optimized and how much it would cost to optimize and implement minor upgrades to their existing treatment systems to reduce nutrient loads to San Francisco Bay. This information is necessary to understand the extent that Dischargers can maximize existing treatment systems for nutrient removal to reduce the risk of impairment of San Francisco Bay. This Order also requires evaluation for side-stream treatment opportunities. Implementing side-stream treatment can be a capital intensive upgrade, but it is included in the optimization evaluation since opportunities for side-stream treatment are site-specific.

Major facilities are those with a design flow greater than or equal to 1 million gallons per day (mgd). While most of the nutrient loads to San Francisco Bay are from municipal wastewater treatment facilities with design flows greater than 10 mgd, this Order requires other major facilities to evaluate the potential to optimize their treatment and to evaluate the costs of upgrades because there is uncertainty concerning nutrient cycling within in San Francisco Bay. It is possible that all nutrient sources may contribute significantly to nutrient impacts and that many Dischargers will need to optimize treatment.

For Dischargers that implement minor upgrades or treatment plant optimization, the Regional Water Board intends to recognize early actions and encourage early nutrient removal where opportunities exist. As part of Dischargers' actions to implement minor upgrades or treatment plant optimization, Dischargers should also consider how such actions may be consistent with or contrary to actions Dischargers plan to address the impacts of sea level rise and climate change.

This provision is authorized by Clean Water Act section 1318(a) and Water Code section 13383. Section 1318(a) authorizes the collection of information necessary to carry out the objectives of the Clean Water Act, including but not limited to developing or assisting in the development of any effluent limitation, other limitation, prohibition, effluent standard, pretreatment standard or standard of performance. The Regional Water Board implements this requirement through Water Code section 13383.

2. Evaluation of Potential Nutrient Discharge Reduction by Treatment Plant Upgrades or Other Means

This Order requires major Dischargers to study how existing treatment plants can be upgraded and how much it could cost to upgrade their existing treatment systems to reduce nutrient loads to San Francisco Bay and its tributaries. This information is

necessary to understand measures the Dischargers could need to implement to significantly reduce nutrient discharges should the need arise to reduce the risk of impairment of San Francisco Bay.

This requirement is consistent with U.S. EPA's NPDES Permit Writers' Manual, which states:

> Treatability studies are applicable when treatability information is lacking for a pollutant or pollutants that would prohibit a permit writer from developing defensible technology-based effluent limits. Treatability studies can also be required if the permit writer suspects that a facility may not be able to comply with an effluent limit.[5]

This Order requires major Dischargers to evaluate options for upgrading their treatment plants because nutrient load reductions from their facilities could be important in reducing potential nutrient-related impacts in San Francisco Bay.

The intent of the requirement to address sea level rise and climate change as part of the nutrient upgrade evaluation is to avoid identifying nutrient removal options that turn out to be infeasible because of actions implemented or planned to address sea level rise or climate change.

Additionally, this provision highlights that major Dischargers can evaluate other means for reducing nutrient loads that may have positive ancillary benefits. For example, Dischargers could consider increasing water recycling to reduce nutrient loads and potable water use. It may also be possible to use wetlands or other treatment upgrades to remove nutrients while also providing habitat, including habitat for endangered species; protecting against sea level rise; and removing constituents of emerging concern, such as pharmaceuticals. This evaluation should also consider how upgrades that reduce nutrient loads may be consistent with or contrary to upgrades Dischargers plan to address the impacts of sea level rise and climate change.

This provision is authorized by Clean Water Act section 1318(a) and Water Code section 13383. Section 1318(a) authorizes the collection of information necessary to carry out the objectives of the Clean Water Act, including but not limited to developing or assisting in the development of any effluent limitation, other limitation, prohibition, effluent standard, pretreatment standard or standard of performance. The Regional Water Board implements this requirement through Water Code section 13383.

Also, this Order requires Dischargers to evaluate the impact on nutrient loads due to treatment plant optimization and upgrades implemented in response to other regulations or requirements. The Regional Water Board understands reductions in nutrient loads may impact the loads of other pollutants in the effluent as well as biosolids quality, and vice versa. For example, an upgrade from biosolids

[5] *U.S. EPA NPDES Permit Writers' Manual*, Publication Number EPA-833-B-96-003, December 1996, page 139.

incineration to anaerobic digestion will result in an increase in nutrient loading to the POTW effluent. This requirement will allow Dischargers to show how nutrient loads will increase or decrease after process changes are made in response to other regulations and requirements and will help elucidate the balance of competing environmental benefits.

3. Monitoring, Modeling, and Embayment Studies

This Order requires the Dischargers to conduct, or to collaborate on, studies to address the potential impacts of nutrients on San Francisco Bay beneficial uses. The Regional Water Board recognizes there are great efficiencies from collaborating on large scale study efforts. The Bay Area Clean Water Agencies (BACWA) has identified $880,000[6] each permit year as a collective level of effort from the Dischargers. The Regional Water Board finds this amount to be an appropriate level of effort initially to support science plan development and implementation and receiving water monitoring for nutrients identified in this provision. If the Dischargers and BACWA are successful in securing additional outside resources, such as from grants or other agencies for nutrient monitoring or studies identified in the science plan, the outside funding and work would not be requirements under this Order, nor would the outside funding count towards the Dischargers' level of effort under this provision.

The Regional Water Board notes that Dischargers have contributed over a million dollars directly and through the RMP to fund scientific studies examining the impact of nutrients on San Francisco Bay and have conducted facility nutrient monitoring since July 2012. Dischargers are also collaborating with other regional stakeholders on the development of a science plan and governance structure to guide scientific research on nutrient impacts.

Support for modeling will inform the development of Nutrient Numeric Endpoints (NNEs) that the Regional and State Water Boards are developing. The NNE framework aims to establish a suite of numeric endpoints based on the ecological response of a waterbody to nutrient over-enrichment and eutrophication (e.g., excessive algal blooms leading to decreased dissolved oxygen). In addition to numeric endpoints for response indicators, the NNE framework will include models that link the response indicators to nutrient loads and other management control**s** for a range of potential future conditions in the Bay. The NNE framework is intended to serve as numeric guidance to translate the Basin Plan's narrative objective for biostimulatory substances. The modeling efforts will enable a mechanistic (cause and effect) approach that bases management endpoints on ecological response. In this way, the model may be used to link nutrient loads with co-factors (e.g., strength of tides, residence time, clam grazing, increase/decreases in turbidity) and, therefore, provide more accurate information on the relative importance of reducing nutrient loads from certain Dischargers.

[6] The $880,000 identified by BACWA does not include costs to comply with other provisions of this Order or funds Dischargers contribute to the Regional Monitoring Program.

On the subembayment level, there is a need to coordinate studies, such as those in Suisun Bay, to better understand why phytoplankton biomass is suppressed in this bay segment. In Suisun Bay, extremely low phytoplankton biomass and a highly-altered phytoplankton community composition have characterized the system since 1987, when the invasive clam *Corubula amurensis* became widely established. Studies suggest that elevated levels of ammonium or an altered ratio in nitrogen to phosphorus may be contributing to low phytoplankton biomass and changes in phytoplankton species composition.[7] Additionally, there is also a need to coordinate studies for the Lower South Bay because it is enriched with nitrogen and phosphorus. The median dissolved inorganic nitrogen concentrations in South San Francisco Bay are almost ten times higher than those in estuaries that do not have direct municipal wastewater treatment plant discharges.[8] Trends in chlorophyll (a) suggest that this portion of the estuary may be starting to lose some of its historic resilience to high nutrient loads.

This provision is authorized by Clean Water Act section 1318(a) and Water Code section 13383. Section 1318(a) authorizes the collection of information necessary to carry out the objectives of the Clean Water Act, including but not limited to developing or assisting in the development of any effluent limitation, other limitation, prohibition, effluent standard, pretreatment standard or standard of performance. The Regional Water Board implements this requirement through Water Code section 13383.

4. Reopener Provisions

These provisions are based on 40 C.F.R. sections 122.62 and 122.63 and allow modification of this Order as necessary in response to updated water quality standards, regulations, or other new and relevant information that may become available in the future, and other circumstances as allowed by law.

VII. RATIONALE FOR MONITORING AND REPORTING PROGRAM (MRP)

Attachment E contains the MRP for this Order. It specifies pollutants to be monitored, monitoring frequencies, and reporting requirements. The following provides the rationale for the MRP requirements.

Consistent with the Regional Water Board's March 2, 2012, Water Code section 13267 order to collect nutrient data, this Order requires Dischargers to report nitrogen and phosphorus discharge levels and trends. The monitoring frequencies specified depend on each Discharger's nutrient loads and its resources to conduct the monitoring. For example, those with larger flows are required to monitor more frequently.

This Order requires the Dischargers to support receiving water monitoring to enable load/response modeling, track nutrient trends over time, and identify harmful algae blooms

[7] SFEI, Nutrient Conceptual Model Draft, May 1, 2013, page 6.
[8] Cloern, J. E., and A. D. Jassby (2012), "Drivers of change in estuarine-coastal ecosystems: Discoveries from four decades of study in San Francisco Bay," *Reviews of Geophysics,* 50, RG4001, page 14.

and associated toxins. These requirements are necessary because San Francisco Bay may be becoming less resistant to nutrient discharges, municipal wastewater treatment facilities are the primary source of nutrient loadings to San Francisco Bay, and the need for future controls can be informed by an improved understanding of the fate and transport of nutrients in San Francisco Bay.

Finally, this Order requires Dischargers to submit an annual report, either individually or as a group. The annual report is to include a summary of monitoring data and an evaluation of nutrient load and concentration trends. This information is necessary to establish baseline loads. The requirement for a trend analysis is to ensure that Dischargers investigate the causes of any changes in nutrient discharges from their treatment plants. This will allow for a better understanding of why nutrient loads may change and help identify controllable measures for maintaining levels of treatment. Additionally, this Order requires that Dischargers report nutrient loads from all municipal treatment plants in their respective subembayments. This is to establish baseline loads by subembayment and the potential for nutrient load trading.

VIII. PUBLIC PARTICIPATION

The Regional Water Board considered the issuance of WDRs that will serve as an NPDES permit for the Dischargers' facilities. As a step in the WDR adoption process, Regional Water Board staff developed tentative WDRs and encouraged public participation in the WDR adoption process.

A. Notification of Interested Parties. The Regional Water Board notified the Dischargers 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 by transmitting electronic copies of tentative WDRs to the Dischargers and other interested parties and by publishing a notice in the Oakland Tribune. The public had access to the agenda and any changes in dates and locations through the Regional Water Board's website at www.waterboards.ca.gov/sanfranciscobay.

B. Written Comments. Interested persons were invited to submit written comments concerning the tentative WDRs as explained through the notification process. Comments were due either in person or by mail at the Regional Water Board office at 1515 Clay Street, Suite 1400, Oakland, California 94612, to the attention of **Robert Schlipf**. For full staff response and Regional Water Board consideration, the written comments were due at the Regional Water Board office by **5:00 p.m.** on Monday, **March 10, 2014**.

C. Public Hearing. The Regional Water Board held a public hearing on the tentative WDRs during its regular meeting at the following date and time, and at the following location:

Date: **April 9, 2014**
Time: 9:00 a.m.
Location: Elihu Harris State Office Building

1515 Clay Street, 1st Floor Auditorium
Oakland, CA 94612

Contact: Robert Schlipf, (510) 622-2478, robert.schlipf@waterboards.ca.gov

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 to be in writing.

Dates and venues change. The Regional Water Board web address is http://www.waterboards.ca.gov/sanfranciscobay, where one could access the current agenda for changes in dates and locations.

D. Reconsideration of Waste Discharge Requirements. Any aggrieved person may petition the State Water Board to review the Regional Water Board decision regarding the final WDRs. The State Water Board must receive the petition at the following address within 30 calendar days of the Regional Water Board action:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

For instructions on how to file a petition for review, see http://www.waterboards.ca.gov/public_notices/petitions/water_quality/wqpetition_instr.shtml.

E. Information and Copying. Supporting documents, and comments received are on file and may be inspected at the address above at any time between 9:00 a.m. and 5:00 p.m., Monday through Friday. Copying of documents may be arranged by calling (510) 622-2300.

F. 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 the Facility, and provide a name, address, and phone number.

G. Additional Information. Requests for additional information or questions regarding this Order should be directed to Robert Schlipf at (510) 622-2478 or RSchlipf@waterboards.ca.gov.

APPENDIX G – BAAQMD PERMIT

03/25/15 A2482

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

Plant# 2482 Page: 1 Expires: APR 1, 2016

This document does not permit the holder to violate any District regulation or other law.

City of Richmond Water Pollution Control District
601 Canal Boulevard
Richmond, CA 94804

Location: 601 Canal Boulevard
Richmond, CA 94804

S#	DESCRIPTION	[Schedule]	PAID
8	Standby Diesel engine, 1586 hp, Caterpillar S/N 24Z04374		366
	Standby Generator	[B]	
	Emissions at: P2 Stack		
10	Commercial/Institutional Boiler, 4200K BTU/hr max, Natural gas		0
	Hot Water Boiler #1	[exempt]	
	Abated by: A10 Afterburner		
	Emissions at: P10 Stack		
11	Commercial/Institutional Boiler, 4200K BTU/hr max, Natural gas		0
	Hot Water Boiler #2	[exempt]	
	Abated by: A11 Afterburner		
	Emissions at: P11 Stack		
12	Standby Diesel engine, 755 hp, EPA# DCEXL015.AAJ, Cummins		44
	Emergency Standby Generator	[B,66 days]	
	Emissions at: P1 Stack		
100	CHEM> Sewage, Wastewater treatment plant, Municipal sewage		381
	Municipal Wastewater Treatment Plant	[F]	
110	CHEM> Sewage, Preliminary treatment, Municipal sewage		1535
	Preliminary Treatment	[G1]	
	Abated by: A3 Unclassified Abatement Device		
	A4 Fibrous Packed Scrubber		

The operating parameters described above are based on information supplied by permit holder and may differ from the limits set forth in the attached conditions of the Permit to Operate. The limits of operation in the permit conditions are not to be exceeded. Exceeding these limits is considered a violation of District regulations subject to enforcement action.

RECEIVED
MAR 30 2015
BY: Martha Mosley

03/25/15 A2482

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

Plant# 2482 Page: 2 Expires: APR 1, 2016

This document does not permit the holder to violate any District regulation or other law.

S#	DESCRIPTION	[Schedule]	PAID
120	CHEM> Sewage, Primary treatment, Municipal sewage Primary Treatment	[G1]	1535
130	CHEM> Sewage, Secondary treatment, Municipal sewage Secondary Treatment	[F]	346
140	CHEM> Sewage, Secondary clarifiers, Municipal sewage Secondary Clarifiers	[F]	346
150	CHEM> Sewage, Disinfection, Municipal sewage Disinfection	[F]	346
151	CHEM> Sewage, Primary treatment, Municipal sewage Secondary Treatment - Additional Clarifier	[G1]	1535
160	CHEM> Sewage, Sludge handling processes, Municipal sewage Sludge Handling	[G1]	1535
170	CHEM> Sewage, Digesters, Municipal sewage Anaerobic Digesters Abated by: A1 Flare A3 Unclassified Abatement Device	[G1]	1535

11 Permitted Sources, Exempt Sources

*** See attached Permit Conditions ***

The operating parameters described above are based on information supplied by permit holder and may differ from the limits set forth in the attached conditions of the Permit to Operate. The limits of operation in the permit conditions are not to be exceeded. Exceeding these limits is considered a violation of District regulations subject to enforcement action.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

Plant# 2482 Page: 3 Expires: APR 1, 2016

This document does not permit the holder to violate any District regulation or other law.

*** PERMIT CONDITIONS ***

Source# 8 subject to Condition ID# 22820
Source# 12 subject to Condition ID# 22850
Source# 170 subject to Condition ID# 19952

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

This document does not permit the holder to violate any District regulation or other law.

*** PERMIT CONDITIONS ***

==========

COND# 19952 *applies to S#'s 170, -11, -10, -4, -3*

S-170 - Digesters

1. Except as allowed by Part 7 of this condition, raw digester gas shall not be vented to the atmosphere. (Basis: Regulation 1-301, Cumulative Increase)

2. Except as specified in part 7, the owner/operator shall control the emissions from S# 170 Anaerobic Digesters No. 1 and No. 2 at all times by: a. Injection of A-3 consisting of either: i. Ferric chloride; ii. Ferric sulfate; iii. Other APCO approved compounds AND b. Combustion of digester gas in the Waste Gas Burner (A-1, Flare) (Basis: Regulation 1-301)

3. The owner/operator shall add ferric chloride and/or ferric sulfate or other compounds approved by the APCO into the digesters at a rate sufficient to keep the level of H2S in the digester gas below 200 ppm, measured at the outlet of the digesters, prior to the Waste Gas Burner (A-1, Flare).

If the monitoring in Part 4 shows an H2S concentration above this limit, the owner/operator shall increase the feed of ferric chloride, ferric sulfate or other compounds approved by the APCO to a rate sufficient to reduce the H2S concentration in the digester gas below the limit within 15 days or such other time as may be approved by the APCO. The owner/operator shall re-test and record the H2S concentration at the outlet of digesters daily, until the above limit is attained. (Basis:
Regulation 1-301, 2-1-403)

4. To demonstrate compliance with the standard in Part 3, the owner/operator shall monitor and record the H2S concentration in the digester gas exiting each digester at least once every calendar week. The owner/operator shall use Draeger tubes or an equivalent monitoring method approved by the Air Pollution Control Officer. (Basis Regulation 2-1-403)

5. The owner/operator may propose for District review, based on actual measurements taken at the site during operation of the digesters, that the monitoring schedule

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

This document does not permit the holder to violate any District regulation or other law.

*** PERMIT CONDITIONS ***

in Part 4 be changed based on the decline in H2S concentration in the digester gas. Written approval by the District's Engineering Division must be received by the owner/operator prior to a change to the monitoring schedule. (Basis: Regulation 2-1-403)

6. The owner/operator shall record the dates, hours of use, and the digester gas flow (in cubic feet) to the Waste Gas Burner (flare), in a District approved logbook. (Basis: Regulation 2-1-403)

7. Failure to abate digester gas emissions from the following causes or activities shall not be considered a violation of Parts 1 or 2, provided that the ambient H2S concentration level in Part 10 is not exceeded. The owner/operator shall keep in a District approved logbook, the date, time and type of the maintenance activities listed below. a. Digester gas leaks from digester gas piping system provided the piping systems are maintained in good operating condition. b. Preventative maintenance on pressure relief valves to ensure proper operation. c. Manual draining of condensate from digester gas piping systems to ensure proper digester operation. d. Releases from pressure relief valves as designed, in order to maintain the integrity of the digester cover membranes. (Basis: Regulation 2-1-403)

8. If detected and known, the owner/operator shall record the occurrence, duration, and cause of emissions of digester gas from causes or activities not listed in Part 7. The owner/operator shall not cause or allow any digester gas emissions otherwise allowed by this Part to create a violation of District regulations. (Basis: Regulation 1-301)

9. (deleted startup condition)

10. The owner/operator shall conduct daily inspections on all digester gas relief valves to ensure that the valves are not leaking. In the event the relief valve lifts, the valve must properly re-seat and does not leak. The owner/operator shall keep records of the date and time of the inspection and the findings as well as any action taken on a District approved logbook. (Basis: Regulation

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

This document does not permit the holder to violate any District regulation or other law.

*** PERMIT CONDITIONS ***

2-1-403)

11. To ensure the digester cover is not leaking, the owner/operator shall monitor the air chamber between the inner and outer membranes on the digester cover so that methane levels are below the lower explosive limit (LEL). If methane levels are above the LEL, the owner/operator shall take immediate action to commence shutdown of the digester in a safe manner. The owner/operator shall keep a log of any methane readings above the LEL, and the action take for each.

S-110 - Preliminary Treatment. To reduce odor emissions, the owner/operator shall cover and vent emissions from the S-110 Preliminary Treatment to A-4 Biofilter Odor Abatement System. (Basis: Regulation 1-301 & 2-1-403)

12. The owner/operator shall properly operate and properly maintain A-4 in accordance with the manufacturer's specifications. (Basis: Regulation 1-301, 2-1-403)

13. The owner/operator may take A-4 out of service for maintenance provided no odors resulting in a public nuisance shall occur. (Basis: Regulation 1-301, 2-1-403)

14. To demonstrate compliance, the owner/operator of A-4 shall maintain the following records in a District approved log,
    a. Maintenance date and time the unit was taken out of service and returned to service.
    b. Description of type of maintenance performed
(Basis: Cumulative Increase)

General

15. In the event that a public nuisance odor source is identified at this facility, the owner/operator shall employ all measures, practices, or modifications necessary to abate the nuisance. [Basis: Regulation 1-301]

16. The owner/operator shall maintain a permanent H2S

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

This document does not permit the holder to violate any District regulation or other law.

*** PERMIT CONDITIONS ***

ambient monitoring/recording network using Jerome Model 651, or other as approved by the District. If ambient H2S concentration exceeds 60 parts per billion (ppb), averaged over 3 consecutive minutes, the owner/operator shall take immediate action to identify the source(s) of the H2S and take corrective action. The owner/operator shall record the date of the occurrence, duration, and cause of emissions of H2S exceedances in an APCO approved logbook. (Basis: Regulation 9-2-301)

17. The owner/operator shall keep all records made pursuant to these conditions on site for a period of at least 24 months following the date of the record. These records shall be made available to the District upon request. (Basis:
Regulation 2-1-403)

End of Conditions

COND# 22820 *applies to S# 8*

1. The owner/operator shall not exceed 20 hours per year per engine for reliability-related testing.
Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

2. The owner/operator shall operate each emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, State or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing). Operating while mitigating emergency conditions or while emission testing to show compliance with District, State or Federal emission limits is not limited.
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

3. The owner/operator shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

This document does not permit the holder to violate any District regulation or other law.

*** PERMIT CONDITIONS ***

==========

[Basis: Title 17, California Code ofRegulations, section 93115, ATCM for Stationary CI Engines]

4. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.
   a. Hours of operation for reliability-related activities (maintenance and testing).
   b. Hours of operation for emission testing to show compliance with emission limits.
   c. Hours of operation (emergency).
   d. For each emergency, the nature of the emergency condition.
   e. Fuel usage for each engine(s).

   [Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

5. At School and Near-School Operation:
   If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply:

   The owner/operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:
   a. Whenever there is a school sponsored activity (ifthe engine is located on school grounds)
   b. Between 7:30 a.m. and 3:30 p.m. on days when school is in session.

   "School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or structure, playground, athletic field, or other areas of school property but does not include

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

This document does not permit the holder to violate any District regulation or other law.

*** PERMIT CONDITIONS ***

unimproved school property.

[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

COND# 22850 *applies to S# 12*

1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing.
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

2. The owner/operator shall operate each emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, State or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing). Operating while mitigating emergency conditions or while emission testing to show compliance with District, State or Federal emission limits is not limited.
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

3. The owner/operator shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained.
[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

4. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

This document does not permit the holder to violate any District regulation or other law.

*** PERMIT CONDITIONS ***

Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.

a. Hours of operation for reliability-related activities (maintenance and testing).
b. Hours of operation for emission testing to show compliance with emission limits.
c. Hours of operation (emergency).
d. For each emergency, the nature of the emergency condition.
e. Fuel usage for each engine(s).

[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

5. At School and Near-School Operation:
If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply:

The owner/operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:

a. Whenever there is a school sponsored activity (if the engine is located on school grounds)
b. Between 7:30 a.m. and 3:30 p.m. on days when school is in session.

"School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or structure, athletic field, or other areas of school property but does not include unimproved school property.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 ELLIS STREET
SAN FRANCISCO, CALIFORNIA 94109
(415) 771-6000

PERMIT TO OPERATE

Plant# 2482 Page: 11 Expires: APR 1, 2016

This document does not permit the holder to violate any District regulation or other law.

*** PERMIT CONDITIONS ***

==========

[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

~~~~~~~~~~~~~~~~~~~~~~~~~~~~ END OF CONDITIONS ~~~~~~~~~~~~~~~~~~~~~~~~~~~~

RECEIVED
MAR 30 2015
BY: Martha Mosley
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

	Source Description	Annual Average lbs/day PART	ORG	NOx	SO2	CO
8	Standby Generator	-	.04	.6	-	.13
10	Hot Water Boiler #1	.01	-	4.8	.03	.82
11	Hot Water Boiler #2	.01	-	4.8	.03	.82
12	Emergency Standby Generator	.02	.02	1	-	.1
100	Municipal Wastewater Treatment Plant	-	6.34	-	-	-
110	Preliminary Treatment	-	-	-	-	-
120	Primary Treatment	-	-	-	-	-
130	Secondary Treatment	-	-	-	-	-
140	Secondary Clarifiers	-	-	-	-	-
150	Disinfection	-	-	-	-	-
151	Secondary Treatment - Additional Clarifier	-	-	-	-	-
160	Sludge Handling	-	-	-	-	-
170	Anaerobic Digesters	-	-	-	-	-
	T O T A L S	.06	6.4	11.2	.06	1.87

** PLANT TOTALS FOR EACH EMITTED TOXIC POLLUTANT **

Pollutant Name	Emissions lbs/day
Perchloroethylene	.10
Toluene	.38
Trichloroethylene	.02
Xylene	.23
Chloroform	.50
Methylene chloride	.86
Dichlorobenzene	.02
Diesel Engine Exhaust Particulate Matter	.03
Ammonia (NH3) pollutant	.71

APPENDIX H – CONDITION ASSESSMENT

Table 1.A Richmond Equipment List and Condition Assessment (w/o Solids and Instrumentation and Control)
WWTP Facility Plan
City of Richmond and Veolia Water

Start Year	2016
Master Plan Horizon	2045
Cost Escalation	3%

Discipline Code Legend	
Mechanical	1
Electrical	2
Structural	3
Mech and Structural	4
Mech and Electrical	5
Instrumentation	6

Condition Ranking Legend	
Excellent	1
Good	2
Fair	3
Poor	4
Inoperable	5

Color Coding
Updates to 2010 Master Plan Findings
Useful Life Changed From Guidelines as part of 2010 Master Plan
Cost not included in the R&R Projects(1)

Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
Influent Pump Station								
Influent Pump Station Misc Valves	1	5	1953	63	25	0	$50,000	Extensive Corrosion on plumbing in wetwell
HVAC	1	5	2009	7	25	18	$250,000	Extensive Corrosion on Fans and Ducts
Motorized Gate Pump No. 1	1	1	2009	7	25	18	$25,000	
Motorized Gate Pump No. 2	1	1	2009	7	25	18	$25,000	
Motorized Gate Pump No. 3	1	1	2009	7	25	18	$25,000	
Motorized Gate Pump No. 4	1	1	2009	7	25	18	$25,000	
East Wetwell Inlet Gate	1	1	2009	7	25	18	$25,000	Could not see condition but is functional
West Wetwell Inlet Gate	1	1	2009	7	25	18	$25,000	Could not see condition but is functional
Influent Pump No. 1 Check Valve	1	3	1953	63	25	0	$17,500	
Influent Pump No. 2 Check Valve	1	3	1953	63	25	0	$17,500	
Influent Pump No. 3 Check Valve	1	3	1953	63	25	0	$17,500	
Influent Pump No. 4 Check Valve	1	3	1953	63	25	0	$17,500	
Skimming Pump No. 1	1	3	1953	63	25	0	$20,000	Skimming Influent pipe is too low
Skimming Pump No. 2	1	3	1953	63	25	0	$20,000	Skimming Influent pipe is too low
Influent Pump No. 1	1	1	2009	7	25	18	$35,000	To be replaced in 2009
Influent Pump No. 2	1	1	2009	7	25	18	$35,000	To be replaced in 2009
Influent Pump No. 3	1	1	2009	7	25	18	$35,000	To be replaced in 2009
Influent Pump No. 4	1	1	2009	7	25	18	$35,000	To be replaced in 2009
Influent Barscreen	1	2	2002	14	25	11	$200,000	
Bar Screen Auger	1	2	2002	14	25	11	$20,000	
Bar Screen Compactor - Cog Rake	1	2	2002	14	25	11	$20,000	
Bar Screen Washing Screw Compactor	1	1	2009	7	25	18	$20,000	
Headworks MCC	2	1	1967	49	20	0	$200,000	Rust and dust. Disconnect at SW mount on front.
Headworks Ductbanks	2	3	2016	0	20	20	$400,000	Condition Unknown
VFD -Influent Pump No. 1	2	1	2009	7	20	13	$50,000	---
VFD -Influent Pump No. 2	2	1	2009	7	20	13	$50,000	---
VFD -Influent Pump No. 3	2	1	2009	7	20	13	$50,000	---
VFD -Influent Pump No. 4	2	1	2009	7	20	13	$50,000	---
Influent Pump Station Grating/Handrails	3	5	1953	63	40	0	$25,000	Heavy corrosion. Evidence of concrete stair repair
Influent Pump Station Building	3	2	1953	63	60	0	$3,000,000	Heavy corrosion - Pipe hanger condition 5.
Pump Hoist	4	3	1953	63	40	0	$25,000	
Influent Pump Station Piping	4	3	1953	63	40	0	$150,000	No flexibility
Bar Screen Crane Hoist-Monorail	4	3	2002	14	40	26	$25,000	
Composite Sampler	6	2	2002	14	15	1	$5,000	
Pre-Bar Screen Level Transmitter	6	2	2002	14	15	1	$5,000	Install date estimated
Post-Bar Screen Level Transmitter	6	2	2002	14	15	1	$5,000	Install date estimated
Headworks PLC	6	2	2009	7	15	8	$25,000	Install date estimated
East Wetwell Level Sensor	6	2	2002	14	15	1	$1,000	Install date estimated
West Wetwell Level Sensor	6	2	2002	14	15	1	$1,000	Install date estimated
Grit Removal								
Gate - Grit Influent (east)	1	5	2010	6	25	19	$25,000	Not Functional
Gate - Grit Influent (west)	1	5	2010	6	25	19	$25,000	Not Functional
Gate - Grit Influent (center/east)	1	5	2010	6	25	19	$25,000	Not Functional (dagger board is used instead)
Gate - Grit Influent (west/center)	1	5	2010	6	25	19	$25,000	Not Functional
Gate - Grit Influent (center)	1	4	2010	6	25	19	$25,000	Functional
Grit Screw Drive (east)	1	3	2010	6	25	19	$10,000	Corroded. Used 4 times per day for 15 minutes
Grit Screw Dive (center)	1	3	2010	6	25	19	$10,000	Corroded. Used 4 times per day for 15 minutes
Grit Screw Drive (west)	1	3	2010	6	25	19	$10,000	Corroded. Used 4 times per day for 15 minutes
Grit Collector (east)	1	3	2010	6	25	19	$20,000	Poor Condition - Large amount of ragging
Grit Collector (center)	1	3	2010	6	25	19	$20,000	Not used - center basin is covered
Grit Collector (west)	1	3	2010	6	25	19	$20,000	Poor Condition - Large amount of ragging
Gate - Grit Effluent (east)	1	4	2010	6	25	19	$25,000	Covered - condition could not be observed
Gate - Grit Effluent (center)	1	4	2010	6	25	19	$25,000	Covered - condition could not be observed
Gate - Grit Effluent (west)	1	4	2010	6	25	19	$25,000	Covered - condition could not be observed
Effluent Splitter Gate	1	4	2010	6	25	19	$25,000	Extensive Corrosion
Gate - Effluent Grit to Primary 1	1	4	2010	6	25	19	$25,000	Extensive Corrosion
Gate - Effluent Grit to Primary 2	1	4	2010	6	25	19	$25,000	Extensive Corrosion
Grit Cross Collector	1	3	2010	6	25	19	$25,000	Covered - condition could not be observed
Grit Removal Ductbanks	2	3	1953	63	20	0	$50,000	Condition Unknown
Grit Removal Structure	3	4	2010	6	40	34	$100,000	H2S damange to influent box. Galvanized steel at end of useful life. Screw conveyors lack seismic support.
Grit Removal Grating/Guardrail	3	4	2010	6	40	34	$50,000	---
Grit Piping Group	4	3	2010	6	40	34	$25,000	
Parshall Flume (east)	6	3	2010	6	15	9	$0	Not functional - no LIT
Parshall Flume (center)	6	3	2010	6	15	9	$0	Not functional - no LIT
Parshall Flume (west)	6	3	2010	6	15	9	$0	Not functional - no LIT
HVAC	1	4	2010	6	25	19	$0	Not Observed
Primary Treatment								
Sludge Cross Collector (North)	1	3	2002	14	25	11	$50,000	
Sludge Cross Collector (South)	1	3	2002	14	25	11	$50,000	
Bypass Channel Gate	1	3	1990	26	25	0	$50,000	Superficial Corrosion. Install date estimated
Bypass Channel Cl1 Flash Mixer	1	3	1990	26	25	0	$15,000	Install date estimated - Not functional
Primary Sludge Collector (North)	1	3	2002	14	25	11	$150,000	Corrosion on Drive - plywood chain guard
Primary Sludge Collector (South)	1	3	2002	14	25	11	$150,000	Corrosion on Drive - plywood chain guard
Primary Scum Pump (North)	1	2	2002	14	25	11	$20,000	
Primary Scum Pump (South)	1	2	2002	14	25	11	$20,000	
Helical Augur Scum Skimmer (North)	1	2	2002	14	25	11	$20,000	Scum routed to digestors not hopper. Scum consists primarily of trash
Helical Augur Scum Skimmer (South)	1	2	2002	14	25	11	$20,000	Good Condition but poor performance
Primary Scum Collector (North)	1	2	2002	14	25	11	$20,000	
Primary Scum Collector (South)	1	2	2002	14	25	11	$20,000	Good Condition but poor performance
Primary Clarifier MCC	2	2	2016	0	20	20	$135,000	
Primary Treatment Ductbanks	2	3	2016	0	20	20	$110,000	Condition Unknown

Table 1.A Richmond Equipment List and Condition Assessment (w/o Solids and Instrumentation and Control)
WWTP Facility Plan
City of Richmond and Veolia Water

Start Year	2016
Master Plan Horizon	2045
Cost Escalation	3%

Discipline Code Legend	
Mechanical	1
Electrical	2
Structural	3
Mech and Structural	4
Mech and Electrical	5
Instrumentation	6

Condition Ranking Legend	
Excellent	1
Good	2
Fair	3
Poor	4
Inoperable	5

Color Coding
Updates to 2010 Master Plan Findings
Useful Life Changed From Guidelines as part of 2010 Master Plan
Cost not included in the R&R Projects(1)

Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
Primary Clarifier Grating/Handrails	3	4	2002	14	40	26	$100,000	Grating in condition 4. Guard rain in condition 2. Some grating has been replaced.
Primary Clarifier Structure	3	2	1953	63	65	2	$5,000,000	Scum removal box condition 4. H2S damange in scum box - condition 3.
Scum Piping Group	4	3	1967	49	40	0	$40,000	one pinhole leak has been clamped off
Scum Valve Group	4	3	1967	49	40	0	$20,000	
Bypass Channel Flow/Level Sensor	6	2	2005	11	15	4	$1,000	
Primary Scum Level Sensor (North)	6	2	2002	14	15	1	$1,000	
Primary Scum Level Sensor (South)	6	2	2002	14	15	1	$1,000	
Level Sensor in Exit Flume	6	2	2002	14	15	1	$1,000	Install date estimated
Aeration Basins								
Aerator No. 3A	1	5	1967	49	25	0	$0	Not Functional - No Power
Aerator No. 3B	1	5	1967	49	25	0	$0	Not Functional - No Power
Aerator No. 3C	1	5	1967	49	25	0	$0	Not Functional - No Power
Channel Aeration - Under Grating West of Basin 1	1	4	1967	49	25	0	$0	Not Functional - Condition Estimated
Channel Aeration - Under Grating btw Basin 1/2	1	4	1967	49	25	0	$0	Not Functional - Condition Estimated
Channel Aeration - Under Grating btw Basin 2/3	1	4	1967	49	25	0	$0	Not Functional - Condition Estimated
Channel Aeration - Under Grating btw Basin 3/4	1	4	1967	49	25	0	$0	Not Functional - Condition Estimated
Distribution Gate 1A	1	5	1967	49	25	0	$15,000	Not Functional
Distribution Gate 1B	1	5	1967	49	25	0	$15,000	Not Functional
Distribution Gate 1C	1	5	1967	49	25	0	$15,000	Not Functional
Distribution Gate 2A	1	5	1967	49	25	0	$15,000	Not Functional
Distribution Gate 2B	1	5	1967	49	25	0	$15,000	Not Functional
Distribution Gate 2C	1	5	1967	49	25	0	$15,000	Not Functional
Distribution Gate 3A	1	5	1967	49	25	0	$15,000	Not Used
Distribution Gate 3B	1	5	1967	49	25	0	$15,000	Not Used
Distribution Gate 3C	1	5	1967	49	25	0	$15,000	Not Used
Distribution Gate 4A	1	5	1967	49	25	0	$15,000	Not Used
Distribution Gate 4B	1	5	1967	49	25	0	$15,000	Not Used
Distribution Gate 4C	1	5	1967	49	25	0	$15,000	Not Used
Effluent Shear Gate 1C	1	3	1967	49	25	0	$25,000	Not used - Condition Unknown
Effluent Sheer Gate 2C	1	3	1967	49	25	0	$25,000	Not used - Condition Unknown
Effluent Sheet Gate 3C	1	3	1967	49	25	0	$25,000	Not used - Condition Unknown
Effluent Sheet Gate 4C	1	3	1967	49	25	0	$25,000	Not used - Condition Unknown
Gate between 3/4	1	2	1990	26	25	0	$75,000	Installation Date Unknown
Aerator No. 1A	1	3	2002	14	25	11	$50,000	
Aerator No. 1 B	1	3	2002	14	25	11	$50,000	
Aerator No. 1C	1	3	2002	14	25	11	$50,000	
Aerator No. 2A	1	3	2002	14	25	11	$50,000	Rebuilt in 2015 Nov.
Aerator No. 2B	1	3	2002	14	25	11	$50,000	
Aerator No. 2C	1	3	2002	14	25	11	$50,000	
Aeration Basin Ductbanks	2	3	1967	49	20	0	$50,000	Condition Unknown
Aeration Basins Grating/Handrails	3	3	1967	49	40	0	$100,000	Condition 2 for the grating and SST guardrail. Condition 3 for the galvanized steel grating. Guard rail is stained, corrosion onset.
Aeration Basin Structure No. 1	3	2	1967	49	50	1	$1,500,000	Corroded steel pipe support.
Aeration Basin Structure No. 2	3	2	1967	49	50	1	$1,500,000	Major crack in wall on pipe channel between A and B.
Aeration Basin Structure No. 3	3	2	1967	49	50	1	$1,500,000	Severe corrosion in all tanks. HDPE sheeting installed in tanks in areas of severe corrosion.
Aeration Basin Structure No. 4	3	2	1967	49	50	1	$1,500,000	
Aeration Basin No. 1 Mixer Platforms	3	3	1967	49	50	1	$200,000	Mixer platform seismic strength is questionable. Exposed reinforcement and spalling on underside of mixer platform deck.
Aeration Basin No. 2 Mixer Platforms	3	3	1967	49	50	1	$200,000	Mixer platform seismic strength is questionable. Exposed reinforcement and spalling on underside of mixer platform deck.
Aeration Basin No. 3 Mixer Platforms	3	3	1967	49	50	1	$200,000	Mixer platform seismic strength is questionable. Exposed reinforcement and spalling on underside of mixer platform deck.
Aeration Basin No. 4 Mixer Platforms	3	3	1967	49	50	1	$200,000	Mixer platform seismic strength is questionable. Exposed reinforcement and spalling on underside of mixer platform deck.
Aeration Basin Mixed Liquor Channel	3	2	1967	49	50	1	Incld in A. Basin cost	
RAS Piping - Under/above Grating btw Basi	4	4	1967	49	40	0	$100,000	
RAS Piping - Under/above Grating btw Basi	4	4	1967	49	40	0	$100,000	
RAS Valving - Under/above Grating btw Bas	4	4	1967	49	40	0	$100,000	
RAS Valving - Under/above Grating btw Bas	4	4	1967	49	40	0	$100,000	
DO Probe - Aerator No. 1 B	6	1	2008	8	15	7	$2,500	
DO Probe - Aerator No. 1C	6	1	2008	8	15	7	$2,500	
DO Probe - Aerator No. 2B	6	1	2008	8	15	7	$2,500	
DO Probe - Aerator No. 2C	6	1	2008	8	15	7	$2,500	
Secondary Clarification								
SC1 Influent Channel and Walkway	1	5	1967	49	25	0	$75,000	Extensive Corrosion
SC1 Scum Skimmer	1	3	1967	49	25	0	$25,000	Not working
SC1 Launders	1	4	1967	49	25	0	$50,000	Launder bars corroded.
SC1 Structure	3	2	1967	49	50	1	$1,500,000	Consider mechanism anchorage for guardrail.
SC1 Collector Mechanism	4	4	2003	13	40	27	$200,000	collector mechanism upgraded in 2003
SC1 Piping	4	3	1967	49	40	0	$25,000	
SC2 Influent Channel and Walkway	1	5	1967	49	25	0	$75,000	Extensive corrosion, extensive loss of materia. Safety concern.

Table 1.A Richmond Equipment List and Condition Assessment (w/o Solids and Instrumentation and Control)
WWTP Facility Plan
City of Richmond and Veolia Water

Start Year	2016
Master Plan Horizon	2045
Cost Escalation	3%

Discipline Code Legend	
Mechanical	1
Electrical	2
Structural	3
Mech and Structural	4
Mech and Electrical	5
Instrumentation	6

Condition Ranking Legend	
Excellent	1
Good	2
Fair	3
Poor	4
Inoperable	5

Color Coding
Updates to 2010 Master Plan Findings
Useful Life Changed From Guidelines as part of 2010 Master Plan
Cost not included in the R&R Projects(1)

Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
SC2 Scum Skimmer	1	3	1967	49	25	0	$25,000	Not working
SC2 Launders	1	4	1967	49	25	0	$50,000	Launder bars corroded.
SC2 Structure	3	2	1967	49	50	1	$1,500,000	Consider mechanism anchorage for guardrail.
SC2 Collector Mechanism	4	5	2003	13	40	27	$200,000	Collector mechanism upgraded in 2003
SC2 Piping	4	3	1967	49	40	0	$25,000	
SC3 Scum Skimmer	1	3	1993	23	25	2	$75,000	Corrosion on skimmer
SC3 Launders	1	4	1993	23	25	2	$25,000	
SC3 Influent Channel and Walkway	1	2	1993	23	25	2	$50,000	
SC3 Structure	3	2	1991	25	40	15	$1,500,000	No movement between Abasin and Clarifier 3.
SC3 Collector Mechanism	4	4	1991	25	40	15	$200,000	
SC3 Piping	4	3	1991	25	40	15	$25,000	
Secondary Process Control Building								
RAS Pump NO. 1 VFD	2	3	2004	12	20	8	$15,000	
RAS Pump NO. 2 VFD	2	3	2004	12	20	8	$15,000	
RAS Pump NO. 3 VFD	2	3	2004	12	20	8	$15,000	
RAS Pump NO. 4 VFD	2	3	2004	12	20	8	$15,000	
RAS Pump NO. 5 VFD	2	3	2004	12	20	8	$15,000	
RAS Pump NO. 6 VFD	2	3	2004	12	20	8	$15,000	
Aerator 1A VFD	2	2	2004	12	20	8	$15,000	Insufficient light. No ESP and control. No D.S. Install date unknown
Aerator 1B VFD	2	2	2004	12	20	8	$15,000	
Aerator 1C VFD	2	2	2004	12	20	8	$15,000	
Aerator 2A VFD	2	2	2004	12	20	8	$15,000	
Aerator 2B VFD	2	2	2004	12	20	8	$15,000	
Aerator 2C VFD	2	2	2004	12	20	8	$15,000	
Ductbanks	2	3	2016	0	20	20	$250,000	Condition Unknown
Secondary Control Building	3	3	1967	49	40	0	$250,000	Siginificant seismic risk w/ concrete roof. No shear capacity.
Secondary Treatment PLC	6	2	2002	14	15	1	$25,000	Install date estimated
Secondary Treatment Gallery								
Channel Air Blower No. 1	1	5	1967	49	25	0	$0	Not functional
Channel Air Blower No. 2	1	5	1967	49	25	0	$0	Not functional
WAS Pump No. 1	1	4	1967	49	25	0	$20,000	Extensive corrosion on pump exterior
WAS Pump No. 2	1	4	1967	49	25	0	$20,000	Extensive corrosion on pump exterior
WAS Pump No. 3	1	4	1967	49	25	0	$20,000	Extensive corrosion on pump exterior
WAS Pump No. 4	1	4	1992	24	25	1	$20,000	Extensive corrosion on pump exterior
WAS Pump No. 5	1	4	1992	24	25	1	$20,000	Extensive corrosion on pump exterior
RAS Pump No. 5 (Clarifier 3)	1	5	2010	6	25	19	$25,000	Submersible - Condition Estimated. 35-hp Flygt centrifugal pump, non-clogging impeller. No issues.
RAS Pump No. 6 (Clarifier 3)	1	5	2010	6	25	19	$25,000	Submersible - Condition Estimated. Vaughn chopper pump. No issues.
RAS Pump No. 1 (Clarifier 1)	1	5	2010	6	25	19	$25,000	Submersible - Condition Estimated. 35-hp Flygt centrifugal pump, non-clogging impeller. No issues.
RAS Pump No. 2 (Clarifier 1)	1	5	2010	6	25	19	$25,000	Submersible - Condition Estimated. 35-hp Flygt centrifugal pump, non-clogging impeller. No issues.
RAS Pump No. 3 (Clarifier 2)	1	5	2010	6	25	19	$25,000	Submersible - Condition Estimated. 35-hp Flygt centrifugal pump, non-clogging impeller. No issues.
RAS Pump No. 4 (Clarifier 2)	1	5	2010	6	25	19	$25,000	Submersible - Condition Estimated. 35-hp Flygt centrifugal pump, non-clogging impeller. No issues.
WAS MCC No. 1	2	4	2016	0	20	20	$250,000	Excessive corrosion on bolt cover.
WAS MCC No. 2	2	4	2016	0	20	20	$250,000	
WAS MCC No. 3	2	4	1967	49	20	0	$0	Never installed
WAS Pump No. 1 VFD	2	3	2006	10	20	10	$15,000	Pump vent clogged with oil.
WAS Pump No. 2 VFD	2	3	2006	10	20	10	$15,000	Pump vent clogged with oil.
WAS Pump No. 3 VFD	2	3	2006	10	20	10	$15,000	Install date unknown
WAS Pump No. 4 VFD	2	3	2006	10	20	10	$15,000	Pull box rusted. No bolt cover.
WAS Pump No. 5 VFD	2	3	2006	10	20	10	$15,000	Install date unknown
Transformer	2	3	1990	26	20	0	$0	Install date unknown
Transformer	2	3	1990	26	20	0	$0	Install date unknown
Transformer	2	3	1990	26	20	0	$0	Install date unknown
Transformer	2	3	1990	26	20	0	$0	Install date unknown
Ductbanks	2	3	2016	0	20	20	$400,000	Condition Unknown
RAS Piping - Clarifier 1	4	4	1967	49	40	0	$25,000	
RAS Valves - Clarifier 1	4	4	1967	49	40	0	$25,000	
RAS Piping - Clarifier 2	4	4	1967	49	40	0	$25,000	
RAS Valves - Clarifier 2	4	4	1967	49	40	0	$25,000	
WAS Piping	4	4	1967	49	40	0	$50,000	extensive corrosion
WAS Valves	4	4	1967	49	40	0	$50,000	extensive corrosion
RAS Piping - Clarifier 3	4	3	1991	25	40	15	$25,000	
RAS Valves - Clarifier 3	4	3	1991	25	40	15	$25,000	
RAS Flow Meter - Pumps 1/2	6	3	2002	14	15	1	$5,000	Install date estimated
RAS Flow Meter - Pumps 3/4	6	3	2002	14	15	1	$5,000	Install date estimated
RAS Flow Meter - Pumps 5/6	6	3	1990	26	15	0	$5,000	Install date estimated
WAS Mag Meter No. 1	6	4	1990	26	15	0	$5,000	Install date estimated
Chlorine Contact Basin								
Mixer No. 1	1	3	1978	38	25	0	$10,000	Not used
Mixer No. 2	1	3	1978	38	25	0	$10,000	Not used
Gate 1	1	3	1978	38	25	0	$25,000	
Gate 2	1	3	1978	38	25	0	$25,000	
Gate 3	1	3	1978	38	25	0	$25,000	
Gate 4	1	3	1978	38	25	0	$25,000	
Gate 5	1	3	1978	38	25	0	$25,000	
Gate 6	1	3	1978	38	25	0	$25,000	
Gate 7	1	3	1978	38	25	0	$25,000	
Gate 8	1	3	1978	38	25	0	$25,000	

Table 1.A Richmond Equipment List and Condition Assessment (w/o Solids and Instrumentation and Control)
WWTP Facility Plan
City of Richmond and Veolia Water

Start Year	2016
Master Plan Horizon	2045
Cost Escalation	3%

Discipline Code Legend	
Mechanical	1
Electrical	2
Structural	3
Mech and Structural	4
Mech and Electrical	5
Instrumentation	6

Condition Ranking Legend	
Excellent	1
Good	2
Fair	3
Poor	4
Inoperable	5

Color Coding
Updates to 2010 Master Plan Findings
Useful Life Changed From Guidelines as part of 2010 Master Plan
Cost not included in the R&R Projects(1)

Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
Gate 9	1	3	1978	38	25	0	$25,000	
Gate 10	1	3	1978	38	25	0	$25,000	
Gate 11	1	3	1978	38	25	0	$25,000	
Gate 12	1	3	1978	38	25	0	$25,000	
Gate 13	1	3	1978	38	25	0	$25,000	
Gate 14	1	3	1978	38	25	0	$25,000	
Gate 15	1	3	1978	38	25	0	$25,000	
Gate 16	1	3	1978	38	25	0	$25,000	
Gate 17	1	3	1978	38	25	0	$25,000	
Bisulfite Mixer	1	3	1978	38	25	0	$0	Not used
Bisulfite Injector	1	3	1978	38	25	0	$10,000	Not Observed
CCB Grating/Handrails	3	3	1978	38	40	2	$100,000	---
Structure - Basin 1	3	2	1978	38	40	2	$1,000,000	---
Structure - Basin 2	3	2	1991	25	40	15	$1,000,000	---
Parshall Flume No. 1	6	4	1978	38	15	0	$1,000	Bubbler System
Parshall Flume No. 2	6	4	1978	38	15	0	$1,000	Bubbler System
Effluent SO3 Analyzer	6	2	2006	10	15	5	$1,000	Install date estimated
Confluence Structure								
Outfall gate	1	4	1978	38	25	0	$0	Not Functional and not used
WCC gate	1	4	1978	38	25	0	$0	Not Functional and not used
Confluence Structure	3	2	1978	38	40	2	$750,000	---
Confluence Structure Grating/Handrails	3	2	1978	38	40	2	$25,000	Stairs are substandard and does not meet OSHA.Slide hazard as well as falling rocks west of structure.
Reverse Flow Piping	4	3	1978	38	40	2	$0	not used - no flexibility
Reverse Flow Valves	4	3	1978	38	40	2	$0	not used - no flexibility
Chlorine Analyzer - WCCSD	6	2	2006	10	15	5	$5,000	Install date estimated
Chlorine Analyzer - Combined	6	2	2006	10	15	5	$5,000	Install date estimated
SO2 Analyzer	6	2	2006	10	15	5	$5,000	Install date estimated
Chemical Tank Farm								
Bisulfite Pump No. 1	1	2	2004	12	25	13	$10,000	Install date estimated
Bisulfite Pump No. 2	1	2	2004	12	25	13	$10,000	Install date estimated
Bisulfite Piping	1	2	2004	12	25	13	$10,000	Install date estimated
Bisulfite valves	1	2	2004	12	25	13	$10,000	Install date estimated
Containment Structure	3	2	1990	26	40	14	$100,000	Install date unknown (15-20 years). All concrete has been exposed to chemical.
Hypo Tank 1	4	5	2015	1	15	14	$20,000	
Hypo Tank 2	4	5	2015	1	15	14	$20,000	
Hypo Tank 3	4	5	2015	1	15	14	$20,000	
Hypo Tank 4	4	3	1992	24	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
Hypo Tank 5	4	3	1992	24	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
Hypo Tank 6	4	3	1992	24	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
Bisulfite Tank 1	4	3	1992	24	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
Bisulfite Tank 2	4	3	1992	24	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
Bisulfite Tank 3	4	3	1992	24	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
Disinfection Building								
Disinfection Building HVAC	1	3	1978	38	25	0	$75,000	Concrete corrosion damage beginning, expect it to accelerate.
Plant Effluent Bubbler - Basin 1	1	3	1978	38	25	0	$1,000	Not Observed
Plant Effluent Bubbler - Basin 2	1	3	1978	38	25	0	$1,000	Not Observed
Hypo Pump No. 1	1	2	2004	12	25	13	$10,000	Install date estimated
Hypo Pump No. 2	1	2	2004	12	25	13	$10,000	Install date estimated
MCC	2	3	2016	0	20	20	$150,000	Excessive panel corrosion. Missing lights and cover. No conduit body cover.
Ductbanks	2	3	2016	0	20	20	$475,000	Condition Unknown
Disinfection Building Structure	3	3	1978	38	40	2	$1,000,000	Potential sesmic risk with precast roof diaphragm.
Chlorine Analyzer-WCCSD	6	2	2006	10	15	5	$1,000	Install date estimated
Turbidity Meter	6	2	2006	10	15	5	$5,000	Install date estimated
Chlorine Analyzer - Pre-CCB	6	2	2006	10	15	5	$1,000	Install date estimated
Chlorine Analyzer - Post-CCB	6	2	2006	10	15	5	$1,000	Install date estimated
Chlorine Analyzer - Final - Richmond	6	2	2006	10	15	5	$1,000	Install date estimated
Final Effluent Sampler - Richmond	6	1	2006	10	15	5	$5,000	
PLC	6	2	2002	14	15	1	$25,000	Install date estimated
Primary Sludge Pumping								
Primary Sludge Pump No. 1	1	3	2007	9	25	16	$15,000	
Primary Sludge Pump No. 2	1	3	2007	9	25	16	$15,000	
Primary Sludge Pump (Spare)	1	3	2007	9	25	16	$15,000	Waiting Rebuild
Primary Sludge MCC	2	4	2016	0	20	20	$150,000	Rust and dust. No cover plate. Excessive corrosion.
Ductbanks	2	3	2016	0	20	20	$200,000	Condition Unknown
Primary Sludge Pump Building	3	3	1953	63	40	0	$500,000	Glass block at NW wall. Cracks at penetrations. Localized spalling concrete. Parapet and piping in condition 4.
Primary Sludge Piping	4	4	1953	63	40	0	$25,000	
Primary Sludge Valve Group	4	4	1953	63	40	0	$50,000	

Table 1.A Richmond Equipment List and Condition Assessment (w/o Solids and Instrumentation and Control)
WWTP Facility Plan
City of Richmond and Veolia Water

Start Year	2016
Master Plan Horizon	2045
Cost Escalation	3%

Discipline Code Legend	
Mechanical	1
Electrical	2
Structural	3
Mech and Structural	4
Mech and Electrical	5
Instrumentation	6

Condition Ranking Legend	
Excellent	1
Good	2
Fair	3
Poor	4
Inoperable	5

Color Coding
Updates to 2010 Master Plan Findings
Useful Life Changed From Guidelines as part of 2010 Master Plan
Cost not included in the R&R Projects(1)

Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
Primary Sludge Pressure Transmitter	6	3	2002	14	15	1	$1,000	Install date estimated
Primary Sludge Flow Meter	6	3	2002	14	15	1	$5,000	Install date estimated
PLC/Wireless Equipment	6	3	2002	14	15	1	$25,000	Install date estimated
Sludge Thickening								
DAFT #1 Sludge Thickened Sludge Pump #	1	5	1967	49	25	0	$0	Not used
DAFT #1 Sludge Thickened Sludge Pump #2	1	5	1967	49	25	0	$0	Not used
DAFT #1 Sludge Rake	1	5	1967	49	25	0	$0	Not used
DAFT #1 Recirc Pump No. 1	1	5	1967	49	25	0	$0	Not used
DAFT #1 Recirc Pump No. 2	1	5	1967	49	25	0	$0	Not used
DAFT #1 Air compressor	1	5	1967	49	25	0	$0	Not used
DAFT #1 Skimmer	1	5	1967	49	25	0	$0	Not used
DAFT #1 MCC	2	5	1967	49	20	0	$0	Not operational
DAFT #1 Structure (North)	3	3	1967	49	40	0	$0	Canopy metal roof deck w/ condition 5.
DAFT #1 Grating/Handrails	3	3	1967	49	40	0	$0	---
DAFT #1 Valves	4	5	1967	49	40	0	$0	not in service
DAFT #1 Pressurization Tank	4	5	1967	49	40	0	$0	not in service
DAFT #1 Piping	4	5	1967	49	40	0	$0	not in service
DAFT #1 Level Sensor	6	3	1967	49	15	0	$0	Install date estimated
DAFT #2 Polymer System	1	5	1978	38	25	0	$0	Not used
DAFT #2 Sludge Rake	1	4	1978	38	25	0	$0	only daft in service for last 3 years
DAFT #2 Sludge Thickened Sludge Pump #3	1	3	1978	38	25	0	$0	only daft in service for last 3 years
DAFT #2 Sludge Thickened Sludge Pump #4	1	3	1978	38	25	0	$0	only daft in service for last 3 years
DAFT #2 Recirc Pump No. 1	1	3	1978	38	25	0	$0	only daft in service for last 3 years
DAFT #2 Recirc Pump No. 2	1	3	1978	38	25	0	$0	only daft in service for last 3 years
DAFT #2 Air compressor	1	3	1978	38	25	0	$0	only daft in service for last 3 years
DAFT #2 Skimmer	1	3	1978	38	25	0	$0	only daft in service for last 3 years
DAFT #2 MCC	2	4	1978	38	20	0	$0	Heavy Corrosion.
DAFT #2 Grating/Handrails	3	5	1978	38	40	2	$0	Steel deck on canopy corrosion w/ Condition 5.Pump base cracked w/ condition 5.
DAFT #2 Structure (South)	3	3	1978	38	40	2	$0	Cracks and spalling at guardrail top.
DAFT #2 Piping	4	3	1978	38	40	2	$0	
DAFT #2 Valves	4	3	1978	38	40	2	$0	
DAFT #2 Pressurization Tank	4	3	1978	38	40	2	$0	
DAFT #2 Level Sensor	6	3	1978	38	15	0	$0	Install date estimated
Electrical Substation								
HVAC	1	3	1967	49	25	0	$25,000	not observed
Automatic Transfer Switch	2	4	2016	0	20	20	$65,000	
Switchgear	2	3	2016	0	20	20	$1,250,000	Bolt cover missing. Some paint removal on front. Minor corrosion.
Bus Duct	2	5	2016	0	20	20	$100,000	Exposed bus - safety hazard
Ductbanks	2	3	2016	0	20	20	$0	Accounted for in other areas
Electrical Substation Building	3	2	1967	49	40	0	$250,000	---
Switchgear	2		2016	0	20	20	$0	Not in service
Old Electrical Substation Building	3	2	1953	63	40	0	$100,000	SW Corner Elec. box hutch deformed. Corrosion of hatch door/deck.
Standby Generator								
Standby Generator HVAC	1	3	1991	25	25	0	$0	not observed
Underground Fuel Tank	1	3	1991	25	25	0	$50,000	not observed
Standby Generator	2	2	1988	28	30	2	$825,000	
Standby Generator Loadbank	2	2	1988	28	30	2	$60,000	not observed
Standby Generator Building	3	2	1988	28	40	12	$250,000	South wall has large openings.
Bioassay Building								
Bioassay HVAC	1	3	1991	25	25	0	$50,000	not observed
Air Compressor	1	3	1991	25	25	0	$0	not used
Bioassay Building	3	3	1953	63	40	0	$500,000	East wall minimal shear capacity. Seismic irregularity.
Admin. and Maintenance Buildings								
Admin Building HVAC	1	3	1990	26	25	0	$200,000	Poor performance - Installation data unknown
Admin Building Structure	3	2	1953	63	75	12	$1,500,000	multiple renovations/add-ons
Ductbanks	2	3	2016	0	20	20	$50,000	Condition Unknown
Maintenance Building HVAC (Locker/Lunch	1	3	1967	49	25	0	$50,000	not observed
Maintenance Building HVAC (Shop)	1	3	1967	49	25	0	$50,000	not observed
Ductbanks	2	3	2016	0	20	20	$50,000	Condition Unknown
Maintenance Building Structure (Locker/Lun	3	3	1967	49	40	0	$750,000	---
Maintenance Building Structure (Shop)	3	3	1967	49	40	0	$750,000	Shear walls look small for roof size (seismic deficiency)
Solids Handling Building and Abandoned Anaerobic Digesters								
Solids Handling Building Structure	3	3	1953	63	40	0	---	Not recommended for replacement. Minor efflourences from roof slab. Columns and beams okay. Exterior walls shod some m-p cracking. Columns show pattern consistent with concrete lift, horizontal cracks, segregation. Metal door frames failed, heavily corroded. Condition of Northern exterior columns better than Southern exterior columns.
Plant Air Compressor No. 1	1	3	2010					Significant maintenance.
Plant Air Compressor No. 1	1	3	unknown					Older than Plant Air Compressor No. 1. Significant maintence required.
Abandoned Anaerobic Digester No. 1	3	5	1953	63	40	0	---	Not recommended for replacement.
Abandoned Anaerobic Digester No. 2	3	5	1953	63	40	0	---	Not recommended for replacement.
Flare	3	2	1967	49	40	0	---	Works well. Low maintenance. Corrosion.
Maintenance Building HVAC (Locker/Lunch	1	3	1967	49	25	0	$50,000	not observed
Maintenance Building HVAC (Shop)	1	3	1967	49	25	0	$50,000	not observed
Ductbanks	2	3	2016	0	20	20	$50,000	Condition Unknown
Maintenance Building Structure (Locker/Lun	3	3	1967	49	40	0	$750,000	---

Table 1.A Richmond Equipment List and Condition Assessment (w/o Solids and Instrumentation and Control)
WWTP Facility Plan
City of Richmond and Veolia Water

Start Year	2016
Master Plan Horizon	2045
Cost Escalation	3%

Discipline Code Legend	
Mechanical	1
Electrical	2
Structural	3
Mech and Structural	4
Mech and Electrical	5
Instrumentation	6

Condition Ranking Legend	
Excellent	1
Good	2
Fair	3
Poor	4
Inoperable	5

Color Coding
Updates to 2010 Master Plan Findings
Useful Life Changed From Guidelines as part of 2010 Master Plan
Cost not included in the R&R Projects(1)

Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
Maintenance Building Structure (Shop)	3	3	1967	49	40	0	$750,000	Shear walls look small for roof size (seismic deficiency)
Potable Water System								
Hydro-Tank	1	3	1995	21	25	4	$20,000	Installation Date Unknown
Air Gap Tank	1	3	1995	21	25	4	$10,000	Installation Date Unknown
Water Booster Pump No. 1	1	3	1995	21	25	4	$20,000	Installation Date Unknown
Water Booster Pump No. 2	1	3	1995	21	25	4	$20,000	Installation Date Unknown
Meter	6	3	1995	21	15	0	$5,000	Install date estimated
Hydro-Tank	1	3	1995	21	25	4	$0	Not Used
Water Booster Pump No. 1	1	3	1995	21	25	4	$0	Not Used
Water Booster Pump No. 2	1	3	1995	21	25	4	$0	Not Used
Ductbanks	2	3	2016	0	20	20	$50,000	condition unknown
Structure	3	3	1995	21	40	19	$100,000	
Meter	6	3	1995	21	15	0	$0	Not used
3W System								
Pump No. 2	1	3	2010	6	25	19	$30,000	Motors are old. Pump seal life is poor.
Piping/valves	1	3	1978	38	25	0	$50,000	3W pipes clog.
Pump No. 1	1	3	2010	6	25	19	$30,000	Motors are old. Pump seal life is poor.
Pump No. 1 VFD	2	2	2010	6	20	14	$15,000	in bioassay building
Pump No. 2 VFD	2	2	2010	6	20	14	$15,000	in bioassay building
3W MCC	2	2	2016	0	20	20	$80,000	in bioassay building
Ductbanks	2	3	2016	0	20	20	$240,000	Condition Unknown
3W Pump Station Structure	3	4	1967	49	40	0	$50,000	Steel frame condition 4.
pH analyzer	6	3	2002	14	15	1	$1,000	Install date estimated
Sampler - Effluent	6	1	2008	8	15	7	$1,000	
Sampler - Combined Effluent	6	1	2008	8	15	7	$1,000	
Miscellaneous								
Fencing	1	4	1978	38	25	0	$100,000	Various - some areas need renovation Install date estimated
General Lighting/Security	2	4	Varies	Varies	Varies	Varies		Overall site lighting is inadequate. No perimeter lighting
Instrumentation and Control								
Refer to Table 1.B.								

Notes:
(1) Replacement costs for these facilities are not included in the R&R Projects of the 2016 Facility Plan CIP because they will be replaced as part of a capital improvement project. Replacement costs for new facilities are included in the ongoing capital replacement project of the 2016 Facility Plan CIP.

Table 1.B Richmond Instrumentation and Control (I&C) Equipment List and Condition Assessment
WWTP Facility Plan
City of Richmond and Veolia Water

Rank is based on the International Infrastructure Management Manual (IIMM). Conditions are expressed in terms of the amount of repair needed to bring and asset to a like-new (perfect) condition. Definitions of the one through five condition ranking system are as follows

CONDITION RANK	DESCRIPTION	AMOUNT OF REPAIR NEEDED
1	Very Good	0%
2	Minor Defects	1-10%
3	Requires Significant Maintenance	11-20%
4	Requires Rehabilitation	21-50%
5	Unserviceable	> 50%

Equipment Area ID	Process Area	PCM Description	Rank	Recommendation	Timeframe (Years)	Cost	Major Hardware	Notes
PLCs to be replaced or decomissioned as part of a capital improvement project								
9	Sludge Building	Communication Panel	5	Replace	0-3	$125,000	AB SLC5/05 PLC Misc. Relays	Communication panel is SST NEMA 4X. Wiring is in poor Condition.
9	Sludge Building	Main Control Panel	5	Replace	0-3	$93,750	PCB Controller Ethernet Switch UPS	Panel has lexan see through exterior door and is fiberglass. Wiring is in poor condition and disorganized. Panel is adjacent to Communication panel, and both should be replaced in parallel and combined into a single NEMA 4X panel.
7	DAFT	Starter Control Panel	3	Replace	5-10	$62,500	(3) Motor Starters	Outdoor panel, wall mounted. Exterior has significant rust. Internal components new, no wire management. Could potentially be replaced and combined in parallel with Air Injection Control Panel to elimintate this panel.
12	Grit Area	Main Control Panel	3	Replace	8-10	$187,500	FlexI/O Exterior Pilot Controls	Large 2 Bay SST panel, probably NEMA 4X. FlexI/O is connected over DH+ to Headworks PLC. Wire routing is poor, overall panel condition is average. Approx 30 pilot devices on right bay exterior for manual motor controls.
7	DAFT	Air Injection Control Panel	3	Repair	10-12	$156,250	AB Micrologix 1400 PLC (2) AB Powerflex VFD AB PanelView C1000 HMI	Outdoor panel in covered area. Exterior and interior in fair condition, was rebuilt in 2015.
	Sub Total					**$630,000**		
Phase 1 - PLCs to be Replaced in Near Term								
14	Headworks	Main Control Panel	5	Replace	0-2	$250,000	AB Panelview C1000 HMI AB SLC 5/05 PLC Ethernet switch Mission SCADA box	Enclosure is a bay of a piece of MCC or distribution equipment. Staff report this PLC is highly problematic, which escalates the need for replacment based on programming/configuration more than physical condition. Exterior is old but average, internal wiring in poor condition. Recommend using a stand alone enclosure for replacement.
15	Bar Screen 2	Main Control Panel	5	Replace	0-2	$187,500	Multiranger Plus level controller Control Relays (2) motor starters	There was water on inside of panel, which escalates the replacement priority because of the personnel and equipment hazard this introduces. Panel is hardwired to I/O in War Room (area 13 of this report). Large volume of control relays and the level transmitter is reported as inoperable. Panel was rewired to work in only one mode due to multiple hardware failures.
8	Final Outfall Shack	Main Control Panel	5	Replace	0-3	$125,000	AB SLC 5/05 PLC Chemical Sampler Controller	Cabinet exterior is showing fair amount of rust. Wiring conditions inside and outside of panel is poor. Conduit for analog singnal is broken immediately after leaving bottom of cabinet, signal cable run along ground. N-Tron Switch has no cables connected. Immediate replacement with a NEMA 4X recommended, SST316.
23	Communicaitons	Miscellaneous	5	Replace	0-3	$0	Rack Mount Switches	19" Rack cabinet to house network equipment. Internal wiring is very poor, no cable management hardware installed. Recommend replacement with a new netowkr rack as described in body of report. With new rack, patch panels and wire management hardware should be installed to prevent the choatic wiring conditions of present cabinet. Costs
25	Main Control Room	Operator Station	5	Repair	0-3	$0	PC for SCADA workstation	Replacement recommended as detailed in the body of this report. Cost is accounted in the estimate for the project, not duplicated here.
10	1 Water	Miscellaneous Panel	5	Replace	1-3	$93,750	AB SLC5/05 PLC	PLC in in tiny enclosure. Enclosure is in larger cabinet that houses disconnects, a panelboard and a motor control panel. All enclosures show visible rust. Ethernet /Radio converter in bottom of PLc panel, antenna cable runs outside to antenna and is poor condition. Replace with a single NEMA 4X enclosure.
11	Generator/ATS	Main Control Panel	5	Replace	1-3	$218,750	AB SLC PLC	Enclosure appears 20+ years old, based on style of pilot devices mounted on interior panel, poor condition. Panel might be demolished as part of an electrical project planned for the facility.

Table 1.B Richmond Instrumentation and Control (I&C) Equipment List and Condition Assessment
WWTP Facility Plan
City of Richmond and Veolia Water

Rank is based on the International Infrastructure Management Manual (IIMM). Conditions are expressed in terms of the amount of repair needed to bring and asset to a like-new (perfect) condition. Definitions of the one through five condition ranking system are as follows

CONDITION RANK	DESCRIPTION	AMOUNT OF REPAIR NEEDED
1	Very Good	0%
2	Minor Defects	1-10%
3	Requires Significant Maintenance	11-20%
4	Requires Rehabilitation	21-50%
5	Unserviceable	> 50%

Equipment Area ID	Process Area	PCM Description	Rank	Recommendation	Timeframe (Years)	Cost	Major Hardware	Notes
22	Shop Area	SCADA Station	5	Replace	1-3	$0	PC to run SCADA Printer Ethernet switches	Multiple ethernet swtiches are for VNA, security cameras, and SCADA. Recommend replacement with a workstation as detailed in body of report. Cost is accounted in the estimate for the project, not duplicated here.
2	Tank Farm	Remote IO Control Panel	5	Replace	3-5	$250,000	AB SLC CHASSIS REMOTE I/O	Remote I/O panel, connected to Chemical Room SLC PLC over DH+. Should be replaced at same time as Chemical Room PLC.
Sub Total						**$1,130,000**		
Phase 2 - PLCs to be Replaced in Long-Term								
24	Network Room	Main Control Panel	3	Repair*	3-15	$125,000	AB ControlLogix Ethernet/DH+ Bridge AB SLC PLC Sensaphone Autodialer	Based on staff information, ControlLogix and SLC are communication bridges only. ControlLogix appears to be a DH+ to Ethernet bridge, connected to the SLC processor in rack below. SLC is hardwired to the sensaphone autodialer. Autodialer has nearly every LED active, probably indicating that the dialer is nearly always active and dialing a phone. This possibly nusaince scenario could negate the intent the dialer has for alarm priorities. Because of the DH+/Ethernet bridge functionality of this panel, it should be repaired but must be left in place, possibly as long as any SLC or DH+ communications are required, even after the SCADA upgrade project. After a remote dialer has been configured for the new SCADA platform, the sensaphone system can be removed, opening up a significant amount of backpanel area and allowing considerable wiring cleanup of the panel and increase it's longevity.
18	Leachate	Main Control Panel	3	Repair	5-8	$125,000	AB PanelView HMI AB SLC 5/05 PLC Radio converter Ethernet Switch	Panel located indoors and exterior in good condition. Internal wiring is fair. PLC talks over raido to West County. Panelview on exterior is dead and not connected. Repair items will to organize wiring, replace PLC, power supplies, and relays at the recommended timeframe.
19	Digester Building	Main Control Panel	4	Replace	5-10	$93,750	AB Panelview C1000 HMI AB SLC 5/05 PLC Ethernet Switch	Panel located indoors and exterior in good condition. Internal wiring is fair. PLC DH+ Scanner talks to Remote I/O Panels. Repair items will to organize wiring, replace PLC, HMI, power supplies, and relays at the recommended timeframe. Replacement recommended because size of panel is small and should be investigated as the more cost effective option to avoid large amount of field labor to repair panel of this
20	Dystor	Remote IO Panels 1 and 2	4	Replace	5-10	$218,750	AB SLC Chassis IO (2) Motor starter circuits	SST Panel located outdoors. An HMI size cutout has been patched and sealed with SST plate on exterior door. Internal wiring is below average. SLC I/O communicated over DH+ to Digester PLC (area 19).
4	Dechlorination	Communication Panel	4	Repair	7-10	$62,500	Ethernet Switch UPS	Panel is located indoors, SST construction. Very few components in panel, could be re-used.
1	Secondary Treatment	Main Control Panel	3	Replace	7-10	$218,750	AB SLC 5/05 PLC AB PV1000 HMI	Multiple Bay panel located inside, panel is in average condition. Wiring condition is poor and some appears to be under physical strain when cabinet doors are opened.
1	Secondary Treatment	Mission Panel	5	Replace	7-10	$18,750	MISSION 800 RTU	Unclear what function of panel is for. Appears to be hardwired communication gateway for SLC in main control panel to radio. May not be necessary to replace this if Main Control Panel in this area is upgraded.
17	Boiler	Main Control Panel 2	3	Repair	7-10	$100,000	AB Panelview Plus 1000 HMI AB SLC PLC (13 slot) Ethernet Switch Fiber patch panel IS Barrriers Mission SCADA box	Panel is located indoors and in good condition. Wiring is slightly disorganized but in overall good condition. The repair for this cabinet would be to organize wiring, and replace the PLC, power supplies, and relays at the recommended timeframe.

Table 1.B Richmond Instrumentation and Control (I&C) Equipment List and Condition Assessment
WWTP Facility Plan
City of Richmond and Veolia Water

Rank is based on the International Infrastructure Management Manual (IIMM). Conditions are expressed in terms of the amount of repair needed to bring and asset to a like-new (perfect) condition. Definitions of the one through five condition ranking system are as follows

CONDITION RANK	DESCRIPTION	AMOUNT OF REPAIR NEEDED
1	Very Good	0%
2	Minor Defects	1-10%
3	Requires Significant Maintenance	11-20%
4	Requires Rehabilitation	21-50%
5	Unserviceable	> 50%

Equipment Area ID	Process Area	PCM Description	Rank	Recommendation	Timeframe (Years)	Cost	Major Hardware	Notes
21	Flare	Main Control Panel		Repair	7-10	$62,500	(2) Flame monitor controllers AB MicroLogix 1100 PLC	Panel is NEMA 4X and located outdoors. Exterior is in good condition, Interior above average. No internal wire management installed, recommend installation of wireways and replacement of PLC at repair timeframe.
3	Chemical Room	Main Control Panel	3	Replace	8-10	$187,500	AB SLC5/05 PLC AB Panelview Plus 1000 Mission SCADA box	Panel located indoors, fiberglass construction. Interior in Fair condition Only route for SCADA to New Tank system
5	Carrier Water	Main Control Panel	3	Repair	11-13	$31,250	(2) Motor Starters	Hardware for two motor starter circuits, IEC contactors. Wiring is fair, needs wireways.
16	Boiler	Main Control Panel 1	3	Replace	11-13	$187,500	AB MicroLogix 1100 PLC Expansion I/O block for PLC 5 port ethernet switch	Enclosure in good condition, internal wiring in good condiiton. Communicates over ethernet to main boiler room PLC.
6	Wet Weather Tank	Main Control Panel	2	Repair	12-15	$6,250	AB CompactLogix PLC AB Panelview Plus 1500 HMI	Enclosure is in good condition with new hardware. Wiring is organized but wireway covers should be installed.
26	Wet Weather Pump Station	Main Control Panel	1	None	15-25	$12,500	AB ControlLogix PLC	New Panel installed in last few months for wet weather storage project.
Sub Total						**$1,450,000**		
Total						**$2,580,000**		

Table 2. Summary of Priority 1, 2, and 3 Rehabilitation and Replacement Projects
WWTP Facility Plan
City of Richmond and Veolia Water

Process	Equipment	Replacement Cost Estimated in 2010 Master Plan (costs in 2008 dollars)[1]	Update per Facility Plan Condition Assessment	Updated Replacement Cost (costs in 2008 dollars)[1]	Updated Replacement Cost to be Included in R&R Project (costs in 2016 dollars)[2]
Priority 1 Equipment					
Headworks	Replace Headworks MCC	$ 200,000		$ 200,000	$ 244,000
Headworks	Replace Headworks Ductbanks	$ 400,000	Replaced Since Master Plan	$ -	$ -
Headworks	Replace HVAC	$ 250,000	Replaced Since Master Plan	$ -	$ -
Headworks	Replace Influent Pump No. 1 Check Valve	$ 17,500		$ 17,500	$ 21,000
Headworks	Replace Influent Pump No. 2 Check Valve	$ 17,500		$ 17,500	$ 21,000
Headworks	Replace Influent Pump No. 3 Check Valve	$ 17,500		$ 17,500	$ 21,000
Headworks	Replace Influent Pump No. 4 Check Valve	$ 17,500		$ 17,500	$ 21,000
Headworks	Replace Influent Pump Station Piping	$ 150,000		$ 150,000	$ 183,000
Headworks	Replace Influent Pump Station Misc Valves	$ 50,000		$ 50,000	$ 61,000
Aeration Basins	Replace Aeration Basin Ductbanks	$ 50,000	Replaced Since Master Plan	$ -	$ -
Secondary Clarifier No. 1	Replace SC1 Influent Channel and Walkway	$ 75,000		$ 75,000	$ 91,000
Secondary Clarifier No. 1	Replace SC1 Piping	$ 25,000		$ 25,000	$ 30,000
Secondary Clarifier No. 2	Rehabilitate SC2 Influent Channel and Walkway	$ 75,000		$ 75,000	$ 91,000
Secondary Clarifier No. 2	Replace SC2 Piping	$ 25,000		$ 25,000	$ 30,000
Secondary Control Building	Replace Ductbanks	$ 250,000	Replaced Since Master Plan	$ -	$ -
Secondary Treatment Gallery	Replace WAS MCC No. 1	$ 250,000	Replaced Since Master Plan	$ -	$ -
Secondary Treatment Gallery	Replace WAS MCC No. 2	$ 250,000	Replaced Since Master Plan	$ -	$ -
Secondary Treatment Gallery	Replace Ductbanks	$ 400,000	Replaced Since Master Plan	$ -	$ -
Secondary Treatment Gallery	Replace MCC	$ 150,000	Replaced Since Master Plan	$ -	$ -
Disinfection Building	Replace Ductbanks	$ 475,000	Replaced Since Master Plan	$ -	$ -
Disinfection Building	Replace Disinfection Building HVAC	$ 75,000		$ 75,000	$ 91,000
Disinfection Building	Replace Plant Effluent Bubbler - Basin 1	$ 1,000		$ 1,000	$ 1,000
Disinfection Building	Replace Plant Effluent Bubbler - Basin 2	$ 1,000		$ 1,000	$ 1,000
Primary Sludge Pumping	Replace Primary Sludge MCC	$ 150,000	Replaced Since Master Plan	$ -	$ -
Primary Sludge Pumping	Replace Ductbanks	$ 200,000	Replaced Since Master Plan	$ -	$ -
Chlorine Contact Basin	Replace Mixer No. 1	$ 10,000		$ 10,000	$ 12,000
Chlorine Contact Basin	Replace Mixer No. 2	$ 10,000		$ 10,000	$ 12,000
Chlorine Contact Basin	Replace Bisulfite Injector	$ 10,000	Included in Facility Plan CIP Project	$ -	$ -
Electrical Substation	Replace HVAC	$ 25,000	Replaced Since Master Plan	$ 25,000	$ 30,000
Electrical Substation	Replace Automatic Transfer Switch	$ 65,000	Replaced Since Master Plan	$ -	$ -
Electrical Substation	Replace Switchgear	$ 1,250,000	Replaced Since Master Plan	$ -	$ -
Electrical Substation	Replace Bus Duct	$ 100,000	Replaced Since Master Plan	$ -	$ -
3W Pump Station	Replace Pump No. 1 VFD	$ 15,000	Replaced Since Master Plan	$ -	$ -
3W Pump Station	Replace Pump No. 2 VFD	$ 15,000	Replaced Since Master Plan	$ -	$ -
3W Pump Station	Replace 3W MCC	$ 80,000	Replaced Since Master Plan	$ -	$ -
3W Pump Station	Replace Ductbanks	$ 240,000	Replaced Since Master Plan	$ -	$ -
3W Pump Station	Replace 3W Pump Station Structure	$ 50,000	Replaced Since Master Plan	$ 50,000	$ 61,000
3W Pump Station	Replace Pump No. 2	$ 30,000	Replaced Since Master Plan	$ -	$ -
3W Pump Station	Replace piping/valves	$ 50,000	Included in Facility Plan CIP Project	$ -	$ -
Administration Building	Replace Ductbanks	$ 50,000	Replaced Since Master Plan	$ -	$ -
	Subtotal Priority 1 Equipment	***$ 5,572,000***		***$ 842,000***	***$ 1,000,000***

Table 2. Summary of Priority 1, 2, and 3 Rehabilitation and Replacement Projects
WWTP Facility Plan
City of Richmond and Veolia Water

Process	Equipment	Replacement Cost Estimated in 2010 Master Plan (costs in 2008 dollars)[1]	Update per Facility Plan Condition Assessment	Updated Replacement Cost (costs in 2008 dollars)[1]	Updated Replacement Cost to be Included in R&R Project (costs in 2016 dollars)[2]
Priority 2 Equipment					
Aeration Basins	Distribution Gate 1A	$ 15,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	Distribution Gate 1B	$ 15,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	Distribution Gate 1C	$ 15,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	Distribution Gate 2A	$ 15,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	Distribution Gate 2B	$ 15,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	Distribution Gate 2C	$ 15,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	Effluent Shear Gate 1C	$ 25,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	Effluent Sheer Gate 2C	$ 25,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	Effluent Sheet Gate 3C	$ 25,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	Effluent Sheet Gate 4C	$ 25,000	Included in Facility Plan CIP Project	$ -	$ -
Aeration Basins	RAS Piping - Under/above Grating btw Basin 1/2	$ 100,000		$ 100,000	$ 122,000
Aeration Basins	RAS Piping - Under/above Grating btw Basin 3/4	$ 100,000		$ 100,000	$ 122,000
Aeration Basins	RAS Valving - Under/above Grating btw Basin 1/2	$ 100,000		$ 100,000	$ 122,000
Aeration Basins	RAS Valving - Under/above Grating btw Basin 3/4	$ 100,000		$ 100,000	$ 122,000
Aeration Basins	SC1 Scum Skimmer	$ -	Included in Facility Plan CIP Project	$ -	$ -
Secondary Clarifier No. 1	SC1 Launders	$ 50,000		$ 50,000	$ 61,000
Secondary Clarifier No. 2	SC2 Scum Skimmer	$ -	Included in Facility Plan CIP Project	$ -	$ -
Secondary Clarifier No. 2	SC2 Launders	$ 50,000		$ 50,000	$ 61,000
Secondary Control Building	Secondary Control Building	$ 250,000		$ 250,000	$ 304,000
Secondary Treatment Gallery	WAS Pump No. 1	$ 20,000		$ 20,000	$ 24,000
Secondary Treatment Gallery	WAS Pump No. 2	$ 20,000		$ 20,000	$ 24,000
Secondary Treatment Gallery	WAS Pump No. 3	$ 20,000		$ 20,000	$ 24,000
Secondary Treatment Gallery	RAS Flow Meter - Pumps 5/6	$ 5,000		$ 5,000	$ 6,000
Secondary Treatment Gallery	WAS Mag Meter No. 1	$ 5,000		$ 5,000	$ 6,000
Secondary Treatment Gallery	RAS Piping - Clarifier 1	$ 25,000		$ 25,000	$ 30,000
Secondary Treatment Gallery	RAS Valves - Clarifier 1	$ 25,000		$ 25,000	$ 30,000
Secondary Treatment Gallery	RAS Piping - Clarifier 2	$ 25,000		$ 25,000	$ 30,000
Secondary Treatment Gallery	RAS Valves - Clarifier 2	$ 25,000		$ 25,000	$ 30,000
Secondary Treatment Gallery	WAS Piping	$ 50,000		$ 50,000	$ 61,000
Secondary Treatment Gallery	WAS Valves	$ 50,000		$ 50,000	$ 61,000
Chemical Tank Farm	Hypo Tank 1	$ 20,000	Replaced Since Master Plan	$ -	$ -
Chemical Tank Farm	Hypo Tank 2	$ 20,000	Replaced Since Master Plan	$ -	$ -
Chemical Tank Farm	Hypo Tank 3	$ 20,000	Replaced Since Master Plan	$ -	$ -
Chemical Tank Farm	Hypo Tank 4	$ 20,000		$ 20,000	$ 24,000
Chemical Tank Farm	Hypo Tank 5	$ 20,000		$ 20,000	$ 24,000
Chemical Tank Farm	Hypo Tank 6	$ 20,000		$ 20,000	$ 24,000
Chemical Tank Farm	Bisulfite Tank 1	$ 20,000	Included in Facility Plan CIP Project	$ -	$ -
Chemical Tank Farm	Bisulfite Tank 2	$ 20,000	Included in Facility Plan CIP Project	$ -	$ -
Chemical Tank Farm	Bisulfite Tank 3	$ 20,000	Included in Facility Plan CIP Project	$ -	$ -
Primary Sludge Pumping	Primary Sludge Pump Building	$ 500,000		$ 500,000	$ 609,000
Primary Sludge Pumping	Primary Sludge Piping	$ 25,000		$ 25,000	$ 30,000
Civil	Fencing	$ 100,000		$ 100,000	$ 122,000
	Subtotal Priority 2 Equipment	***$ 2,015,000***		***$ 1,705,000***	***$ 2,100,000***

Table 2. Summary of Priority 1, 2, and 3 Rehabilitation and Replacement Projects
WWTP Facility Plan
City of Richmond and Veolia Water

Process	Equipment	Replacement Cost Estimated in 2010 Master Plan (costs in 2008 dollars)[1]	Update per Facility Plan Condition Assessment	Updated Replacement Cost (costs in 2008 dollars)[1]	Updated Replacement Cost to be Included in R&R Project (costs in 2016 dollars)[2]
Priority 3 Equipment					
Headworks	Skimming Pump No. 1	$ 20,000		$ 20,000	$ 24,000
Headworks	Skimming Pump No. 2	$ 20,000		$ 20,000	$ 24,000
Headworks	Influent Pump Station Grating/Handrails	$ 25,000		$ 25,000	$ 30,000
Headworks	Influent Pump Station Building	$ 3,000,000		$ 3,000,000	$ 3,653,000
Headworks	Pump Hoist	$ 25,000		$ 25,000	$ 30,000
Grit Removal	Grit Removal Ductbanks	$ 50,000	Included in Facility Plan CIP Project	$ -	$ -
Primary Treatment	Scum Piping Group	$ 40,000		$ 40,000	$ 49,000
Primary Treatment	Scum Valve Group	$ 20,000		$ 20,000	$ 24,000
Aeration Basins	Aeration Basins Grating/Handrails	$ 100,000		$ 100,000	$ 122,000
Chlorine Contact Basin	Gate 1	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 2	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 3	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 4	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 5	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 6	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 7	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 8	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 9	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 10	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 11	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 12	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 13	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 14	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 15	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 16	$ 25,000		$ 25,000	$ 30,000
Chlorine Contact Basin	Gate 17	$ 25,000		$ 25,000	$ 30,000
Electrical Substation	Electrical Substation Building	$ 250,000		$ 250,000	$ 304,000
Old Electrical Substation	Old Electrical Substation Building	$ 100,000		$ 100,000	$ 122,000
1W - EBMUD	Meter	$ 5,000		$ 5,000	$ 6,000
Bioassay Building	Bioassay Building	$ 500,000		$ 500,000	$ 609,000
Maintenance Building	Maintenance Building HVAC (Locker/Lunch Rooms)	$ 50,000		$ 50,000	$ 61,000
Maintenance Building	Maintenance Building HVAC (Shop)	$ 50,000		$ 50,000	$ 61,000
Maintenance Building	Ductbanks	$ 50,000	Included in Facility Plan CIP Project	$ -	$ -
Maintenance Building	Maintenance Building Structure (Locker/Lunch Roon	$ 750,000		$ 750,000	$ 913,000
Maintenance Building	Maintenance Building Structure (Shop)	$ 750,000		$ 750,000	$ 913,000
	Subtotal Priority 3 Equipment	***$ 6,230,000***		***$ 6,130,000***	***$ 7,500,000***

Notes
(1) August 2008 dollars. 20-Cities ENR CCI = 8362.
(2) February 2016 dollars. 20-Cities ENR CCI = 10182.

Legend:
Replaced since Master Plan or replacement project currently underway
Replacement included in or covered by Facility Plan CIP Project

APPENDIX I – COGENERATION COST ANALYSIS

carollo
Engineers...Working Wonders With Water™

PROJECT : WWTP Facility Plan
City of Richmond and Veolia Water
JOB # : 10034A.00
LOCATION : Richmond, CA

Cogeneration Alternative 1: Building
Payback Period : 21 years

INPUTS

Cogen Details, 1x 335 kW		
Power Output	kW	335
Parasitic Electrical Usage	%	10
Fuel Input, LHV	MMBTU/hr	3.07
Uptime	%	0.95
Downtime	%	0.05
Heat Recovery	% of fuel input	42

Digester Gas Details		
LHV	BTU/scf	585

Electricity Costs		
Capital Cost	$	$6,130,000

Electricity Costs		
Electricity Cost	$/kWh	$0.15
Natural Gas Cost	$/MMBtu	$12.06
Green Power Credit	$/kWh	$0.005

Payback Factors		
Discount Rate	%	6.0
Inflation Rate	%	3.0
Electricity Escalator	%	3.0
Maintenance Escalator	%	3.0
Natural Gas Escalator	%	3.0

Maintenance Costs		
Engine and Fuel Conditioning	$/kWh	$0.025

Year		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Cogeneration																										
Gas Production	scf/day	91,600	92,700	93,800	94,900	95,900	97,000	98,100	99,200	100,200	101,300	102,400	103,500	104,600	105,600	106,700	107,800	108,900	109,900	111,000	112,100	113,200	114,300	115,300	116,400	117,500
	MMBTU/day	54	54	55	56	56	57	57	58	59	59	60	61	61	62	62	63	64	64	65	66	66	67	67	68	69
Max Fuel that can be Consumed	MMBTU/day	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
DG Consumed	MMBTU/day	54	54	55	56	56	57	57	58	59	59	60	61	61	62	62	63	64	64	65	66	66	67	67	68	69
NG Consumed	MMBTU/day	16	16	15	14	14	13	13	12	11	11	10	9	9	8	8	7	6	6	5	4	4	3	3	2	1
Excess DG flared	MMBTU/day	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Power Produced	kWh/day	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638
Parasitic Electrical Usage	kWh/day	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764
Net Power Produced	kW	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286
Cogen Heat Generated	MMBTU/day	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Avg Required Heat for WWTP	MMBTU/day	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DG Consumed	MMBTU/yr	19,559	19,794	20,029	20,264	20,477	20,712	20,947	21,182	21,395	21,630	21,865	22,100	22,335	22,548	22,783	23,018	23,253	23,466	23,701	23,936	24,171	24,406	24,619	24,854	25,089
NG Consumed	MMBTU/yr	5,995	5,760	5,525	5,290	5,077	4,842	4,607	4,372	4,158	3,924	3,689	3,454	3,219	3,005	2,770	2,536	2,301	2,087	1,852	1,617	1,383	1,148	934	699	464
Total Fuel Consumed	MMBTU/yr	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554
Power Produced	kWh/yr	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083
Capital	$/yr	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)	$ (408,711)					
O&M	$/yr	$ (69,697)	$ (71,788)	$ (73,941)	$ (76,160)	$ (78,444)	$ (80,798)	$ (83,222)	$ (85,718)	$ (88,290)	$ (90,938)	$ (93,667)	$ (96,477)	$ (99,371)	$ (102,352)	$ (105,423)	$ (108,585)	$ (111,843)	$ (115,198)	$ (118,654)	$ (122,214)	$ (125,880)	$ (129,656)	$ (133,546)	$ (137,553)	$ (141,679)
Natural Gas	$/yr	$ (72,296)	$ (71,548)	$ (70,689)	$ (69,714)	$ (68,907)	$ (67,691)	$ (66,339)	$ (64,846)	$ (63,529)	$ (61,739)	$ (59,784)	$ (57,657)	$ (55,348)	$ (53,227)	$ (50,539)	$ (47,642)	$ (44,526)	$ (41,605)	$ (38,031)	$ (34,205)	$ (30,115)	$ (25,749)	$ (21,587)	$ (16,645)	$ (11,386)
Electricity Savings	$/yr	$ 376,362	$ 387,653	$ 399,283	$ 411,261	$ 423,599	$ 436,307	$ 449,396	$ 462,878	$ 476,765	$ 491,068	$ 505,800	$ 520,974	$ 536,603	$ 552,701	$ 569,282	$ 586,360	$ 603,951	$ 622,070	$ 640,732	$ 659,954	$ 679,752	$ 700,145	$ 721,149	$ 742,784	$ 765,067
Green Power Credit	$/yr	$ 12,545	$ 12,922	$ 13,309	$ 13,709	$ 14,120	$ 14,544	$ 14,980	$ 15,429	$ 15,892	$ 16,369	$ 16,860	$ 17,366	$ 17,887	$ 18,423	$ 18,976	$ 19,545	$ 20,132	$ 20,736	$ 21,358	$ 21,998	$ 22,658	$ 23,338	$ 24,038	$ 24,759	$ 25,502
Cash Flow		$ (161,796)	$ (151,471)	$ (140,749)	$ (129,615)	$ (118,343)	$ (106,349)	$ (93,895)	$ (80,967)	$ (67,873)	$ (53,952)	$ (39,502)	$ (24,505)	$ (8,940)	$ 6,835	$ 23,586	$ 40,968	$ 59,004	$ 77,291	$ 96,694	$ 116,823	$ 546,416	$ 568,078	$ 590,054	$ 613,346	$ 637,505
Payback		$ (161,796)	$ (313,267)	$ (454,016)	$ (583,631)	$ (701,974)	$ (808,323)	$ (902,218)	$ (983,185)	$ (1,051,058)	$ (1,105,010)	$ (1,144,512)	$ (1,169,017)	$ (1,177,957)	$ (1,171,122)	$ (1,147,537)	$ (1,106,569)	$ (1,047,566)	$ (970,274)	$ (873,581)	$ (756,758)	$ (210,342)	$ 357,736	$ 947,790	$ 1,561,136	$ 2,198,641

carollo
Engineers...Working Wonders With Water™

PROJECT : WWTP Facility Plan
City of Richmond and Veolia Water
JOB # : 10034A.00
LOCATION : Richmond, CA

Cogeneration Alternative 2: Stand-Alone Enclosure
Payback Period : 16 years

INPUTS

Cogen Details, 1x 335 kW		
Power Output	kW	335
Parasitic Electrical Usage	%	10
Fuel Input, LHV	MMBTU/hr	3.07
Uptime	%	0.95
Downtime	%	0.05
Heat Recovery	% of fuel input	42

Digester Gas Details		
LHV	BTU/scf	585

Electricity Costs		
Capital Cost	$	$4,910,000

Electricity Costs		
Electricity Cost	$/kWh	$0.15
Natural Gas Cost	$/MMBtu	$12.06
Green Power Credit	$/kWh	$0.005

Payback Factors		
Discount Rate	%	6.0
Inflation Rate	%	3.0
Electricity Escalator	%	3.0
Maintenance Escalator	%	3.0
Natural Gas Escalator	%	3.0

Maintenance Costs		
Engine and Fuel Conditioning	$/kWh	$0.030

Year		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Cogeneration																										
Gas Production	scf/day	91,600	92,700	93,800	94,900	95,900	97,000	98,100	99,200	100,200	101,300	102,400	103,500	104,600	105,600	106,700	107,800	108,900	109,900	111,000	112,100	113,200	114,300	115,300	116,400	117,500
	MMBTU/day	54	54	55	56	56	57	57	58	59	59	60	61	61	62	62	63	64	64	65	66	66	67	67	68	69
Max Fuel that can be Consumed	MMBTU/day	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
DG Consumed	MMBTU/day	54	54	55	56	56	57	57	58	59	59	60	61	61	62	62	63	64	64	65	66	66	67	67	68	69
NG Consumed	MMBTU/day	16	16	15	14	14	13	13	12	11	11	10	9	9	8	8	7	6	6	5	4	4	3	3	2	1
Excess DG flared	MMBTU/day	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Power Produced	kWh/day	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638	7,638
Parasitic Electrical Usage	kWh/day	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764	764
Net Power Produced	kW	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286	286
Cogen Heat Generated	MMBTU/day	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Avg Required Heat for WWTP	MMBTU/day	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DG Consumed	MMBTU/yr	19,559	19,794	20,029	20,264	20,477	20,712	20,947	21,182	21,395	21,630	21,865	22,100	22,335	22,548	22,783	23,018	23,253	23,466	23,701	23,936	24,171	24,406	24,619	24,854	25,089
NG Consumed	MMBTU/yr	5,995	5,760	5,525	5,290	5,077	4,842	4,607	4,372	4,158	3,924	3,689	3,454	3,219	3,005	2,770	2,536	2,301	2,087	1,852	1,617	1,383	1,148	934	699	464
Total Fuel Consumed	MMBTU/yr	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554	25,554
Power Produced	kWh/yr	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083	2,509,083
Capital	$/yr	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)	$ (327,369)					
O&M	$/yr	$ (83,636)	$ (86,145)	$ (88,730)	$ (91,391)	$ (94,133)	$ (96,957)	$ (99,866)	$ (102,862)	$ (105,948)	$ (109,126)	$ (112,400)	$ (115,772)	$ (119,245)	$ (122,822)	$ (126,507)	$ (130,302)	$ (134,211)	$ (138,238)	$ (142,385)	$ (146,656)	$ (151,056)	$ (155,588)	$ (160,255)	$ (165,063)	$ (170,015)
Natural Gas	$/yr	$ (72,296)	$ (71,548)	$ (70,689)	$ (69,714)	$ (68,907)	$ (67,691)	$ (66,339)	$ (64,846)	$ (63,529)	$ (61,739)	$ (59,784)	$ (57,657)	$ (55,348)	$ (53,227)	$ (50,539)	$ (47,642)	$ (44,526)	$ (41,605)	$ (38,031)	$ (34,205)	$ (30,115)	$ (25,749)	$ (21,587)	$ (16,645)	$ (11,386)
Electricity Savings	$/yr	$ 376,362	$ 387,653	$ 399,283	$ 411,261	$ 423,599	$ 436,307	$ 449,396	$ 462,878	$ 476,765	$ 491,068	$ 505,800	$ 520,974	$ 536,603	$ 552,701	$ 569,282	$ 586,360	$ 603,951	$ 622,070	$ 640,732	$ 659,954	$ 679,752	$ 700,145	$ 721,149	$ 742,784	$ 765,067
Green Power Credit	$/yr	$ 12,545	$ 12,922	$ 13,309	$ 13,709	$ 14,120	$ 14,544	$ 14,980	$ 15,429	$ 15,892	$ 16,369	$ 16,860	$ 17,366	$ 17,887	$ 18,423	$ 18,976	$ 19,545	$ 20,132	$ 20,736	$ 21,358	$ 21,998	$ 22,658	$ 23,338	$ 24,038	$ 24,759	$ 25,502
Cash Flow		$ (94,393)	$ (84,486)	$ (74,195)	$ (63,504)	$ (52,690)	$ (41,166)	$ (29,198)	$ (16,769)	$ (4,189)	$ 9,203	$ 23,107	$ 37,542	$ 52,528	$ 67,706	$ 83,843	$ 100,593	$ 117,977	$ 135,594	$ 154,305	$ 173,722	$ 521,240	$ 542,146	$ 563,345	$ 585,836	$ 609,169
Payback		$ (94,393)	$ (178,880)	$ (253,075)	$ (316,579)	$ (369,269)	$ (410,435)	$ (439,633)	$ (456,402)	$ (460,590)	$ (451,388)	$ (428,281)	$ (390,739)	$ (338,211)	$ (270,505)	$ (186,662)	$ (86,069)	$ 31,908	$ 167,502	$ 321,807	$ 495,529	$ 1,016,769	$ 1,558,915	$ 2,122,260	$ 2,708,096	$ 3,317,265