City of Richmond

VEOLIA WATER

Wastewater Treatment Master Plan

January 2010

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City of Richmond and Veolia Water

RICHMOND WASTEWATER TREATMENT MASTER PLAN

January 2010

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City of Richmond and Veolia Water

RICHMOND WASTEWATER TREATMENT MASTER PLAN

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EXECUTIVE SUMMARY

INTRODUCTION

The Richmond Sanitary Sewer District No. 1 (RSSD) provides wastewater treatment and effluent disposal for most of the City of Richmond (City). In 1977, RSSD and the West County Wastewater District (WCWD) entered into a joint powers agreement, forming the West County Agency (WCA). The two agencies share an outfall that discharges to the San Francisco Bay. The service area for RSSD is shown in Figure ES.1.

The District's water pollution control plant (WPCP) is operated under contract by Veolia Water (Veolia). In April 2008, Veolia commissioned Carollo Engineers (Carollo) to prepare a Wastewater Treatment Master Plan (Master Plan) for RSSD. The purpose of the Master Plan is to:

- Evaluate the existing treatment facilities for the capability of meeting current discharge requirements for current dry weather flows.
- Evaluate the treatment facilities for treating projected influent flows over the planning period, which spans from 2008 to 2040.
- Evaluate the treatment facilities for meeting potential new discharge requirements in the future.
- Develop a long-term strategy to meet potential future discharge requirements.
- Identify a strategy to incorporate sustainable elements in the project, including renewable energy and biosolids disposal.
- Develop a long-term plan for the wastewater treatment facilities that meets the City's vision of sustainable methods that represent the best practice for wastewater treatment systems.
- Develop a capital improvement program (CIP) that identifies improvements required for the near term, and improvements for the long term.

CONDITION OF EXISTING TREATMENT AND EFFLUENT DISPOSAL FACILITIES

The RSSD wastewater plant was first constructed in 1953 as a primary treatment facility. The plant was upgraded to secondary treatment in 1967. Smaller upgrade projects have been completed since, including an additional circular clarifier added in 1990. Veolia recently upgraded the influent bar screen, and made structural repairs to the primary

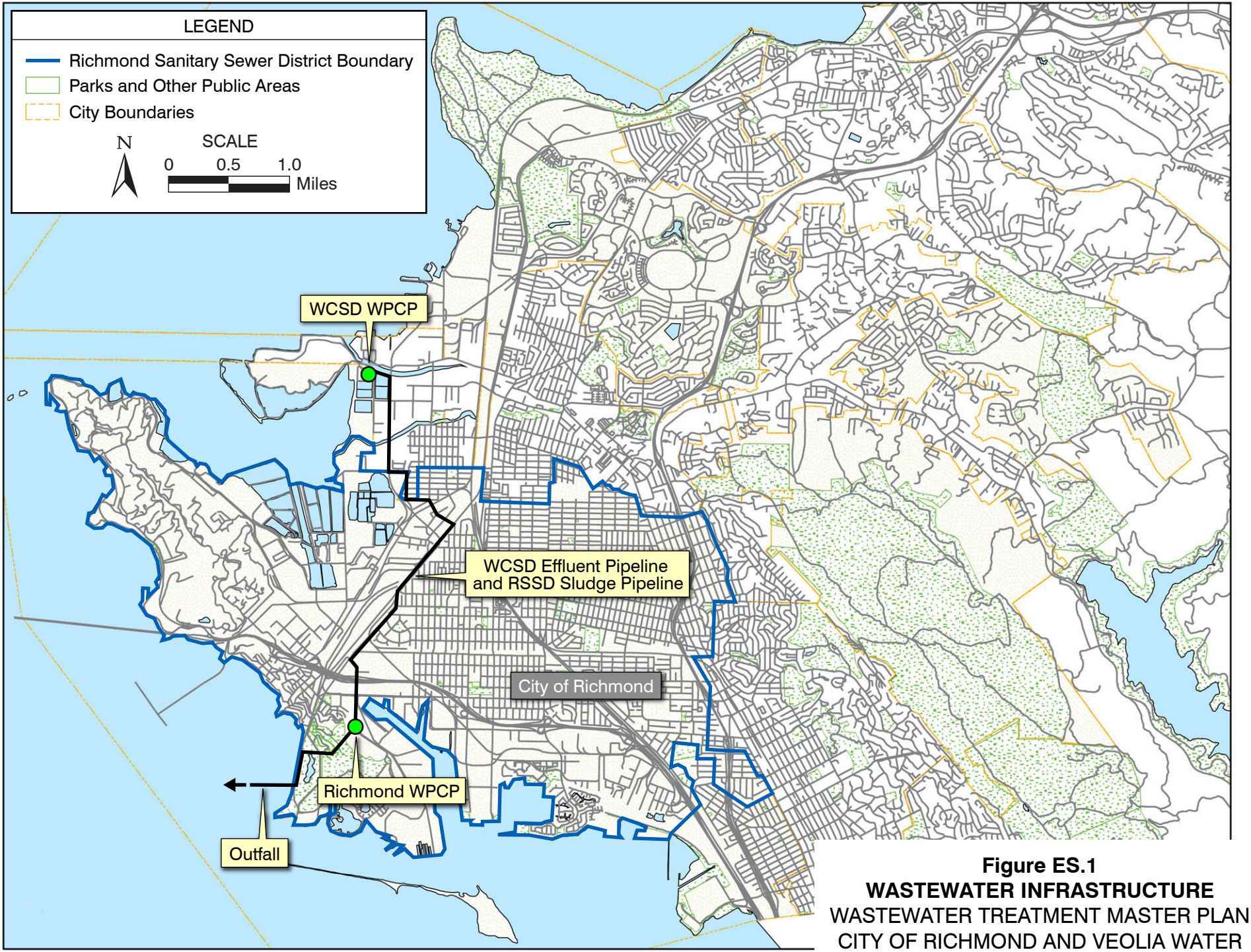

Figure ES.1
WASTEWATER INFRASTRUCTURE
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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and secondary clarifiers. The instrumentation system was also upgraded for key areas.

Despite these upgrades, many more improvements are required to restore the plant to modern standards. Most of the treatment structures are at least 41 years old, and some structures are 55 years old. Most of the electrical equipment (panels, switchgear, and wiring) is also over forty years old. The electrical equipment is severely corroded, and in some areas, poses a safety risk. Collectively, the aging facilities jeopardize the ability of the treatment plant to meet current discharge requirements.

POPULATION PROJECTIONS AND PROJECTED WASTEWATER FLOWS AND LOADS

The current average dry weather flows (ADWF) to the wastewater plant are 6.5 million gallons per day (mgd), and the service area population is 68,000. Based on population projections developed by Boyle Engineering in 2006, the service area population is expected to grow at an annual rate of 1.5 percent per year. At this rate, the service area population will reach approximately 110,000 by the year 2040, and annual ADWF will be at 10.8 mgd.

During wet weather, the RSSD wastewater collection system receives a significant amount of extraneous flows, known as infiltration and inflow (I&I). Sources of I&I include collection system leaks and defects in service laterals. As evidenced by high salinity concentrations in the RSSD wastewater, some of the extraneous flow comes from San Francisco Bay water that leaks into sewers near the bay shoreline. Because of high I&I contributions, the maximum monthly average flow currently reaches up to 14 mgd, which is over two times higher than the average dry weather flow. Assuming the same ratio applies in the future, the maximum monthly flow for 2040 will be 20.1 mgd and the average dry weather flow will be 10.8 mgd. Figure ES.2 illustrates the flow projections used for the Master Plan.

Peak hourly wet weather flow (PHWWF) estimates were taken from the Collection System Master Plan and compared to effluent flow data from 2003 to 2007. At the time of the data analysis, the Richmond plant did not have an influent flow meter. However, the plant did have an effluent flow meter located downstream of the treatment process. The effluent flow meter will not measure instantaneous flows that come to the front of the plant, but it will provide a close approximation. The collection system hydraulic model estimated a peak flow of 53 mgd for a 5-year 24-hour storm event. The District's effluent flow meter has recorded a peak of at least 55 mgd during several storm events over the past five years. Accordingly, a flow of 55 mgd was adopted as the design peak hourly wet weather flow for this Master Plan.

Wastewater loadings (biochemical oxygen demand [BOD] and total suspended solids [TSS]) were assumed to remain at current concentrations throughout the planning period. Wastewater flow and loading projections are summarized in Table ES.1.

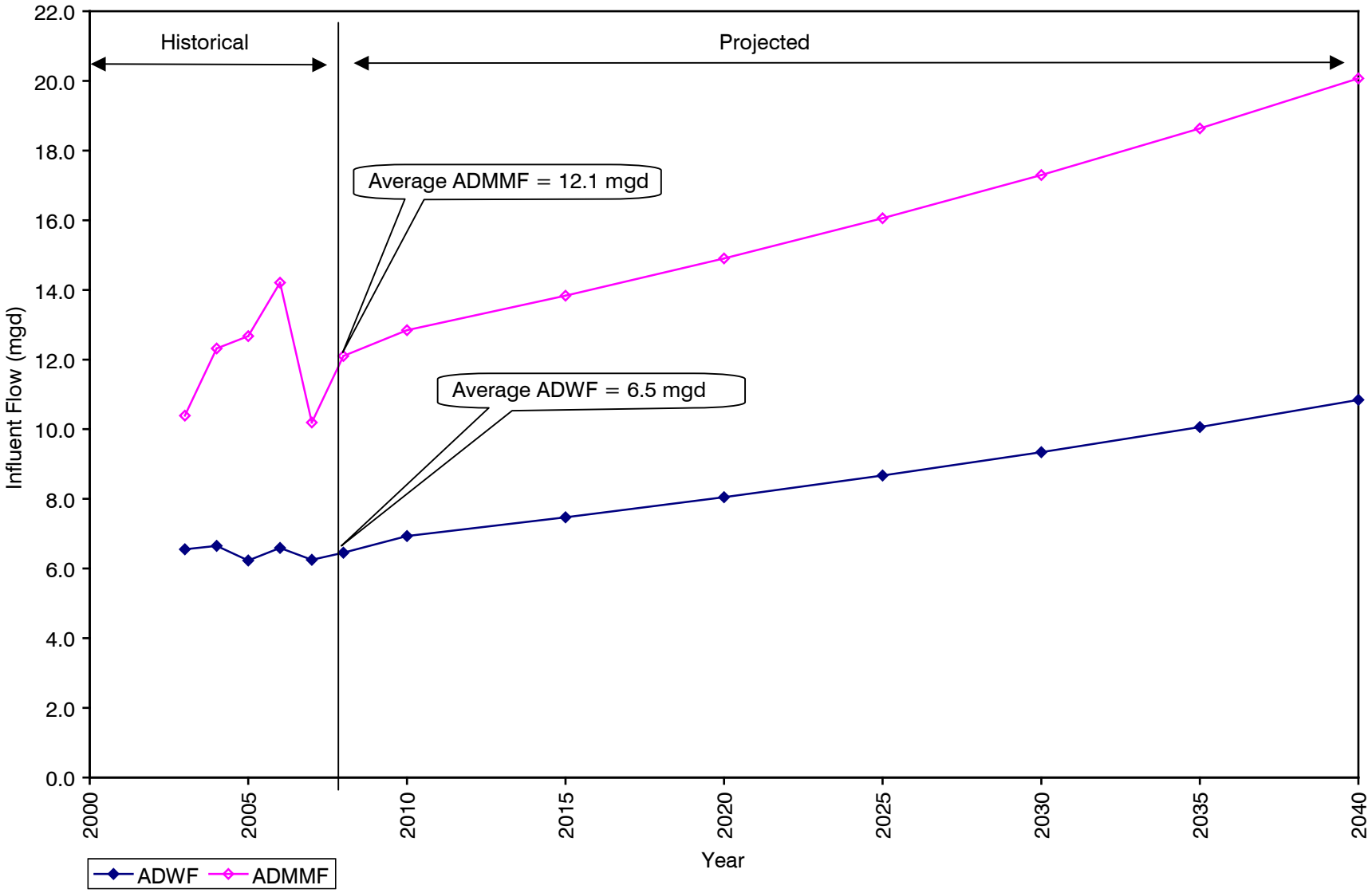

Figure ES.2
FLOW PROJECTIONS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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Table ES.1 Summary of Wastewater Flows and Characteristics
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

		Existing Conditions			Projected 2040 Values		
Parameter	**Units**	**ADWF**	**ADAF**	**ADMMF**	**ADWF**	**ADAF**	**ADMMF**
Flow	mgd	6.5	8.1	12.1	10.8	13.6	20.1
BOD_5	mg/L	292	250	250	285	250	243
	lb/d	15,855	17,235	25,329	25,700	28,356	40,800
TSS	mg/L	468	400	434	455	400	421
	lb/d	25,394	27,345	43,836	41,000	45,370	70,700

Note:
(1) Flows represent Average Dry Weather Flow (ADWF), Average Day Maximum Month Flow (ADMMF), Average Daily Annual Flow (ADAF) and loads in lb/d represent Average Dry Weather Load (ADWL), Average Day Maximum Month Load (ADMML), and Average Day Annual Load (ADAL).

CAPACITY ASSESSMENT

According to the NPDES permit, the facility currently has a rated secondary treatment capacity of 16.0 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.

A hydraulic and process capacity assessment was performed to determine the capacity of the WPCP and outfall. The hydraulic analysis determined that the WPCP and outfall have a hydraulic capacity of 40 mgd during wet weather periods, under high tide conditions. The process analysis showed that the Richmond plant can adequately treat an average day maximum month flow (ADMMF) of 12.3 mgd to the current discharge standards when all units are in service. Because the ADMMF has exceeded 12.3 mgd in the past, the secondary capacity should be expanded to meet these flows. In addition, with one aeration basin or secondary clarifier out of service, the treatment capacity is reduced to 6.5 mgd. Since the current ADWF is 6.5 mgd, most process units need to be improved to treat existing flows and for reliable operation.

CURRENT DISCHARGE REQUIREMENTS

The NPDES permit applies to the combined effluent from the RSSD and WCWD. The legal holder of the permit is the WCA, which includes RSSD and WCWD by a joint powers agreement. A new discharge permit was issued to WCA in April 2008. Key changes to the previous permit include:

- Additional testing, monitoring, and limits for toxic substances. Based on the results of additional testing, a source control program may need to be implemented to reduce pollutants of concern.
- The City is required to commit $20 million to reducing wet weather blending of primary and secondary effluent over the next 5 years. This amount can be spent on the collection system and the wastewater treatment plant.
- Blending of primary/secondary effluent cannot occur until the influent exceeds 20 mgd. In other words, the secondary treatment system must have a peak flow capacity of 20 mgd.
- The ammonia limit is fixed at 32 milligrams per liter (mg/L).

FUTURE DISCHARGE REQUIREMENTS

Wet Weather Blending of Primary and Secondary Effluent

The Environmental Protection Agency (EPA) has been developing regulations for wet weather flow blending over the past several years. In 2005 the EPA published proposed regulations for wet weather blending in the Federal Register (included in Appendix C). The EPA and Regional Water Quality Control Board (RWQCB) discourage blending, but blending is currently allowed if there is no feasible alternative. There is a concern among Bay Area dischargers that they may be required to eliminate blending in the future if the interpretation of “no feasible alternative” changes. Recent discharge permits for East Bay Municipal Utilities District and for South San Francisco contain more restrictions on primary/secondary effluent blending. Accordingly, this Master Plan evaluates alternatives to eliminate blending in the future.

Ammonia Limits

Currently the ammonia limits can be met without adding nitrification facilities. However, the recent collapse of fish populations in the San Francisco Bay-Delta has been linked to many factors, including ammonia discharged in the effluent from publicly owned treatment works. Dischargers to surface waters tributary to the delta are now being required to remove ammonia. There is a possibility that ammonia removal may be required for Bay dischargers as well, but this is likely to be several years away, if ever. However, to plan for this scenario, the Master Plan includes an evaluation of the facilities required to remove ammonia in the future.

STRATEGIES TO SATISFY NEW AND FUTURE DISCHARGE REQUIREMENTS, IMPROVE OPERATION RELIABILITY AND ADD CAPACITY

Provide Secondary Treatment Capacity of 20 mgd during Peak Flows

As stated previously, the new discharge permit requires that the treatment facility provide secondary treatment for up to 20 mgd during wet weather condition. The flow over 20 mgd must receive at least primary treatment. Primary and secondary effluent can be blended if the 20 mgd secondary treatment capacity minimum is maintained.

The recommended strategy to comply with the permit requirement is to expand the aeration basins (add one basin) and convert from mechanical to fine bubble aeration. The additional aeration basin and increased aeration capacity will allow the system to operate under more optimal conditions. This project will entail restoring an existing aeration basin, that had been converted to a flow equalization tank, to its original function. To make up for the lost equalization tank, a new equalization basin will be added.

Limit Peak Wet Weather Influent Flows to 40 mgd

The primary treatment facilities have a peak treatment capacity of 40 mgd. However, flow records and collection system modeling indicate that peak flows may be as high as 55 mgd. When flows reach this level, the treatment processes are essentially flooded and do not function effectively. The recommended strategy to limit influent flows is to construct a new wet weather storage basin just upstream of the treatment plant. The estimated volume for this basin is 2.0 to 3.5 million gallons (MG), assuming no improvements were made to the collection system to reduce I&I. If future collection system studies indicate a reduction in I&I, then the volume of the tank could be reduced.

Increase Peak Flow Capacity for the Effluent Outfall

Hydraulic calculations indicate that the jointly owned outfall has a capacity of about 56 mgd, during high tide. The effluent in the outfall flows by gravity to the bay. When flows from RSSD and WCCSD exceed 56 mgd during high tides, the RSSD effluent flow meter submerges and does not correctly measure flows. In an extreme case, the RSSD chlorine contact tank can overtop. The recommended strategy for increasing the outfall capacity is to construct a low lift outfall pump station. The pump station will add enough pressure to push the peak flows through the outfall pipe to prevent flooding upstream.

The outfall pump station should be designed to provide sufficient capacity to allow for potentially higher flows from WCWD. WCWD is considering an expansion of its treatment facility, which would send more flow to the outfall. The outfall pump station should also be designed to accommodate the projected rise in sea level due to climate change.

Improve Digester Operations

Only one of the two anaerobic digesters (used to reduce and stabilize solids from the plant) is currently functional. The functioning digester is overdue for cleaning to remove grit and rag accumulation. Operation of the sole digester is marginal due to poor heating and mixing, as well limited digester volume resulting from displaced grit and rags.

The recommended strategy to improve digester operation is as follows:

- Improve the influent bar screen system to better remove rags.
- Improve the grit system to remove more grit so it does not carry over to the digester.
- Replace the heating and mixing systems for both digesters (currently in progress)

Provide a Way to Utilize Digester Gas

When both digesters are fully operational, they will produce a significant volume of methane gas. The gas should be utilized as a renewable energy source.

One approach is to utilize the gas to produce electricity with either a fuel cell or reciprocating engine-generator (cogeneration). An alternative approach is use the gas to dry digested sludge. This would dramatically reduce hauling and disposal costs for digested sludge, and would provide more flexibility in disposal options. Only one approach can be selected –there is only enough digester gas to support one of the alternatives. Because cogeneration is more advantageous in the short term, cogeneration is recommended. However, both alternatives would be beneficial and sludge dryings remains a viable project, particularly in the long term.

Provide Biosolids Dewatering

Currently RSSD pumps its digested biosolids to WCWD where it is dewatered. WCWD has indicated that they will not accept the biosolids from RSSD in the near future. RSSD will need to develop a facility to dewater its digested biosolids and provide for disposal of the dewatered biosolids. Dewatering is required with either of the digester gas utilization options described previously. The City, in parallel to the Master Planning effort, is currently evaluating dewatering options. Biosolids disposal costs could be substantially reduced by adding a biosolids drying process in addition to dewatering, as discussed previously.

Accommodating Future Growth

Although growth in the Richmond area is expected to be moderate, a plan is needed for orderly expansion of the treatment processes. The recommended strategy is to add an aeration basin and equalization tank to provide daily flow equalization. The need for these facilities would be triggered by a consistent trend of increasing flows. According to the flow projecting for this master plan, capacity expansions are not expected to be needed until the year 2035.

Eliminate Primary/Secondary Effluent Blending in the Future

Blending of primary effluent with secondary effluent during peak wet weather flows may not be allowable in the future. In other words, all discharges to the bay during peak wet weather flows may eventually require secondary treatment. The recommended strategy to address this possibility is to expand the secondary treatment capacity to 40 mgd. This would be accomplished by converting equalization basins to rectangular secondary sedimentation basins.

Improve Overall Plant Reliability

There are several areas of the treatment plant that are deficient due to wear and tear or the equipment is outmoded. The recommended strategy is to prioritize the replacement or repair of each item. An initial "criticality" analysis was performed with Veolia to identify the priorities. These are presented in the body of this master plan.

Some of the major projects under this category include:

- Secondary clarifier improvements.
- Strainer for plant water system.
- Chemical addition to primary sedimentation basins.
- Odor control system.
- Replacement of sludge thickening system with a gravity belt thickener.

Provide Sustainable Elements in the Proposed Projects

Improvements to the reliability and performance of the treatment plant, as outlined above, benefit the environment by reducing pollutant loadings on the San Francisco Bay. However, because these recommended improvements are substantial, other environmental impacts and the sustainability of each project need to be considered on a broader environmental scale. To this end, potential sustainable elements that could be incorporated into the recommended Master Plan improvements were identified. The elements were categorized by area corresponding to the United Nations Urban Environmental Accords, which the City of Richmond adopted in September 2008. Some of the potential sustainable elements that could be implemented in projects at the WPCP include:

- Electrical demand reduction through installation high efficiency equipment, efficient hydraulic systems, fine bubble aeration systems, and energy monitoring.
- Purchase of green power through the power grid.
- Implementation of a Construction and Demolition Waste Reduction Plan for any future construction projects at the plant.

- Using digester gas as fuel for energy production or for solids drying
- Installation of odor control facilities to improve air quality

RECOMMENDED IMPROVEMENTS

The recommended improvements are grouped in four phases:

- Phase I - Improvements to meet current discharge requirements at current influent flows.
- Phase II - Capacity improvements to accommodate growth.
- Phase III - Improvements to eliminate wet weather blending (if required).
- Phase IV - Improvements to remove ammonia (if required).

Phase I - Reliability Improvements

Approved Projects Currently in Design or Construction

These are projects that were recommended in the Master Plan and have already been approved by the City. The approved projects are as follows:

Project 1.3 - Influent Pump Station Upgrade: This project increases the firm capacity of the pump station by installing larger pumps.

Project 1.15 - Digester and Heating/Mixing System Upgrade: This project rehabilitates and relocates the digester heating and mixing systems. Digester No. 1, which is currently out of service, will be rehabilitated and placed in operation. This will allow Digester No. 2 to be taken out of service for maintenance and grit removal.

Projects Recommended for Immediate Implementation (to be completed in next one to two years)

We recommend that the following projects be implemented as soon as possible. The purpose of these projects is to improve the ability of the Plant to meet discharge requirements in a safe and reliable manner. These projects were selected based on the criticality ranking developed for the Master Plan in June 2008. The following projects are recommended:

Project 1.6 - Convert to Fine Bubble Aeration: This project converts the aeration system from mechanical aerators to fine bubble aeration. The existing mechanical aerators do not provide sufficient oxygen to and/or mixing of the aeration basins. The low oxygen concentrations and poor mixing promote the growth of microorganisms that negatively impact the treatment process. In addition, the mechanical aerators create a mixed liquor aerosol that may be a safety hazard. The proposed fine bubble aeration system would use high efficiency blowers to blow air through diffusers located at the bottom of the aeration

basins. The diffusers distribute air throughout the aeration basins and the bubbles mix the basins as they rise to the top of the basins. It is assumed that the blowers will be located within the existing Chlorine Building located west of the aeration basins. The total cost for this project is estimated at $4,500,000.

Project 1.7 - Convert Existing Equalization (EQ) Basin No. 1 to Third Aeration Basin (AB): A third aeration basin is required to allow the Plant to treat sustained wet weather flows that occur over consecutive days. The existing EQ basin located adjacent to Aeration Basin No. 2 will be converted to Aeration Basin No. 3. The total cost for this project is estimated at $3,000,000.

Project 1.8 - Construct New EQ Basin to Replace the EQ Basin that is Converted to AB No. 3: Because an existing EQ Basin will be converted to an aeration basin, a new EQ basin must be constructed to maintain the two million gallons of wet weather storage that is required by the Plant's discharge permit. The new EQ Basin will be designed and constructed so that it can be converted to a secondary clarifier in the future (if required by potential regulatory changes). The total cost for this project is estimated at $6,000,000.

Project 1.4 - Rehabilitate Existing Grit Basin: The existing grit basin was constructed in 1953. The concrete in the influent wet well is severely corroded and needs to be repaired. The basins do not remove grit effectively due to high wastewater velocities. To remedy these issues, the influent well of the existing grit chambers will be rehabilitated and a new 16-mgd vortex-type grit removal system will be constructed next to the western-most grit chamber. The vortex grit basin would have the capacity to treat peak hour dry weather flows. The total cost for this project is estimated at $1,700,000.

R&R 1 - Priority 1 Rehabilitation and Replacement Projects: This project includes the in-kind replacement of Plant components that have reached the end of their useful life. Replacement of these items can be done all at once or in pieces. Many of the items on the priority 1 list are electrical components that were installed in the 1950s and 1960s. This equipment should be replaced before a failure occurs. The most important equipment in the Priority 1 list, found in Appendix G, is denoted by bold type. If funding is an issue, this equipment in bold should be replaced first. The total cost of replacing all of the Priority 1 equipment is $5,500,000. The cost of replacing just the bold items is $2,000,000.

Projects Recommended for Implementation after Completion of Higher Priority Projects (to be completed within five years)

We recommend that the following projects be implemented after completion of the higher priority projects. Like the projects discussed above, these projects also improve the ability of the Plant to meet discharge requirements in a safe and reliable manner. The projects are listed in order of criticality (highest to lowest).

Project 1.12 - Improve drainage in existing EQ Basins: The bottom of the existing EQ Basins should be grouted to improve drainage. Standing water in the basins creates

breeding grounds for mosquito and allows for the deposition of solids on the basin floors. Many of these solids are discharged to the San Francisco Bay during wet weather events during which blending of primary and secondary effluent is required. The total cost for this project is estimated at $375,000. If one of the EQ Basins is converted to an aeration basin, as recommended in the previous section, the cost of this project would be decreased by approximately 50 percent.

Project 1.1 - Construct Wet Weather Storage Basin Upstream of Plant: A wet weather storage basin, with a preliminary volume of 3 million gallons, should be constructed upstream of the influent pump station to reduce the peak flow of 55 mgd to 40 mgd. The total cost for this project is estimated at $9,000,000.

Project 1.9 - Repair Channel Aeration System and Install Flow Control for the Secondary Clarifiers: This project includes repairing the channel aeration system to maintain suspension of solids and adequate oxygen concentrations in the channel. In addition, flow control weirs will be installed in the effluent channel to improve distribution of flow to the secondary clarifiers. The total cost for this project is estimated at $1,313,000.

Project 1.10A - Grout Corners of Clarifiers 1 and 2: Currently, solids settle in the corners of Clarifiers 1 and 2 where they cannot be collected by the sludge collector mechanism. The solids then nitrify and float to the surface of the clarifiers on top of nitrogen bubbles. The corners of Clarifiers Nos. 1 and 2 should be grouted to prevent this problem. The total cost for this project is estimated at $900,000.

Project 1.10B - New Sludge Collection System: A new sludge collection system for all three clarifiers is required because the draft tube system does not work properly and often clogs with debris/rags. If an additional influent screen is installed, this project may not be necessary because more debris would be removed upstream of the clarifiers. The total cost for this project is estimated at $937,000.

Project 1.11 - Improve Hydraulics of Clarifier 3: This project includes the addition of density current baffles and a new energy dissipating/flocculating feed well. These improvements are necessary because solids carryover issues have impacted Clarifier 3 in the past. This project could be implemented in stages. The total cost for this project is estimated at $375,000.

Project 1.13 - Construct Low Lift Pump Station to Increase Outfall Capacity: A low lift pump station is recommended to increase the hydraulic capacity of the outfall during peak flows and high tides. This will accommodate current peak flows and projected flows from the Richmond Plant and West County Wastewater District (WCWD). The total cost for this project is estimated at $3,375,000.

Project 1.5 - Add Enhanced Coagulation to the Primary Clarifiers: It is recommended that ferric chloride be added to the primary clarifiers during wet weather events to better capture suspended solids. This project includes a chemical storage tank, containment system and chemical feed pumps. The total cost for this project is estimated at $750,000.

Project 1.14 - Sludge Thickening Improvements: This project consists of replacing Dissolved Air Flotation Thickener (DAFT) No. 1 with a gravity belt thickener (GBT). The existing DAFT, which was constructed in 1967, has reached its useful life and should be replaced. The new GBT will be more efficient and consume less power. The total cost for this project is estimated at $1,875,000.

Project 1.16 - Plant Water System: A new automatic strainer system is required for the plant water pumps to prevent damage to pumps that use seal water and to increase pressure throughout the plant water system. The total cost for this project is estimated at $150,000.

Project 1.17 - Construct Odor Control System: An odor control system is recommended to control odors from the influent pump station, grit basin, and primary treatment processes. The total cost for this project is estimated at $3,200,000.

Project 1.2 - Additional Influent Screen: An additional influent screen is recommended to provide a standby for the existing bar screen. This will allow for maintenance of the existing screen and concrete structure, as well as improved screening efficiency. The second screen should have a finer opening to reduce the amount of paper, rags and plastics that reach the primary and secondary treatment systems. Debris that pass through the existing screen accumulates in the anaerobic digester, which reduces the digester capacity. The debris also impacts the performance of the clarifiers by clogging the secondary clarifier sludge collector draft tubes and clogging the primary scum pumps. The total cost for this project is estimated at $4,500,000.

R&R 2 - Priority 2 Rehabilitation and Replacement Projects: This project includes the in-kind replacement of Plant components that have reached the end of their useful life. Priority 1 R&R projects should be completed before Priority 2 projects are implemented. The major Priority 2 components are gates, RAW/WAS piping, WAS pumps, and chemical tanks. The total cost of replacing the Priority 2 equipment is $2,400,000.

R&R 3 - Priority 3 Rehabilitation and Replacement Projects: This project includes the in-kind replacement of Plant components that have reached the end of their useful life. Priority 3 items are the lowest priority R&R projects. The major Priority 3 components are several structures and gates. The total cost of replacing the Priority 3 equipment is $6,200,000.

Sludge Dewatering/Gas Utilization Projects

The City and Veolia have been evaluating sludge dewatering and gas utilization projects in parallel with the Master Plan. The projects below should be implemented after further discussions with the City and Veolia, regarding these projects, take place.

Project 1.18 - Sludge Dewatering Facility: The City has been evaluating options for disposing of the biosolids, including on-site dewatering and trucking to a landfill, or participation in a regional biosolids disposal program. Veolia has prepared preliminary design documents for a dewatering facility at the Richmond plant. For planning purposes, the estimated costs for this project have been included in the CIP. The total cost for this project is estimated at $14,700,000. If the City selects another dewatering alternative, that project cost should be substituted for this cost.

Project 1.19 - Digester Gas Utilization: Currently a portion of the digester gas (methane) is used to fuel boilers to heat the digesters. The remaining gas is flared and released to the atmosphere. The digester gas can be used to fuel a cogeneration facility to produce electricity or to fuel sludge drying equipment to reduce the amount to sludge that must be disposed of in a landfill. The cogeneration project has a lower capital cost but higher operating cost while the sludge drying facility has higher capital costs and lower operating costs. Overall, when evaluated on a present value basis, the economics hinge on tipping fees. If tipping fees remain relatively low ($30 per wet ton), cogeneration is favored. If tipping fees rise ($50 per wet ton), sludge drying is preferred. Because cogeneration is more advantageous in the short term, cogeneration is recommended. However, because a drying facility provides flexibility if biosolids disposal locations and/or regulations change, provisions to allow for the installation of thermal drying in the dewatering facility in the future should be provided. The total cost for this project is estimated at $3,250,000.

Phase II - Capacity Improvements

These improvements are required to accommodate future growth. These projects aren't anticipated to be required until 2035.

Project 2.1 - Additional Aeration Basin: A fourth aeration basin is required to treat buildout flows and loads. The new basin would be constructed by restoring the existing EQ Basin No. 2 to its original function as an aeration basin.

Project 2.2 - Construct new EQ Basin No. 2: A new EQ basin is required to replace the basin converted to Aeration Basin No. 4. A new structure is required to replace the volume lost by restoring EQ Basin No. 2 to Aeration Basin No. 4. The basin would be constructed so that it could be easily converted to a rectangular clarifier in the future. The EQ basins would be used for both diurnal and wet weather equalization.

Phase III - Improvements to Eliminate Primary/Secondary Effluent Blending During Wet Weather (if required)

As discussed previously, if the RWQCB prohibits blending of primary and secondary effluent during wet weather events, the capacity of the secondary process should be expanding to 40 mgd by converting the EQ basins constructed under Phases I and II to rectangular sedimentation basins. In addition, new sludge collection equipment, return activated sludge (RAS) pumps, piping, and valves will be required.

Phase IV - Comply with a Prohibition of Wet Weather Blending and Reduced Ammonia Limits at Buildout Flows and Loads (if required)

This alternative was developed to plan for a possible restriction of ammonia limits in the future. Improvements required for this alternative are not included due to regulatory uncertainty.

CAPITAL IMPROVEMENT PLAN

The recommended CIP encompasses Phases I through III. The improvements associated with Phase IV were not included in the CIP because future ammonia limits are not expected to change for at least several permit renewal cycles, if at all.

Cost Estimates

The cost estimates for the expansion, addition, and/or rehabilitation of WPCP facilities have been prepared for guidance in the evaluation of each alternative. The estimates presented within this Master Plan are considered the "order-of-magnitude" accuracy level. The final project costs will vary from the cost estimates presented in this Master Plan. Table ES.2 summarizes the capital costs for each phase of the Master Plan. These costs include the cost of rehabilitating and/or replacing (R&R) WPCP components in kind after they have reached the end of their useful life.

Table ES.2 Summary of Total Capital Costs for Master Planning Phases(1)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Phase	Capital Costs (Millions of Dollars)
Phase I - Reliability Improvements	$79.0
Phase II - Capacity Improvements	$34.9
Phase III - Improvements to Eliminate Wet Weather Blending	$12.0
Phase IV - Improvements to Remove Ammonia	(not included due to regulatory uncertainties)

Note:

(1) Based on August 2008 dollars; ENRCCI = 9293.

Implementation Schedule

Phase I improvements, which are needed immediately, are planned to occur over the next five years, as funding permits.

As shown in Figure ES.3, Phase II improvements are not required, for growth alone, until approximately 2035. Based on the assumption that primary/secondary effluent blending will be prohibited after two discharge permit renewal cycles, Phase III improvements will be required to be implemented by 2020. Because Phase II improvements are required for Phase III, Phase II improvements are assumed to occur in 2020 as well.

Rehabilitation and replacement (R&R) projects are included in the implementation schedule as lump sums based on their priority. These R&R projects are common to all of the scenarios and are to be considered part of the implementation schedule. These maintenance projects will be required by the WPCP regardless of impacts from future growth or future regulations.

Figure ES.4 presents the design and construction schedule for the phased improvements. This schedule is dependent on future growth and regulations and should be updated at regular intervals. Figure ES.5 shows the projected capital expenditures over the next 30 years.

RECOMMENDED ACTION ITEMS

This section provides a summary of recommended action items that the City and Veolia should pursue after the Master Planning process is complete.

- Once the influent flow meter is installed and the on-going collection system I&I reduction projects are completed, wet weather flow data should be collected and used to calibrate the collection system model. Additional collection system modeling should be performed and the Master Plan should be revised to reflect the updated peak hour wet weather flow ($PHWWF_{10}$).

- Once the new influent sampling station is online (installed in conjunction with the influent flow meter), influent data obtained from this station should be compared to the values contained within this Master Plan, and, if different, incorporated into the Master Plan.

- If WCWD discontinues nitrification, sidestream filtrate treatment may be required to meet the discharge permit limit for ammonia. It is recommended that regular communication with WCWD be continued to provide for advanced notice of changes in operation at WCWD.

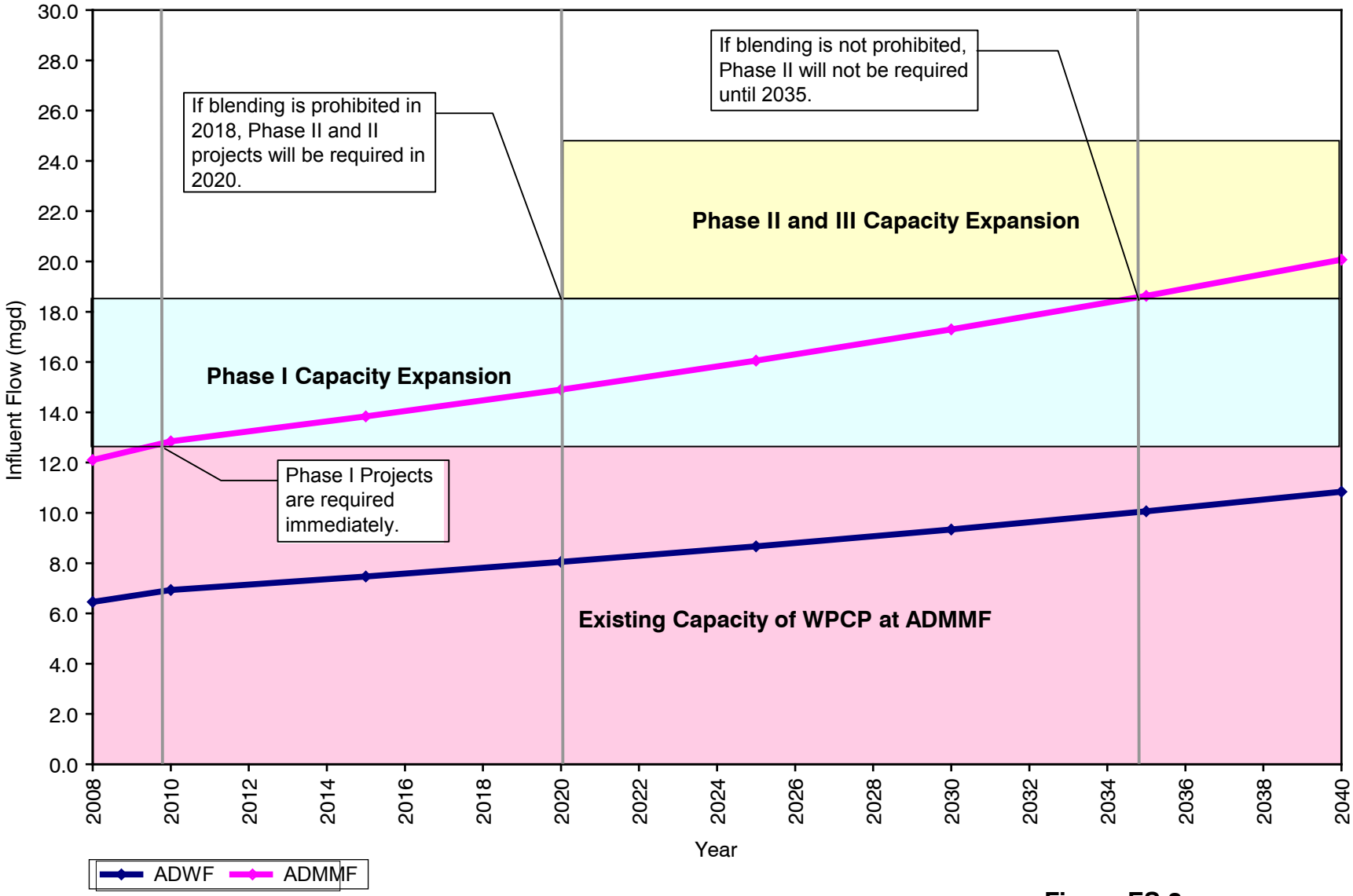

Figure ES.3
CIP IMPLEMENTATION SCHEDULE
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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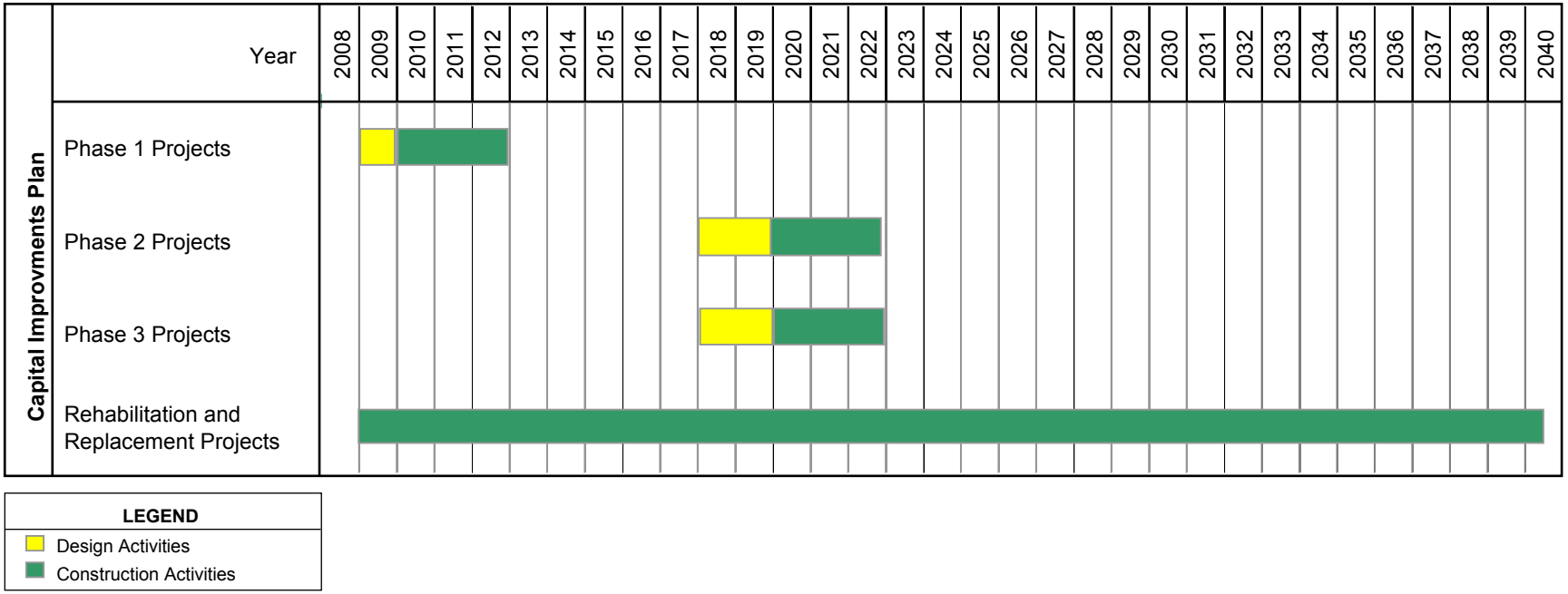

Figure ES.4
DESIGN AND CONSTRUCTION SCHEDULE
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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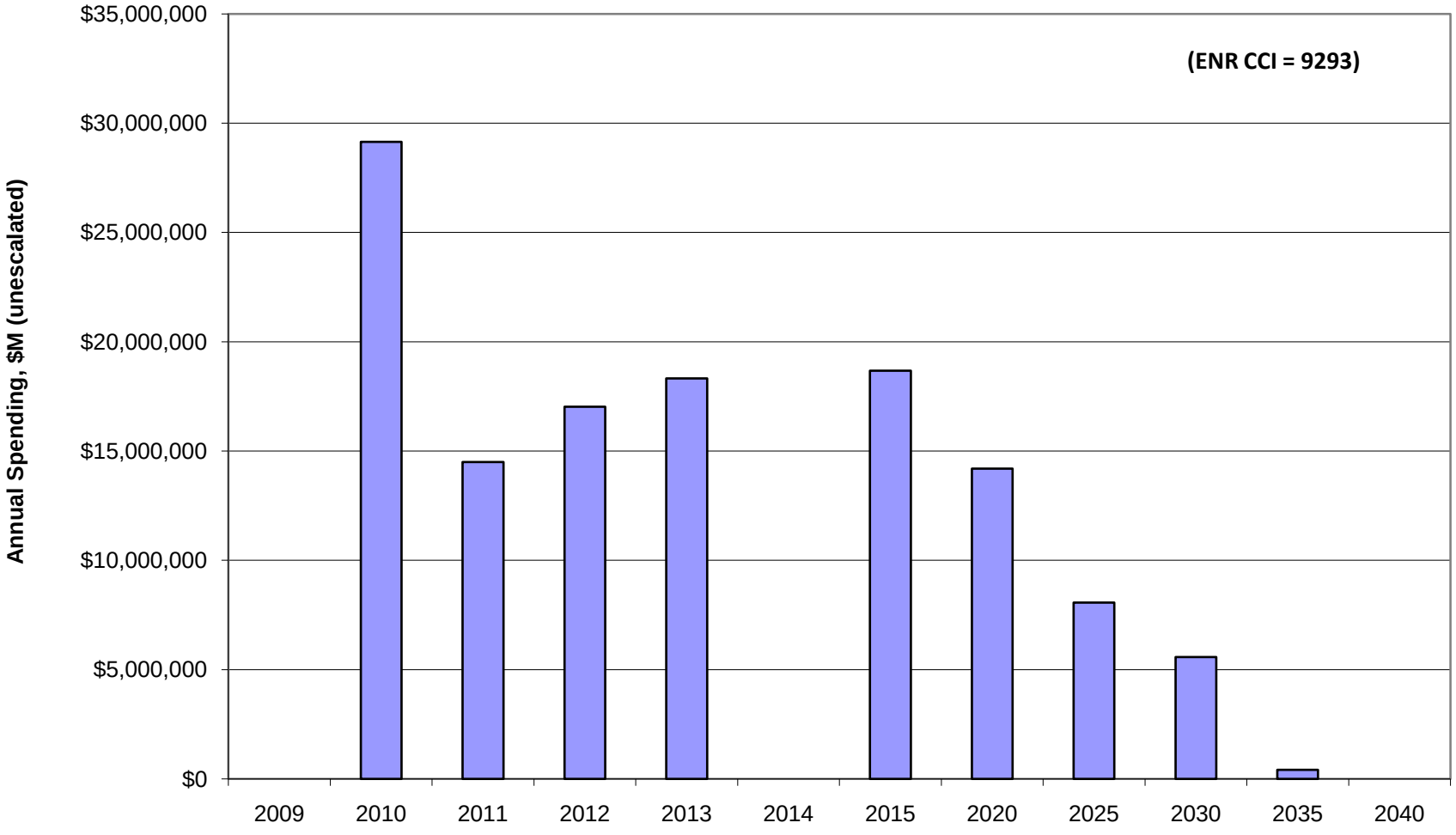

Figure ES.5
CAPITAL IMPROVMENTS PLAN CASH FLOW SUMMARY
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

- The Richmond WPCP effluent should be tested at regular intervals for selenium and other toxic substances upstream to the confluence box where Richmond and WCWD effluent combines.
- In areas of the collection system that the Sewer System Master Plan identified as likely locations of seawater inflows and infiltration, manholes should be sampled and tested for conductivity. If seawater inflows can be reduced or eliminated, production of recycled water at the WPCP may be feasible.
- The Master Plan should be updated every five years to reflect changes in flows, loads and regulations.

Chapter 1

PROJECT BACKGROUND

1.1 PURPOSE AND SCOPE OF PROJECT

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

The existing WPCP has enough hydraulic and conventional treatment capacity for existing dry weather conditions. However, during wet weather events, primary effluent is blended with secondary effluent. New discharge permit requirements, reliability concerns, and population growth are driving RSSD to evaluate the capacity and level of treatment provided by their existing facilities.

The goals of the Wastewater Treatment Master Plan are to:

- Evaluate the existing treatment processes for the capability of reliably meeting existing discharge requirements.
- Evaluate the existing treatment system to meet potential future discharge requirements, such as discontinuing blending during wet weather flows.
- Develop a capital improvement program (CIP) that identifies needs for current improvements and potential improvements in the future.
- Examine and recommend sustainable elements and strategies, which can be incorporated into the proposed CIP projects, that are complementary to the City's environmental initiatives.

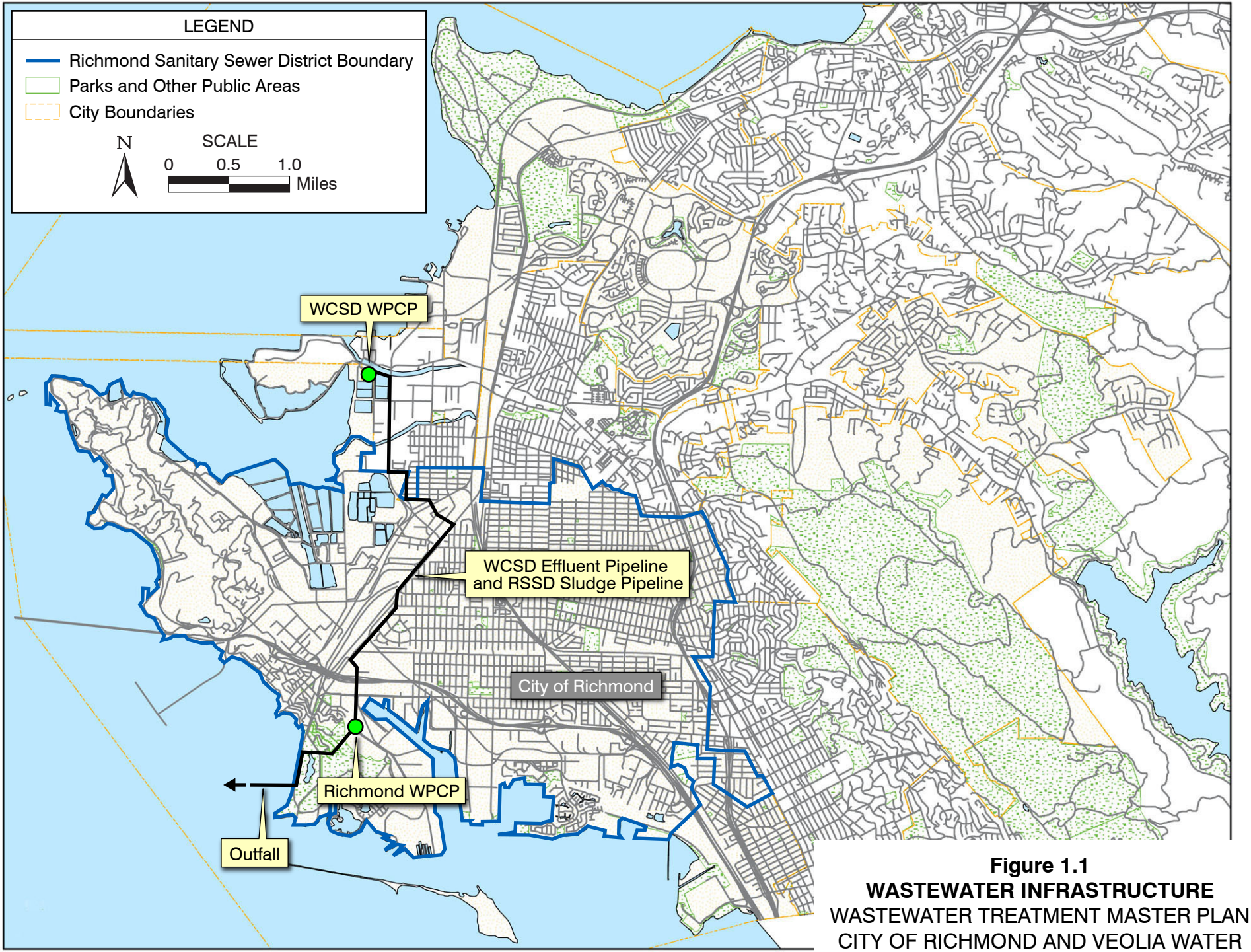

Figure 1.1
WASTEWATER INFRASTRUCTURE
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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1.2 MASTER PLANNING SCOPE

In order to plan ahead and to provide long-range direction for wastewater facility modifications, Veolia and RSSD authorized the preparation of a Wastewater Facilities Master Plan in April 2008. The Master Plan addresses needs through the year 2040, which includes ultimate buildout. The Master Plan will allow Veolia and RSSD to reliably meet existing conventional secondary treatment requirements by proceeding with a cost effective rehabilitation and replacement program.

In addition, the Master Plan looks beyond the existing secondary treatment requirements to future levels of treatment which may include nitrification, nutrient removal, prohibition of wet weather blending, and new discharge limits for toxic substances. As a planning document, the Master Plan is designed to help in establishing a capital improvement plan for the treatment plant. The plan provides facility layouts, an implementation schedule, and planning level costs for each recommended project.

1.3 REPORT ORGANIZATION

The Master Plan is organized into nine sections, followed by appendices that provide more detailed information, and supporting documentation of the results and recommendations of this study. The nine sections are described below:

Executive Summary - Summarizes the capacity analysis, the recommended master plan program, and the capital improvements program.

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

Chapter 2 - Existing System Description: Provides an analysis of the historical treatment plan process performance, including an analysis of each major unit process. Establishes a capacity rating for each major unit process.

Chapter 3 - Flow and Load Projections: Presents flow and load projections through the year 2040 and provides an analysis and recommendation on the design wet weather flow.

Chapter 4 - Regulatory Requirements: Summarizes the impacts of state and federal regulations on the treatment plant. Also presents possible future regulatory scenarios.

Chapter 5 - Condition Assessment and Criticality Evaluation: Describes the condition of the treatment plant and presents an evaluation of the relative criticality of each unit process.

Chapter 6 - Master Plan Alternatives: Based on the information developed in the previous tasks, this section develops a set of alternatives to meet existing and anticipated treatment requirements.

Chapter 7 - Sustainable Design Elements: Presents sustainable strategies and links recommended projects to the United Nations Urban Environmental Accords and other environmental initiatives adopted by the City.

Chapter 8 - Recommended Master Plan Program: Recommends a short and long term implementation plan based on the analysis of alternative scenarios. Compiles a list of capital improvement projects (CIP) and includes a cost loaded schedule for use by the City and Veolia Water in preparation of an updated financial plan.

1.4 ACKNOWLEGEMENTS

Carollo would like to acknowledge the valuable contributions made by Veolia Water and the City to the development of the Wastewater Treatment Master Plan. Specifically, Carollo would like to recognize the following personnel (in alphabetical order) for their efforts.

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Carollo Condition Assessment Team
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Paul Kwong (Instrumentation)
Fred Yap (Electrical)

1.5 GLOSSARY 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_5	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

1.6 REFERENCE MATERIALS

1. Boyle Engineering, City of Richmond Sewer System Master Plan, November 2006.
2. Herwit Engineering, City of Richmond Dewatering Project Design Evaluation, March 2007.
3. Herwit Engineering, Cogeneration Analysis, June 2008
4. Swinerton Management and Consulting, No Feasible Alternatives Analysis, September 2007.
5. Swinerton Management and Consulting, Capital Improvements Projects, March 2007.
6. Tetra Tech, Summary of Richmond Cogeneration Projects, January 2009.
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8. Webster Environmental Associates, Odor Evaluation Report, September 2007.

Chapter 2

EXISTING WASTEWATER TREATMENT FACILITIES AND PERFORMANCE

2.1 DESCRIPTION OF EXISTING FACILITIES

The Richmond Sanitary Sewer District No. 1 (RSSD) Water Pollution Control Plant (WPCP) is a secondary treatment facility. The NPDES permit states that the facility has a secondary treatment capacity of 16.0 million gallons per day (mgd) for average day dry weather flow and 20 mgd for peak wet weather flow (40 mgd for primary treatment).

Unit processes include screening, raw wastewater pumping, primary clarification, secondary treatment with activated sludge, disinfection, dissolved air flotation sludge thickening, and anaerobic sludge digestion. The treated effluent from the plant is combined with effluent from the West County Wastewater District (WCWD). The combined effluent is discharged through a deep water outfall, originating at the WPCP site, into the San Francisco Bay. Digested sludge from the WPCP is currently pumped to sludge lagoons and drying beds owned and operated by WCWD.

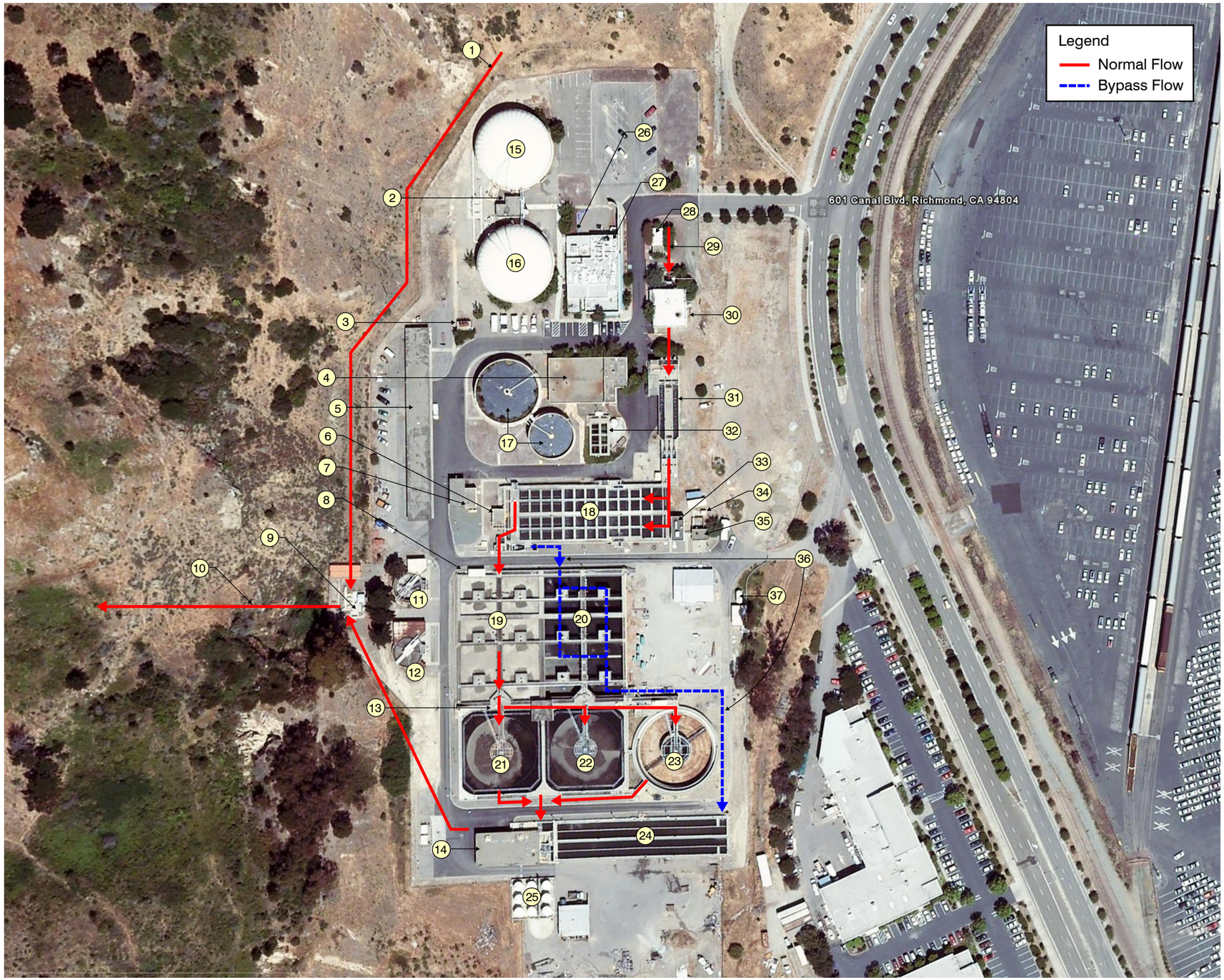
The layout of the existing WPCP treatment facilities is shown in Figure 2.1. A process schematic is shown in Figure 2.2. A brief description of the liquid and solids treatment processes employed at the WPCP is presented below.

2.1.1 Liquid Treatment Processes

Flows from the RSSD collection system are conveyed to the WPCP headworks via a 66-inch interceptor. Leachate from the West Contra Costa Sanitary Landfill (WCCSL) and site drainage from the WPCP is combined with the RSSD wastewater at the headworks. The combined flow enters the headworks through a mechanical bar screen and then into one of two wet wells. Four influent pumps lift the influent to one of three parallel grit removal chambers. Flow from the grit chambers travels by gravity throughout the rest of the plant and outfall.

Following grit removal, the wastewater flows to two 210 feet by 38 feet rectangular primary clarifiers. Primary clarifier effluent flows by gravity to two mechanically aerated aeration basins. The aeration basins are following by two square secondary clarifiers and one circular clarifier. Following clarification, the flow is chlorinated in a chlorine contact basin. 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 to the WPCP exceeds the capacity of the secondary treatment process. Under these conditions, primary effluent is bypassed to two equalization basins with a total volume of 2 million gallons (MG). If the equalization basins become full, the stored primary effluent flows over a fixed weir to the chlorine contact basin for disinfection. After the wet weather event, the equalization basins are drained to the headworks of the plant.



1. Flow from WCCSD
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) Basins
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 from Sewer System
30. Headworks/Influent Pump Station
31. Pretreatment Structure
32. Abandoned Elutriation Tanks
33. Standby Generator
34. PG&E Transformer
35. Switchgear
36. Wet Weather Bypass
37. 1W Pump Station

N

Figure 2.1
WPCP LAYOUT
AND FLOW SCHEMATIC
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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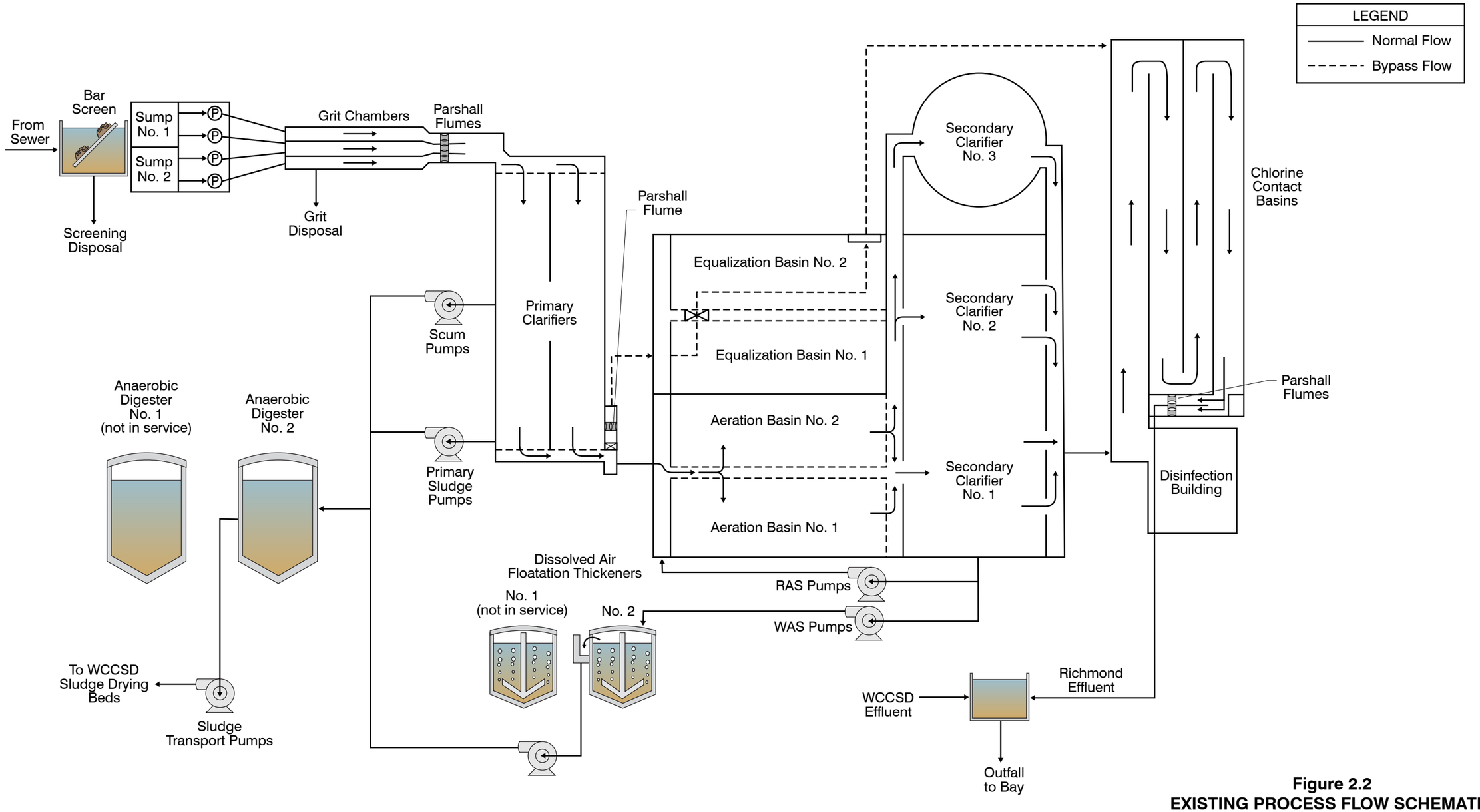

Figure 2.2
EXISTING PROCESS FLOW SCHEMATIC
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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2.1.2 Solids Treatment Processes

Sludge and scum from the primary clarifiers is pumped directly to anaerobic Digester No. 2. Digester No. 1 is out of service due to mechanical and electrical deficiencies. Waste activated sludge (WAS) is sent to dissolved air floatation thickener (DAFT) No. 2 (DAFT No. 1 is out of service). The thickened WAS (TWAS) is combined with the primary sludge and scum and fed to the digester. The digested sludge is pumped to sludge drying beds at WCWD where it is solar dried. After solar stabilization, the dried sludge is transported to the WCCSL for ultimate disposal.

2.2 HISTORICAL WASTEWATER FLOWS

The purpose of this section is to examine existing and historical wastewater flows and characteristics to be used to project future flows and loadings. The characteristics examined include five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and ammonia-nitrogen (NH_3-N).

Flows and loadings are defined in Table 2.1.

Table 2.1 Wastewater Flow and Loading Definitions
Richmond Wastewater Treatment Master 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.	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 have to occur in the same month	To size certain wastewater treatment facilities to meet 30-day NPDES permit requirements
$PHWWF_{10}$	**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

2.2.1 Recorded Wastewater Flows

The recorded average monthly effluent flows at the WPCP for the five-year period between January 2003 and May 2008 are plotted on Figure 2.3 and summarized in Table 2.2. The data were acquired from the WPCP supervisory control and data acquisition (SCADA) system. Influent flow data was not available in the summer of 2008, as the WPCP did not have an influent flow meter. The City and Veolia installed an influent flow meter upstream of the headworks in the fall of 2008. The influent flow meter was required to comply with a cease and desist order from the Regional Water Quality Control Board (RWQCB).

Table 2.2 Recorded Average Daily Effluent Flows (mgd)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	Year					
Month	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
January	10.39	12.32	12.67	11.69	6.80	13.11
February	8.63	11.99	11.09	8.64	10.19	10.49
March	8.07	8.2	11.35	14.21	7.35	6.87
April	8.79	6.77	8.8	13.15	6.71	6.2
May	8.25	6.63	8.25	7.26	6.51	6.21
June	7.27	6.53	7.00	7.00	6.33	
July	6.8	6.67	6.66	6.86	6.46	
August	6.87	6.67	6.48	6.73	6.36	
September	6.79	6.61	6.27	6.53	6.19	
October	6.56	6.83	6.09	6.52	6.54	
November	6.31	6.87	6.33	6.99	6.2	
December	11.91	11.79	14.00	8.67	7.81	
Yearly Average (ADAF)	**8.05**	**8.16**	**8.75**	**8.69**	**6.95**	

The influent flows should be similar to the effluent flows, but the influent flows will have greater peaks than the effluent flows because the peaks are dampened by storage inherent to each treatment process and the equalization basins. Effluent flow values were used to project influent wastewater flows and loadings to the plant since influent flow measurements were not available.

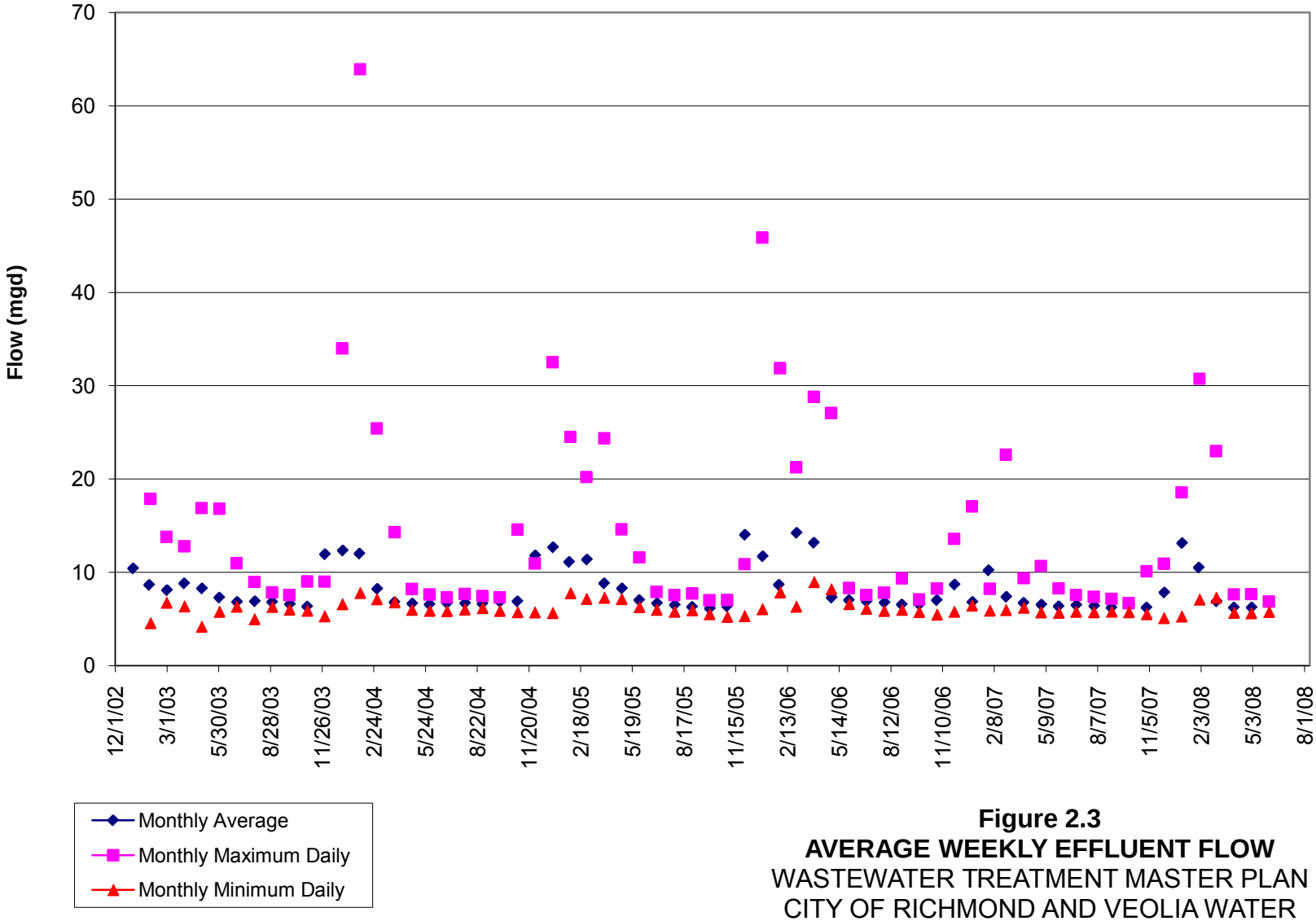

Figure 2.3
AVERAGE WEEKLY EFFLUENT FLOW
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

2.2.2 Average Day Dry Weather Flow and Peak Hour Wet Weather Flow

Historical average day dry weather flows (ADWF) and average day maximum month flows (ADMMF) are shown in Figure 2.4. The WPCP design flows, shown in Figure 2.4, are based on the original design criteria values selected during the design of the WPCP and subsequent upgrades.

The peak hour wet weather flow (PHWWF) occurs during wet weather events. As can be seen from the graph, the wet weather flows often exceed the primary capacity of the WPCP. Note that the SCADA data indicated that during several wet weather events, the SCADA system recorded flows in excess of 55 mgd. It is believed that flowrates in excess of 55 mgd are false readings caused the water level rising above the parshall flumes at the effluent end of the chlorine contact basins. This high water level occurs when high tides coincide with wet weather effluent flows.

The maximum capacity of the existing trunk sewers is unknown. The Collection System Master Plan (Boyle, 2006) concluded that peak wet weather flow during a 5-year, 24-hour storm was 53.3 mgd. A large portion of the peak flow (46.0 mgd) is caused by infiltration and inflow (I&I). The City of Richmond (City) and Veolia are currently working to improve the collection system to reduce I&I. Included in these efforts is the City's $1,000,000 grant to fund a Private Lateral Replacement Program. However, due to the complexity of the sources of I&I flows, it is not anticipated that these efforts will completely eliminate the I&I problem. In Chapter 6, a table is presented that details how reductions in I&I may reduce the need for improvements at the WPCP.

In addition, the RWQCB may require the collection system and treatment plant to have the capacity to convey and treat a 10-year, 24-hour wet weather event. Therefore, for the purpose of this Master Plan, a design current and future wet weather capacity of 55 mgd was adopted. This flowrate will be used to evaluate WPCP process units and plan for additional wet weather facilities. Once the influent flow meter is installed and additional collection system modeling is completed, the Master Plan should be revised to reflect the revised peak hour wet weather flow ($PHWWF_{10}$). More information on wet weather flow rates is presented in Chapter 3.

2.2.3 Average Daily Maximum Month Flows

Table 2.3 summarizes the average daily and monthly flows as well as monthly peak hour flows for the period January 2003 through May 2008. Ratios of ADAL, ADMMF, and PHWWF to the ADWF were determined for the analysis period and are presented in Table 2.4. The highest ADMMF to ADWF ratio during this period is 2.16, which occurred in 2006. The second highest ratio is 2.03, which occurred in 2005, and the average for the study period was 1.85. As discussed previously, the PHWWF values were frequently greater than 40 mgd.

Figure 2.4
DESIGN FLOWS VS ACTUAL FLOWS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Table 2.3 Recorded Wastewater Annual Average Flows (mgd) Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water						
Year	**ADAF**	**ADWF**	**ADWF Months**	**PHWWF[2]**	**ADMMF**	**ADMMF Month**
2003	8.1	6.6	Sep, Oct, Nov	47.5	10.4	Dec
2004	8.2	6.7	Jul, Aug, Sep	40.0	12.3	Jan
2005	8.7	6.2	Sep, Oct, Nov	38.3	12.7	Dec
2006	8.7	6.6	Aug, Sep, Oct	40.3	14.2	Jan
2007	7.0	6.3	Aug, Sept, Nov	33.3	10.2	Feb
2008	--	--	--	42.1	13.1	Jan
Average[1]	8.1	6.5	--	40.2	12.1	--

Notes:
(1) 2008 data is incomplete.
(2) Flow data over 55 mgd is not counted in this dataset.

Table 2.4 Wastewater Annual Flow Ratios Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water							
	Year						
Flow Ratio	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**Average**
ADAF to ADWF	1.23	1.23	1.40	1.32	1.11	--	1.26
ADMMF to ADWF	1.59	1.85	2.03	2.16	1.63	--	1.85
PHWWF to ADWF	7.25	6.02	6.14	2.16	5.33	--	5.38

2.2.4 Diurnal and Daily Flow Variations

In order to determine the typical flow variations that occur on both a diurnal and daily basis, bi-hourly data from the effluent WPCP flow meters were reviewed for the period from January 2003 to May 2008. The average hourly effluent wastewater flows for the period are shown in Figure 2.5. The ratio of average hourly flows to total average flow over the analysis period is shown in Figure 2.6. Peak hour flows occurred at about noon and again at about 10:00 pm. There appears to be a sustained peak daily flow typically extending from approximately 10:00 am to midnight. Based on this analysis, a daily peak hour flow ratio of 1.3, and a daily minimum flow ratio of 0.5 will be used to project future diurnal flow of 1.3, and a daily minimum flow ratio of 0.5 will be used to project future diurnal flow variations. Table 2.5 summarizes these flow ratios.

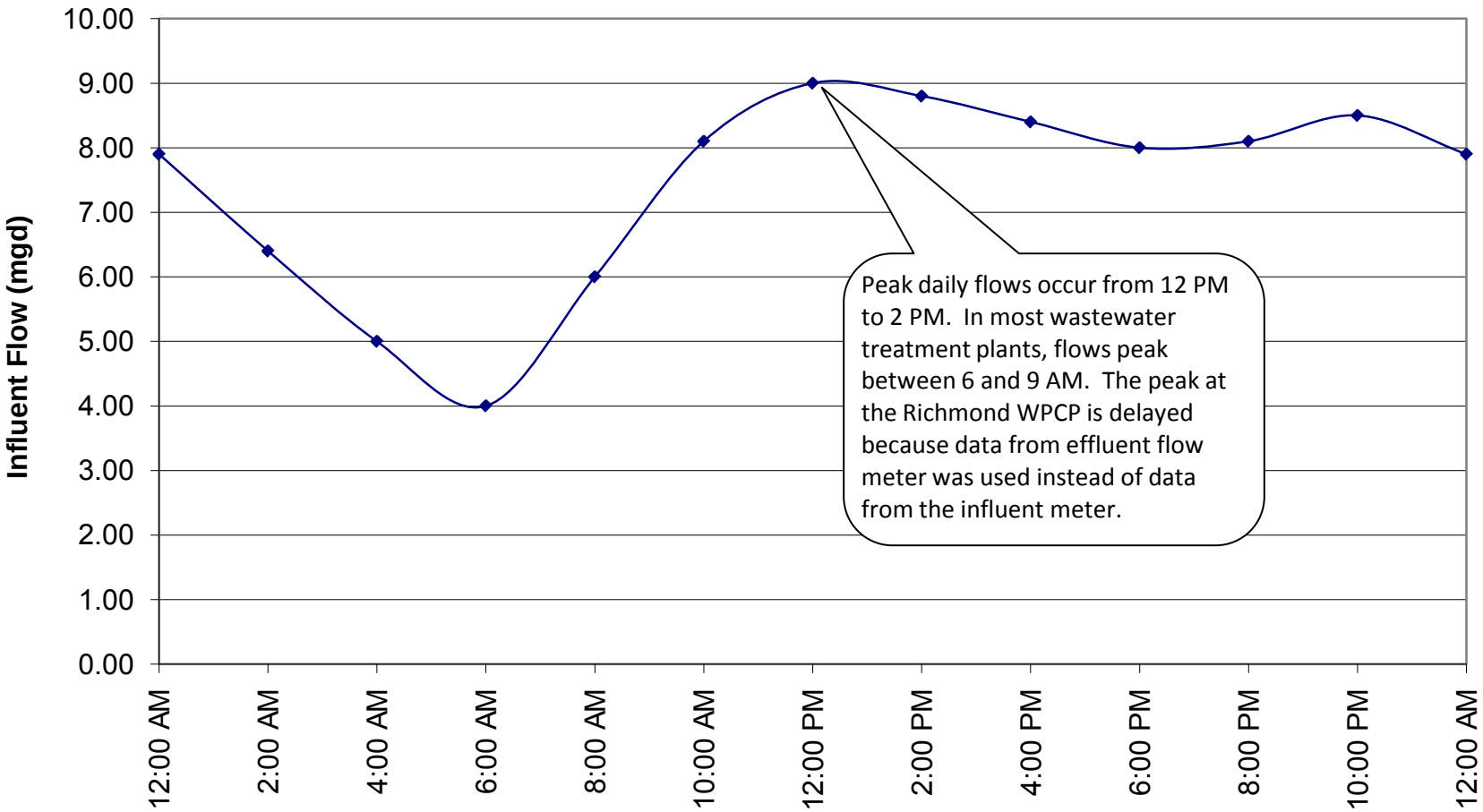

Figure 2.5
DIURNAL CURVE
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

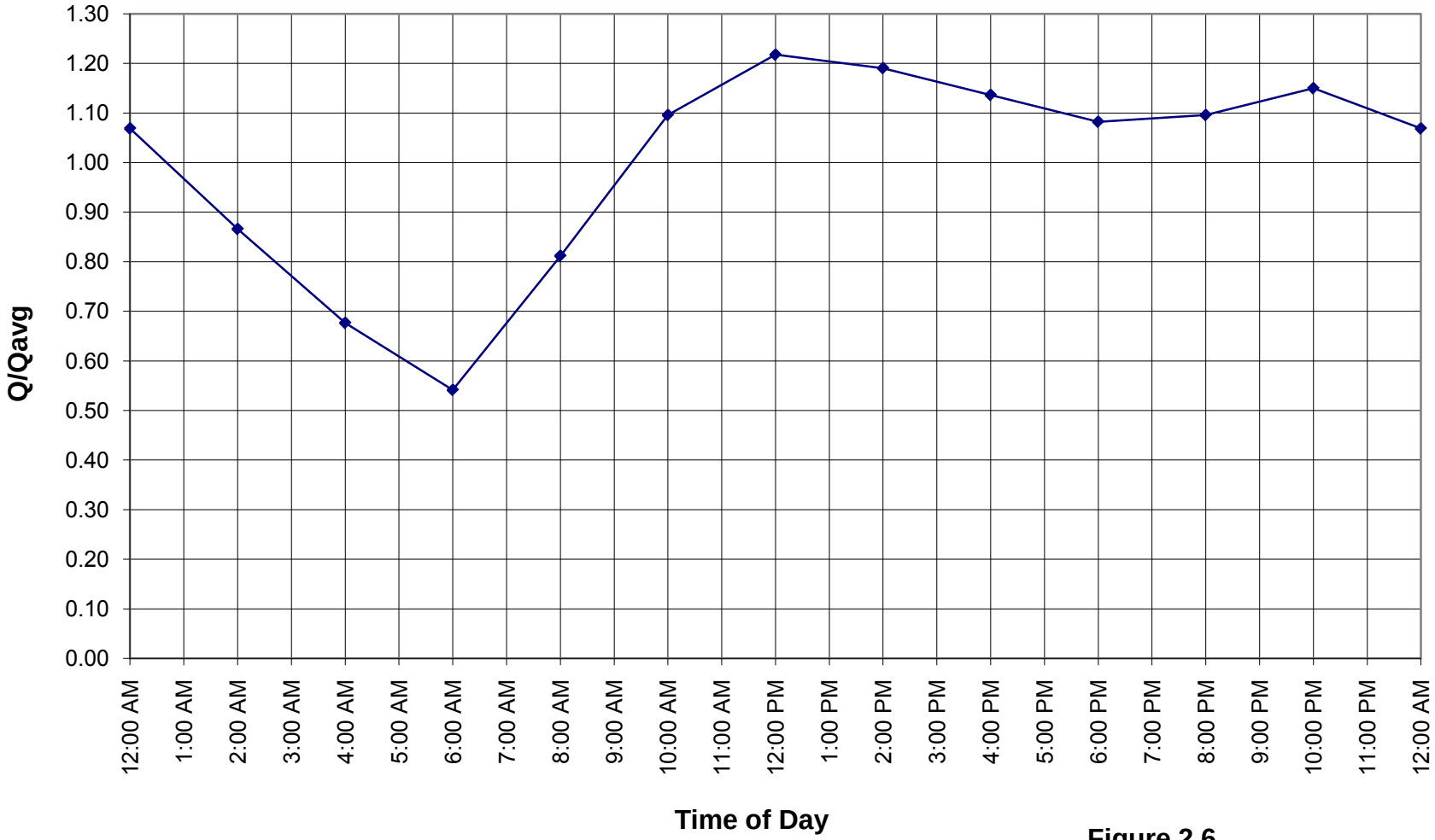

Figure 2.6
DIURNAL FLOW RATIOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Table 2.5 Peak Hour and Minimum Hour Flow Ratios Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water[(1)]	
Average Daily Flow, mgd	7.39
Average Peak Hour Flow (noon), mgd	9.00
Average Peak Hour Flow Ratio	1.22
Average Minimum Hour Flow (6 am)	4.00
Average Minimum Hour Flow Ratio	0.54

Note:
(1) Based on plant flow information from January 2003 through May 2008.

2.3 WASTEWATER LOADINGS

Recorded wastewater characteristics were evaluated for the period between January 2003 and May 2008. The conventional wastewater characteristics examined include BOD_5, TSS, and conductivity (a measure of salinity).

2.3.1 Influent Concentrations

Raw wastewater is sampled at the influent pump station. This location is downstream of where in-plant recycle streams are returned to the headworks. Therefore the influent sample includes not only influent but also recycle flow from the WPCP. Depending on the recycle flow loadings, this operational practice has the potential to impact significant BOD_5, TSS, and ammonia loadings in the influent samples. The monthly average influent BOD_5 and TSS concentrations for 2003 to 2008 are shown in Figures 2.7 and 2.8, respectively. Conductivity levels over time are shown in Figure 2.9.

The graphs show a large variance in the influent BOD_5 and TSS concentrations starting in early 2005. Based on discussions with operations staff, it is believed that the cause of the variance is due to the practice of recycling overflow from the anaerobic digester to the headworks of the WPCP. The plant sewer and the overflow from the dissolved air floatation thickeners is also returned to the headworks, although their impact to the influent sample is likely less significant. As of May 2008, the practice of recycling the digester overflow was discontinued. Once the new influent sampling station is online (installed in conjunction with the influent flow meter), influent data obtained from this station should be incorporated into the Master Plan.

The five-year average influent BOD_5 concentration was 251 milligrams per liter (mg/L). The yearly average influent BOD_5 concentration was 146 mg/L in 2003, increasing to 269 mg/L in 2008. Monthly average concentrations varied from a low of 94 mg/L in 2003 to a high of 480 mg/L in 2006. The increase in BOD_5 concentration may be partially attributed to the practice of recycling anaerobic digester supernatant to the plant headworks. This practice was discontinued in May 2008.

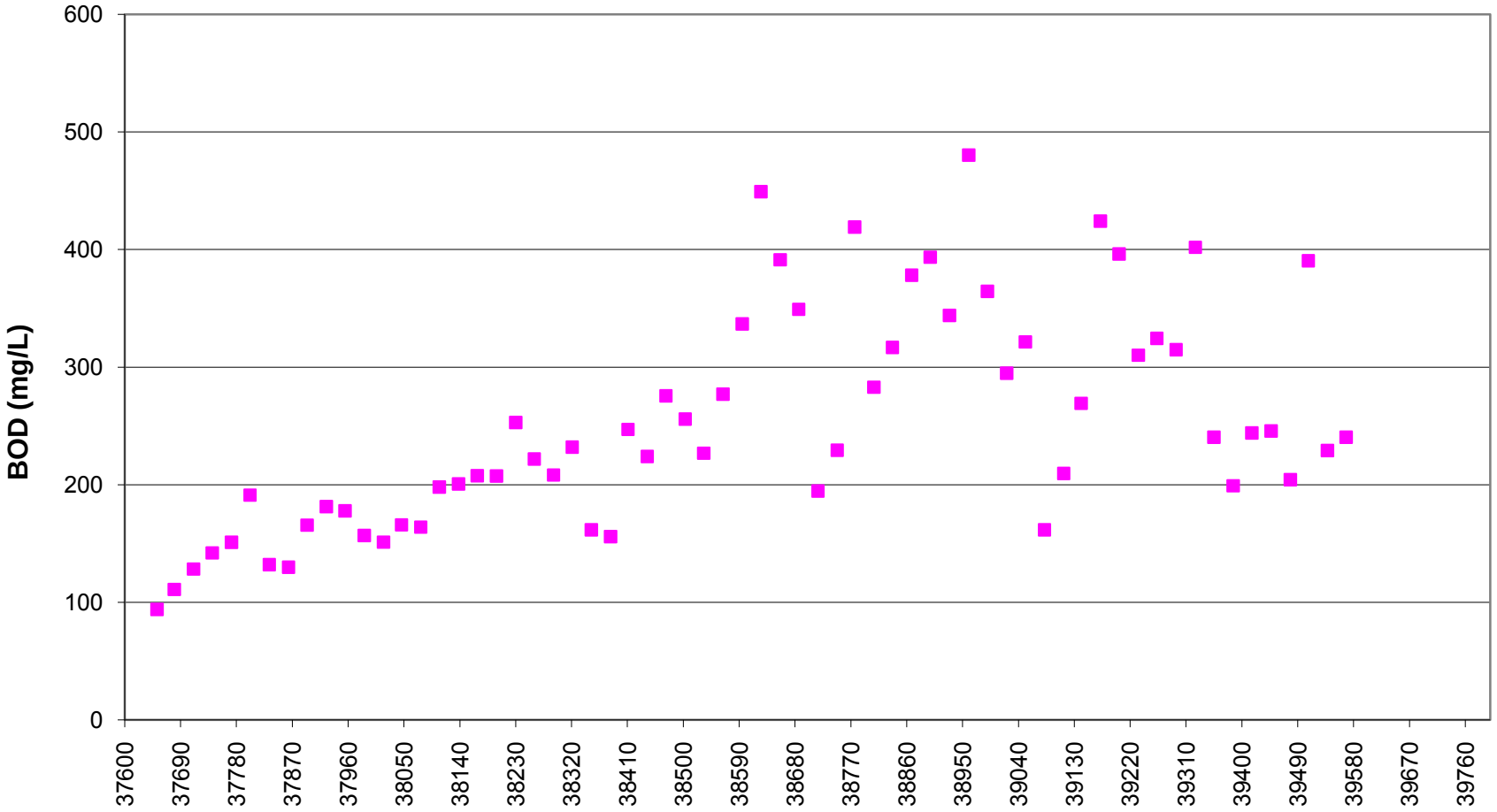

Figure 2.7
INFLUENT BOD_5 CONCENTRATIONS (MONTHLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

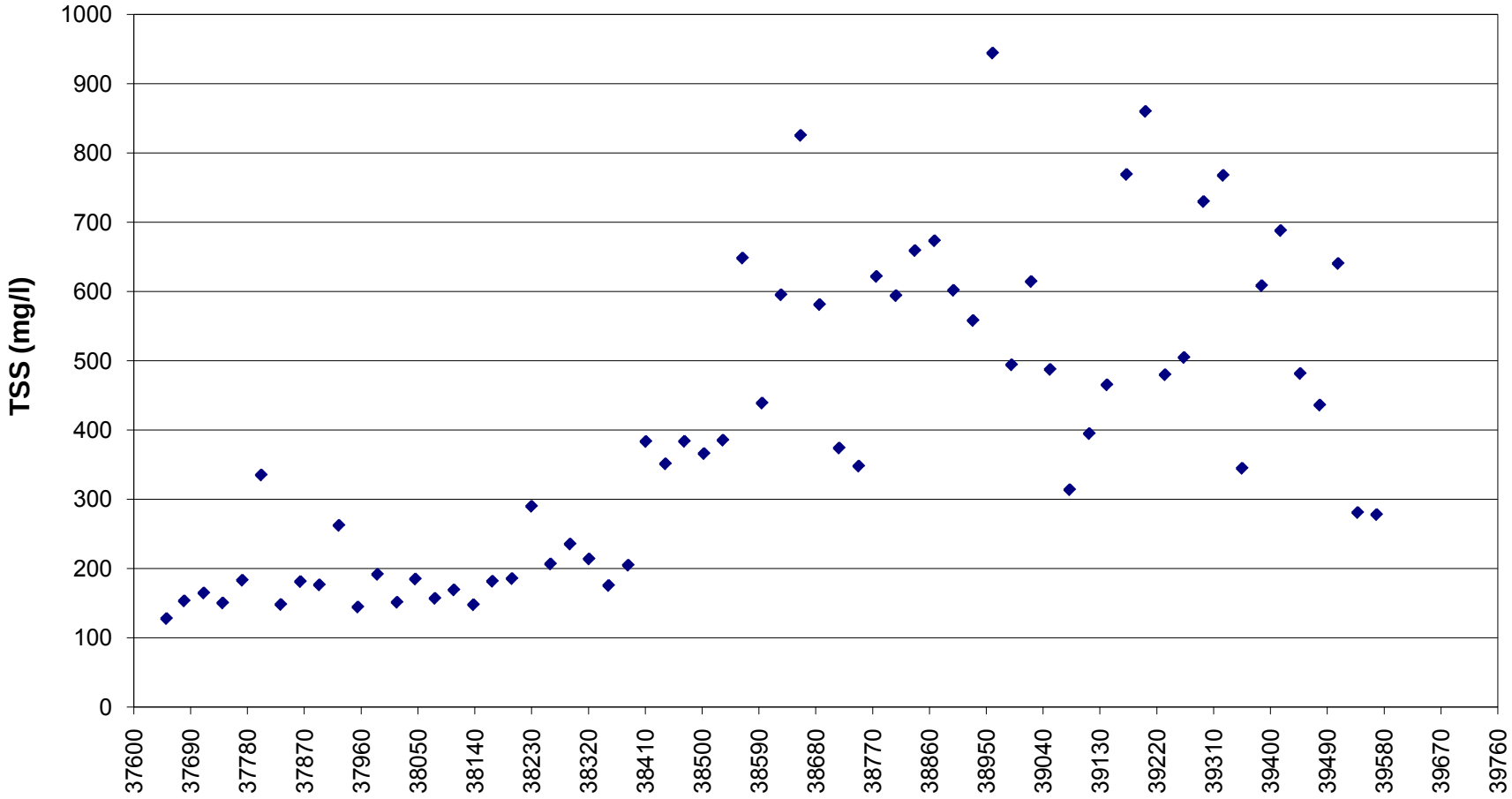

Figure 2.8
INFLUENT TSS CONCENTRATIONS (MONTHLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

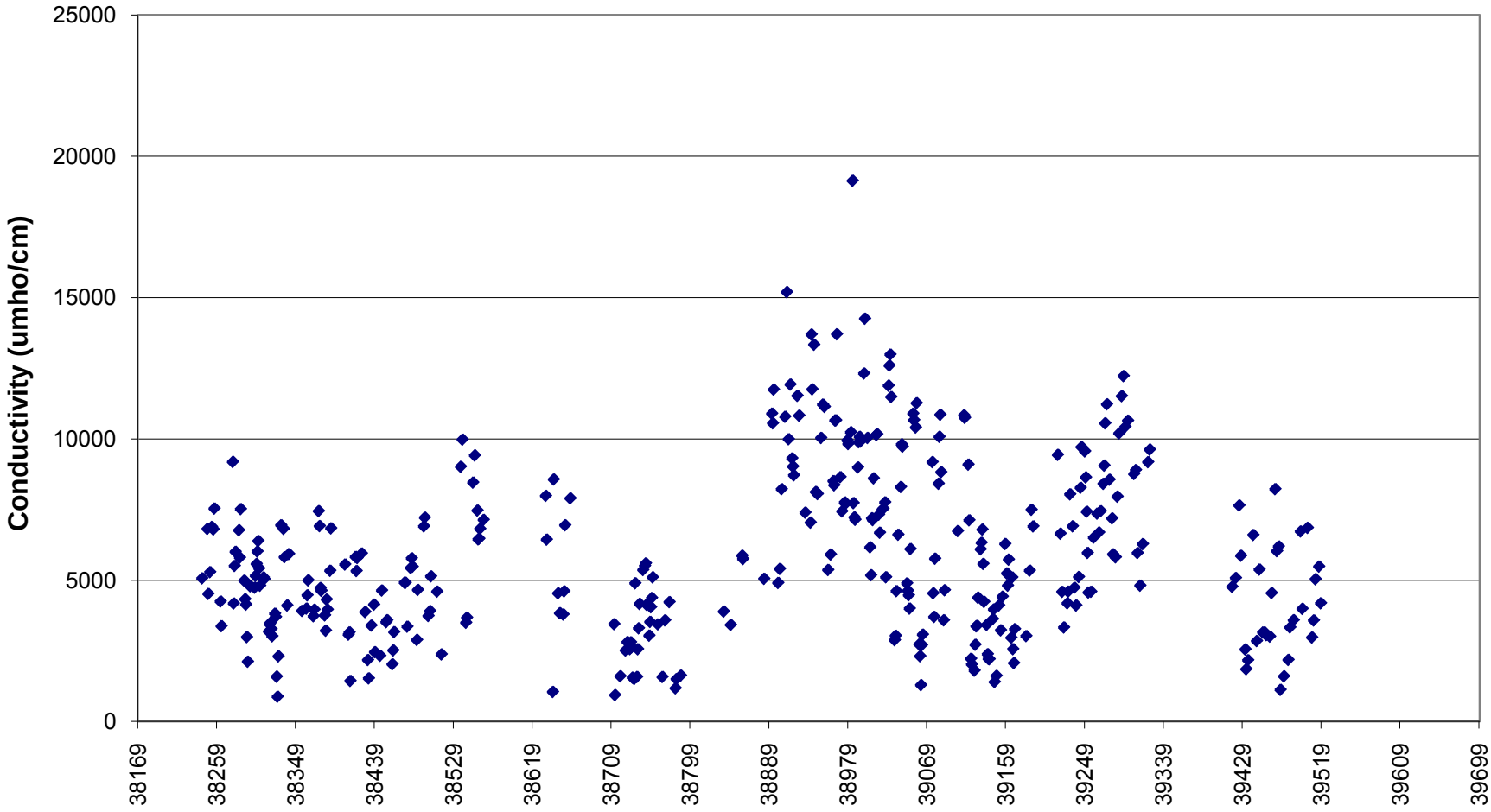

Figure 2.9
INFLUENT CONDUCTIVITY (WEEKLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

The yearly average concentration of influent TSS increased from 183 mg/L in 2003 to 410 mg/L in 2008. Monthly average concentrations varied from a low of 127 mg/L in 2003 to a high of 944 mg/L in 2006. As stated previously, the increase in TSS concentration may have been partially caused by digester supernatant that was recycled to the headworks.

The conductivity of the influent is also much higher than typical domestic wastewaters. For municipalities that use surface water for potable water supply, wastewaters typically have a conductivity of 500 microsiemens per centimeter (umho/cm). The WPCP influent has an average conductivity of 5,900 umho/cm. This indicates that there could be a large quantity of seawater from the San Francisco Bay infiltrating into the collection system. A mass balance shows that seawater may account for as much as 10 percent of the total influent.

The recorded annual average, dry weather, maximum month and maximum day BOD_5 and TSS loadings are shown in Tables 2.6 and 2.7. These loads include the plant recycle load; however, the plant recycle load is not considered a major factor in total plant loadings.

Table 2.6 Recorded Influent BOD_5 Loadings
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Year	Average Day Annual Concentration (mg/L)	Average Day Annual Load (lb/day)	Average Day Dry Weather (lb/day)		Average Day Maximum Month (lb/day)		Maximum Day (lb/day)	
			Months	Load	Month	Load	Date	Load
2003	146	9,677	Sep, Oct, Nov	9,444	Dec	14,502	May	36,457
2004	197	12,936	Jul, Aug, Sep	12,643	Feb	19,731	Feb	60,657
2005	276	19,204	Sep, Oct, Nov	20,540	Dec	23,099	Dec	51,274
2006	331	24,296	Aug, Sep, Oct	21,255	Mar	36,170	Mar	82,176
2007	297	17,120	Aug, Sept, Nov	15,393	Mar	25,672	Feb	42,934
2008	269	20,180	--	--	Feb	32,798	Feb	72,239

The recorded monthly average BOD_5 and TSS loadings are plotted in Figures 2.10 and 2.11. The average day annual, average day dry weather, average day maximum month, and maximum day BOD_5 and TSS loadings are summarized in Tables 2.6 and 2.7.

2.3.2 Industrial Flows and Loads

In 2005, the WPCP began receiving leachate from the WCSSL. The WPCP receives an average of 18,300 gallons per day (gpd) of leachate every other day. WPCP staff stated that the leachate has the following characteristics:

- BOD_5: 50 to 100 milligrams per liter (mg/L).
- TSS: 50 to 100 mg/L.

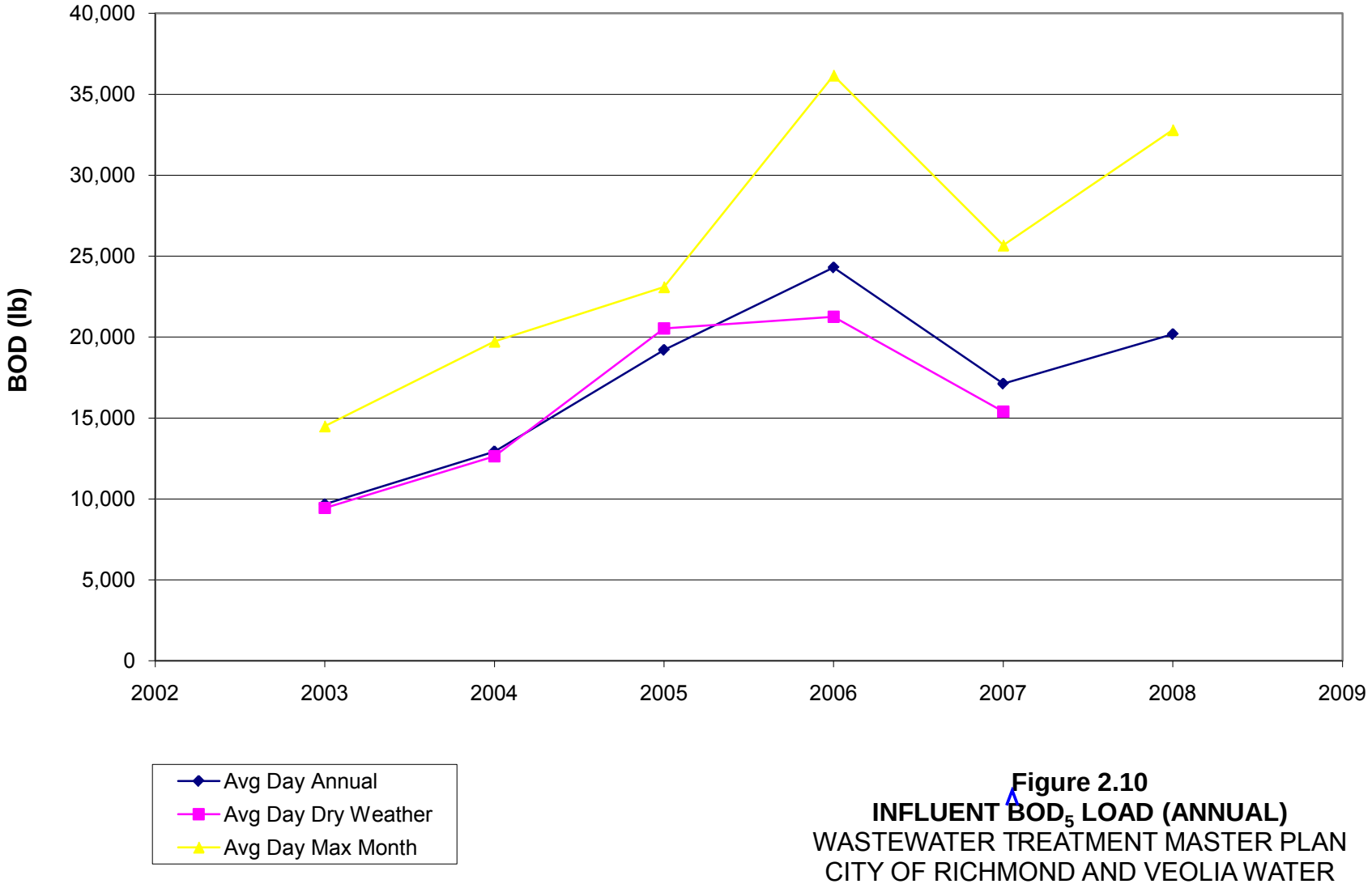

Figure 2.10
INFLUENT BOD_5 LOAD (ANNUAL)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Figure 2.11
INFLUENT TSS LOAD (ANNUAL)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Table 2.7 Recorded Influent TSS Loadings Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water								
	Average Day Annual Concentration	Average Day Annual Load	Average Day Dry Weather (lb/day)		Average Day Maximum Month		Maximum Day	
Year	(mg/L)	(lb/day)	Months	Load	Month	Load	Date	Load
2003	183	12,445	Sep, Oct, Nov	10,540	Jun	20,564	Jun	106,067
2004	192	12,623	Jul, Aug, Sep	12,639	Feb	24,777	Feb	120,041
2005	458	30,558	Sep, Oct, Nov	34,380	Dec	43,427	Dec	151,976
2006	582	41,763	Aug, Sep, Oct	37,579	Mar	70,867	May	201,271
2007	590	34,089	Aug, Sept, Nov	31,829	Apr	50,343	Apr	209,317
2008	410	32,593	--	--	Feb	53,039	Jan	241,168

- Chlorides: 5,000 to 10,000 mg/L.
- Total Dissolved Solids (TDS): 5,000 to 15,000 mg/L.
- Ammonia: 300 to 500 mg/L as N.

Based on plant process performance, the high chlorides and TDS do not appear to be detrimental to the wastewater treatment. The ammonia load from leachate accounts for 3 to 5 percent of the total ammonia in the plant influent.

The City implemented an Industrial Pretreatment Program (IPP) in 1979 to reduce industrial pollution loadings on wastewater treatment plant. The program monitors industrial wastewater discharged into the City's sewer collection system, and regulates approximately 200 permits to wastewater dischargers in the sewer district. Data for industrial loadings included BOD_5 and TSS, but no flows. More analysis on industrial flows and loads should be incorporated into the Master Plan when flow data are available.

2.4 EXISTING TREATMENT PLANT PERFORMANCE

The purpose of this section is to evaluate the performance of the treatment processes. This process performance evaluation will be utilized to establish sizing criteria for use in planning future treatment facility needs.

2.4.1 Current Discharge Requirements

Table 2.8 presents conventional effluent requirements of the National Pollutant Discharge Elimination System (NPDES) discharge permit that was adopted in January 2008 (NPDES Permit No. CA0038539). Table 2.9 presents the NPDES effluent limitations for toxic substances. A copy of the entire NPDES permit is included in Appendix A.

Table 2.8 NPDES Permit Requirements for Richmond Pollution Control Plant[1] Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water						
Constituent	**Units**	**Monthly Average**	**Weekly Average**	**Daily Maximum**	**Instantaneous Minimum**	**Instantaneous Maximum**
BOD_5	mg/L	30	45	--	--	--
Percent Removal of BOD_5	%	85	--	--	--	--
TSS	mg/L	30	45	--	--	--
Percent Removal of TSS	%	85	--	--	--	--
Total Chlorine Residual	mg/L	--	--	--	--	0.0
Total Coliforms	MPN/100 mL	--	--	240[2]	--	10,000[3]
Oil and Grease	mg/L	10	--	20	--	--
pH	pH Units	--	--	--	6.0	9.0

Notes:

(1) Adopted April 2008 for West County Agency, governing the discharge of combined effluent from RSSD WPCP and WCWD WPCP.

(2) Based on a 5-day moving median value.

(3) Based on a single coliform bacteria test.

2.4.1 Overall Treatment Plant Performance

The purpose of this section is to evaluate the performance of the plant relative to NPDES permit requirements. Overall, the WPCP has performed well from 2003 to 2008. Permit excursions that have occurred during this time period are discussed briefly below. A detailed discussion of each violation is included in the RWQCB Staff Summary Report included in Appendix I.

2.4.1.1 $\underline{BOD_5}$

The monthly and weekly influent and effluent BOD_5 concentrations at the WPCP between 2003 and 2008 are shown in Figures 2.12 and 2.13, respectively. For the 5.5 years analyzed, BOD_5 removal averaged 95.6 percent. The monthly and weekly average BOD_5 concentrations for the plant effluent were both 11 mg/L, which is significantly below the NPDES permit requirements of 30 mg/L and 45 mg/L, respectively. The maximum weekly BOD_5 limit was exceeded twice during the study period (8/29/04 and 6/25/06).

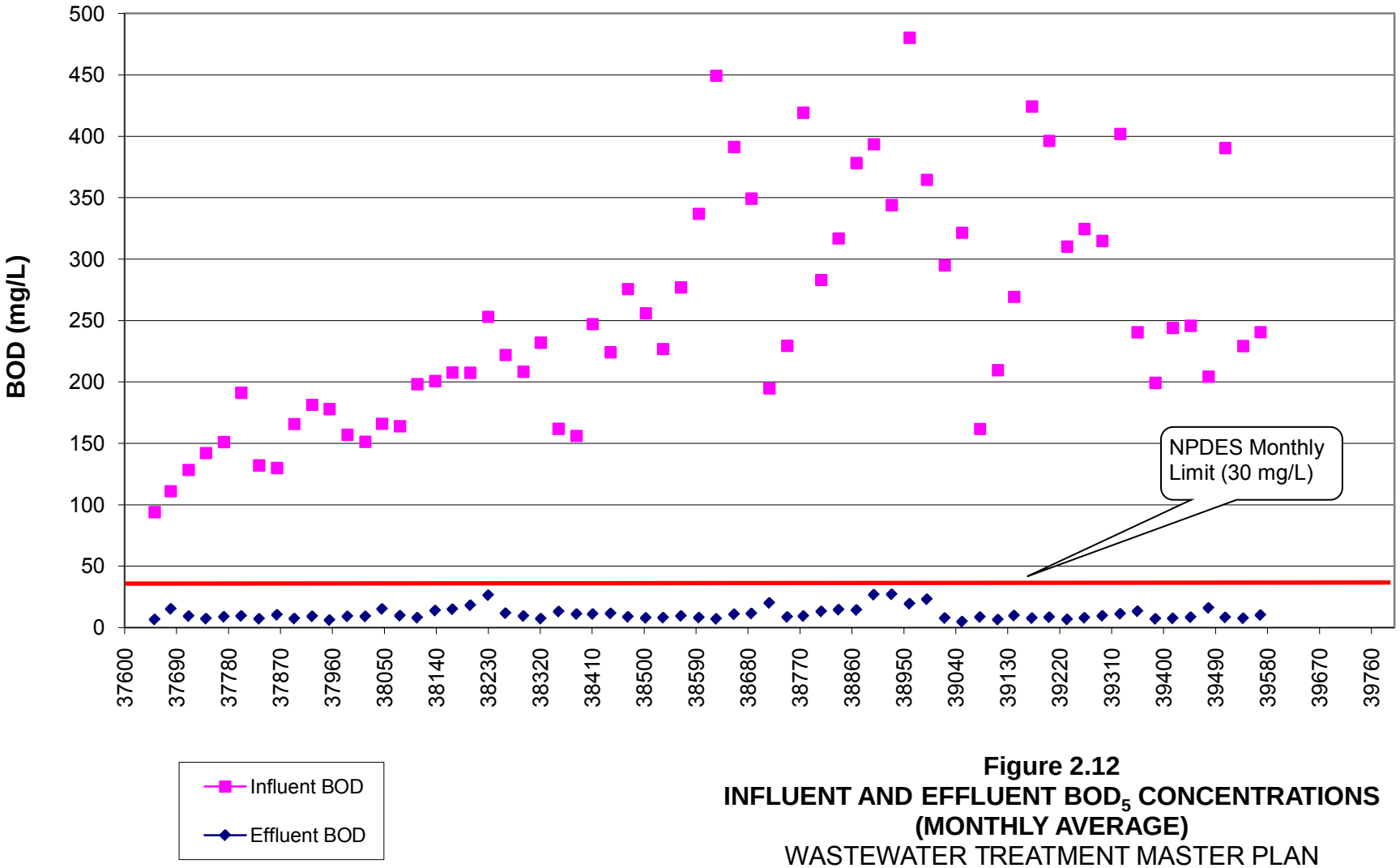

Figure 2.12
INFLUENT AND EFFLUENT BOD_5 CONCENTRATIONS (MONTHLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

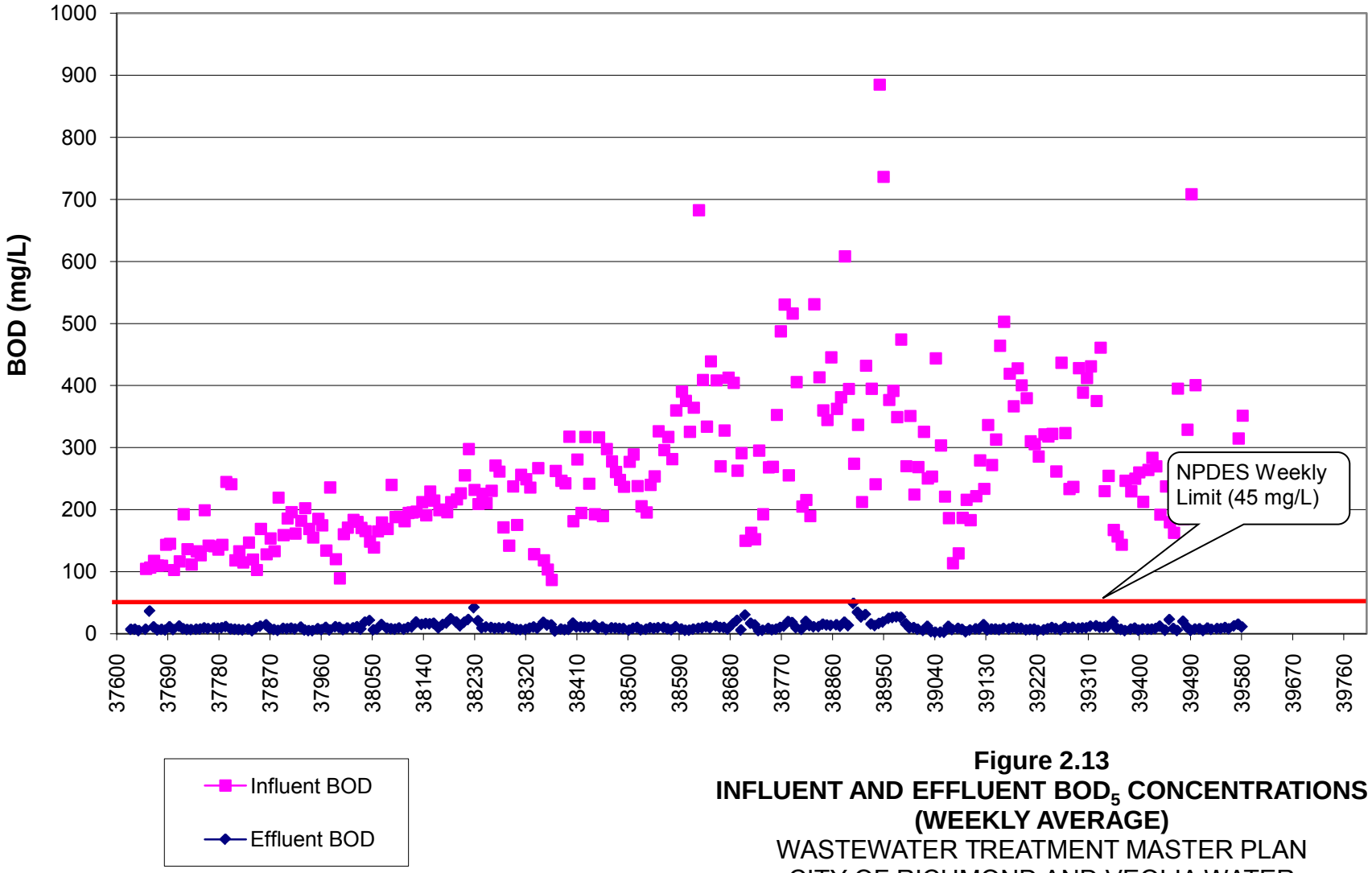

Figure 2.13
INFLUENT AND EFFLUENT BOD_5 CONCENTRATIONS (WEEKLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Table 2.9 NPDES Permit Requirements[1] - Toxic Substances Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water				
	Water Quality-Based Effluent Limits (WQBELs)		Interim Limits	
Constituent	Maximum Daily (MDEL) (ug/L)	Average Monthly (AMEL) (ug/L)	Maximum Daily (ug/L)	Average Monthly (ug/L)
Copper	100	71	--	--
Mercury	0.038	0.021	--	--
Nickel	59	34	--	--
Selenium	8.9	3.8	--	--
Cyanide[1]	15	7.8	--	--
Bis(2-ethylhexyl)phthalate	150	55	--	--
Dioxin - TEQ(2)	2.80E-08	1.40E-08	--	--
4,4-DDD	0.0017	0.00084	0.05	--
Heptachlor	0.0041	0.002	0.01	--
Total Ammonia (mg/L as N)	59	32	--	--

Notes:
(1) After the site-specific objective for cyanide is approved, the cyanide MDEL and AMEL will increase to 41 and 21 ug/L, respectively.
(2) The WQBEL for dioxin will become effective on November 30, 2011.

2.4.1.2 TSS

The monthly and weekly influent and effluent TSS concentrations are shown in Figures 2.14 and 2.15, respectively. For the 5.5 years analyzed, the WPCP achieved an average TSS removal of 95.6 percent. During the analysis period, the average TSS concentration in the final effluent was 18.4 mg/L. This is less than the monthly and weekly NPDES permit limits of 30 mg/L and 45 mg/L, respectively. The weekly average TSS concentration exceeded the weekly NPDES permit three times (weeks of 11/27/05, 12/18/05, and 6/25/06).

2.4.1.3 Ammonia (NH3-N)

The NH_3-N concentrations in the plant influent and effluent are shown in Figure 2.16. The ammonia samples are taken upstream of the compliance point (prior to the point where effluent is combined with WCWD effluent). Although the activated sludge process is not designed for removal of ammonia, some ammonia removal, averaging 12 percent, was observed during the analysis period. The average NH_3-N concentration in the influent and effluent was 22.53 and 19.89 mg/L as nitrogen (N), respectively. The average effluent concentration is well below the average monthly limit of 32 mg/L as N. The monthly effluent concentration has not been exceeded since 2003.

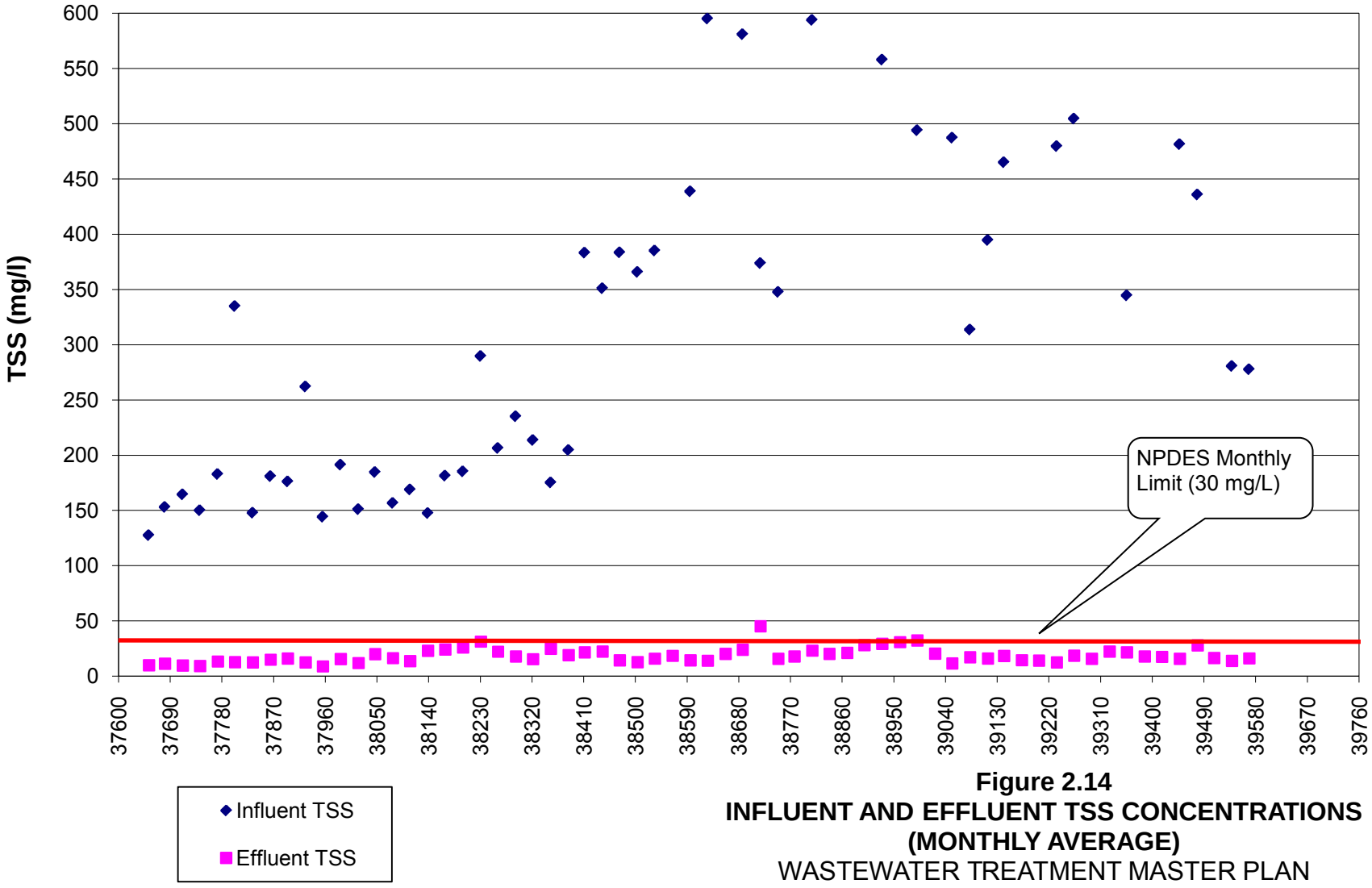

Figure 2.14
INFLUENT AND EFFLUENT TSS CONCENTRATIONS (MONTHLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

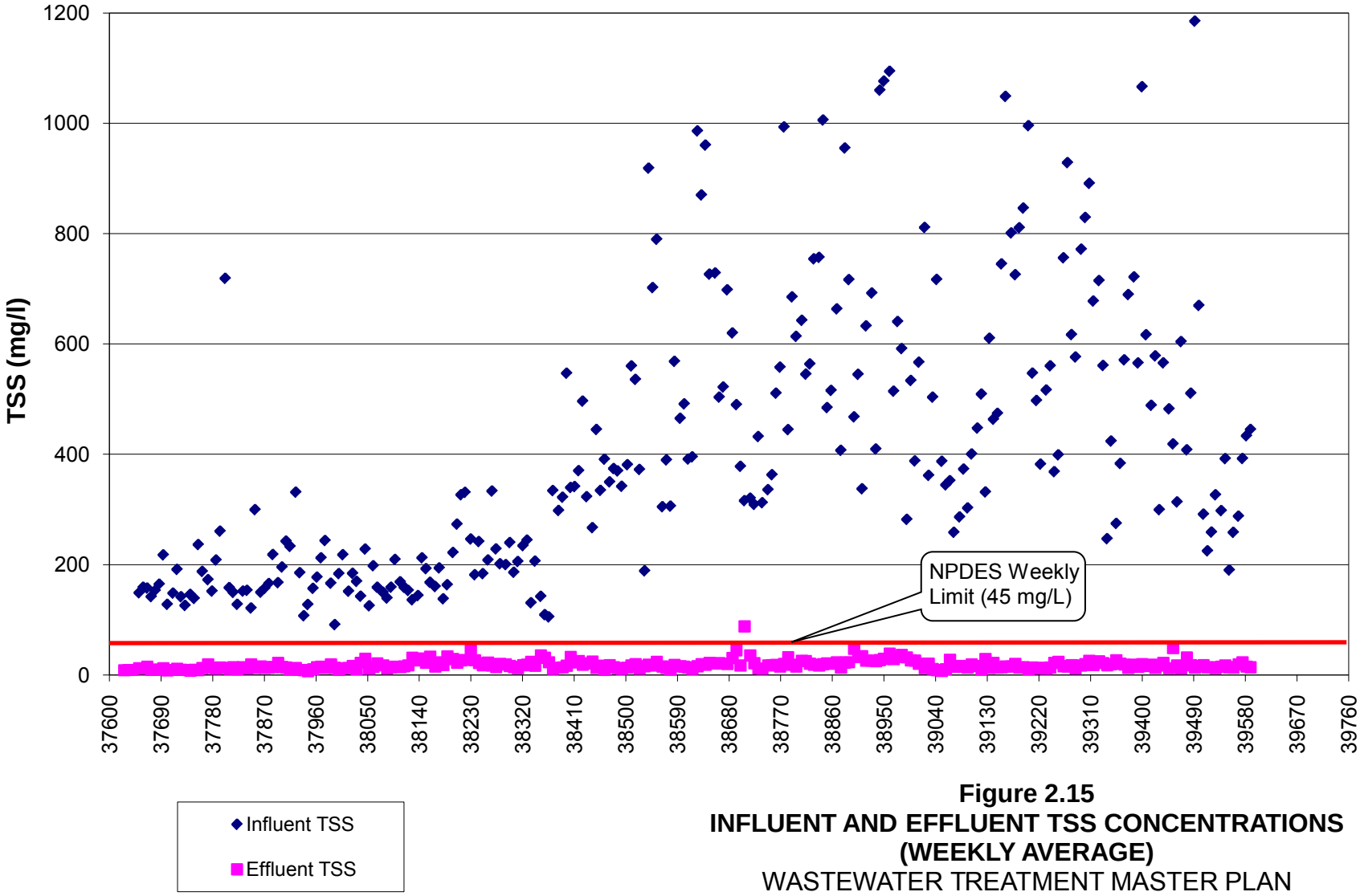

Figure 2.15
INFLUENT AND EFFLUENT TSS CONCENTRATIONS (WEEKLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

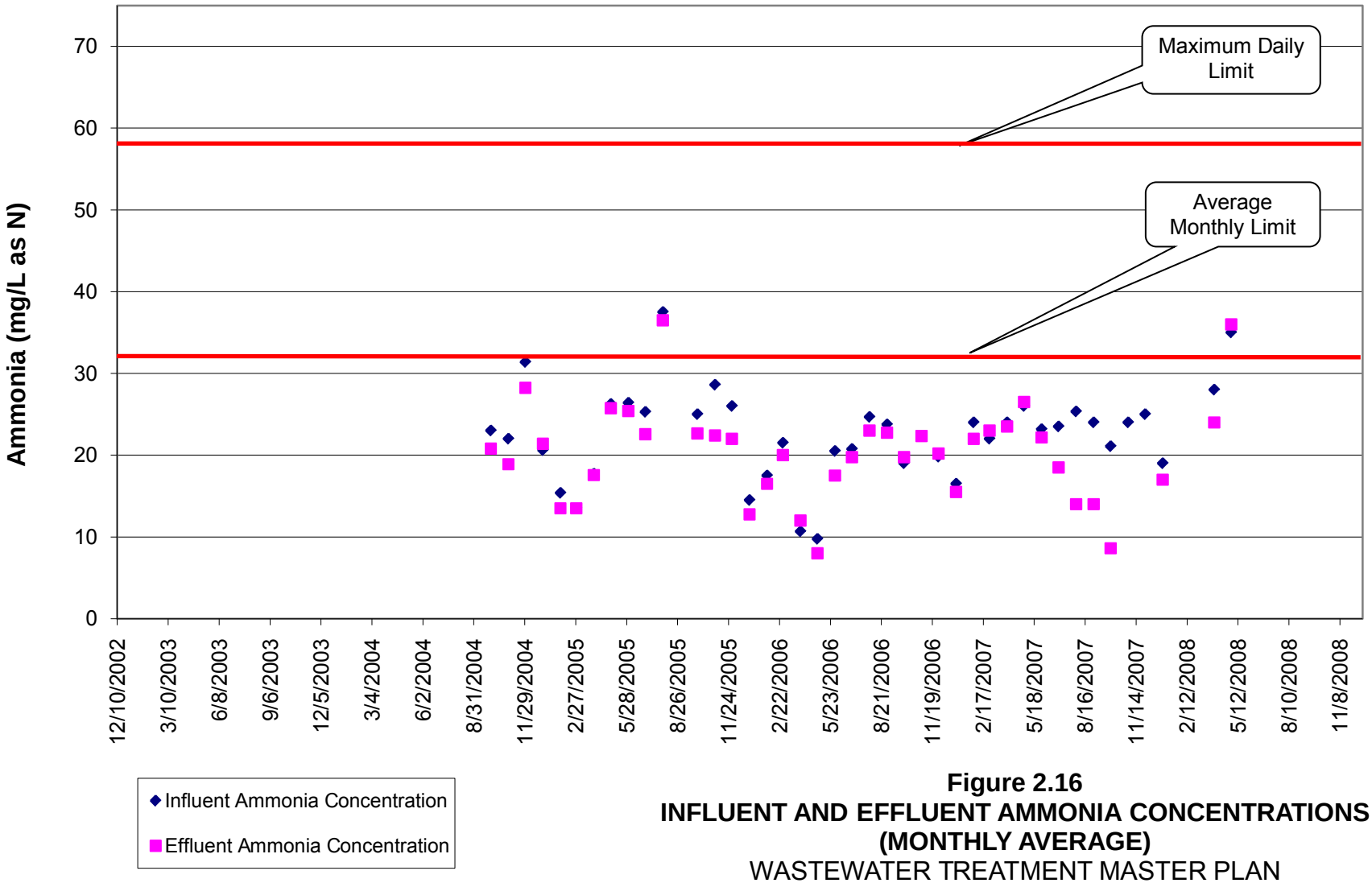

Figure 2.16
INFLUENT AND EFFLUENT AMMONIA CONCENTRATIONS (MONTHLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

2.4.1.4 pH

The NPDES requirement for effluent pH is a daily average pH between 6.0 and 9.0. The effluent pH over the last five years is shown in Figure 2.17. Over this time period, the pH has not been outside the NPDES required pH range. The average pH over the last five years is 7.2.

2.4.1.5 Chlorine

Per the NPDES permit, the combined effluent from RSSD and WCWD cannot exceed an instantaneous maximum chlorine residual concentration of 0.0 mg/L. The City's secondary effluent is treated with an average dose of 4 mg/L of chlorine. The residual from the chlorine contact basin averages 2.5 mg/L. The combined effluent from the City WPCP and WCWD is dechlorinated in the confluence structure using bisulfite.

2.4.1.6 Oil and Grease

The oil and grease concentrations in the plant influent and effluent are shown in Figure 2.18. The average oil and grease concentration in the effluent was 4.25 mg/L. The average effluent concentration is well below the average monthly limit of 10 mg/L. The monthly effluent concentration has never been exceeded. The maximum daily limit of 20 mg/L has been exceeded once (February 2006).

2.4.1.7 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 2.19 shows the coliform five-day median for the last five years. The median coliform limit was exceeded five times in 2003 but none since that time. The maximum daily coliform value was exceeded once during the study period (February 2004).

2.4.1.8 Toxic Substances

The mean and maximum concentrations of the toxic substances observed in the effluent from the City of Richmond and in the combined effluent are presented below in Table 2.10. Based on available data, the effluent concentrations of copper, cyanide, lead, mercury, heptachlor, Bis(2-ethylhexyl)phthalate and nickel comply with current NPDES permit requirements.

The current maximum daily effluent limit (MDEL) for selenium in the combined effluent from the City and WCWD was exceeded on several occasions over the last five years. However, these were not violations because the selenium limit was only recently implemented (2008). The City should commence regular testing for selenium in the WPCP effluent and combined effluent.

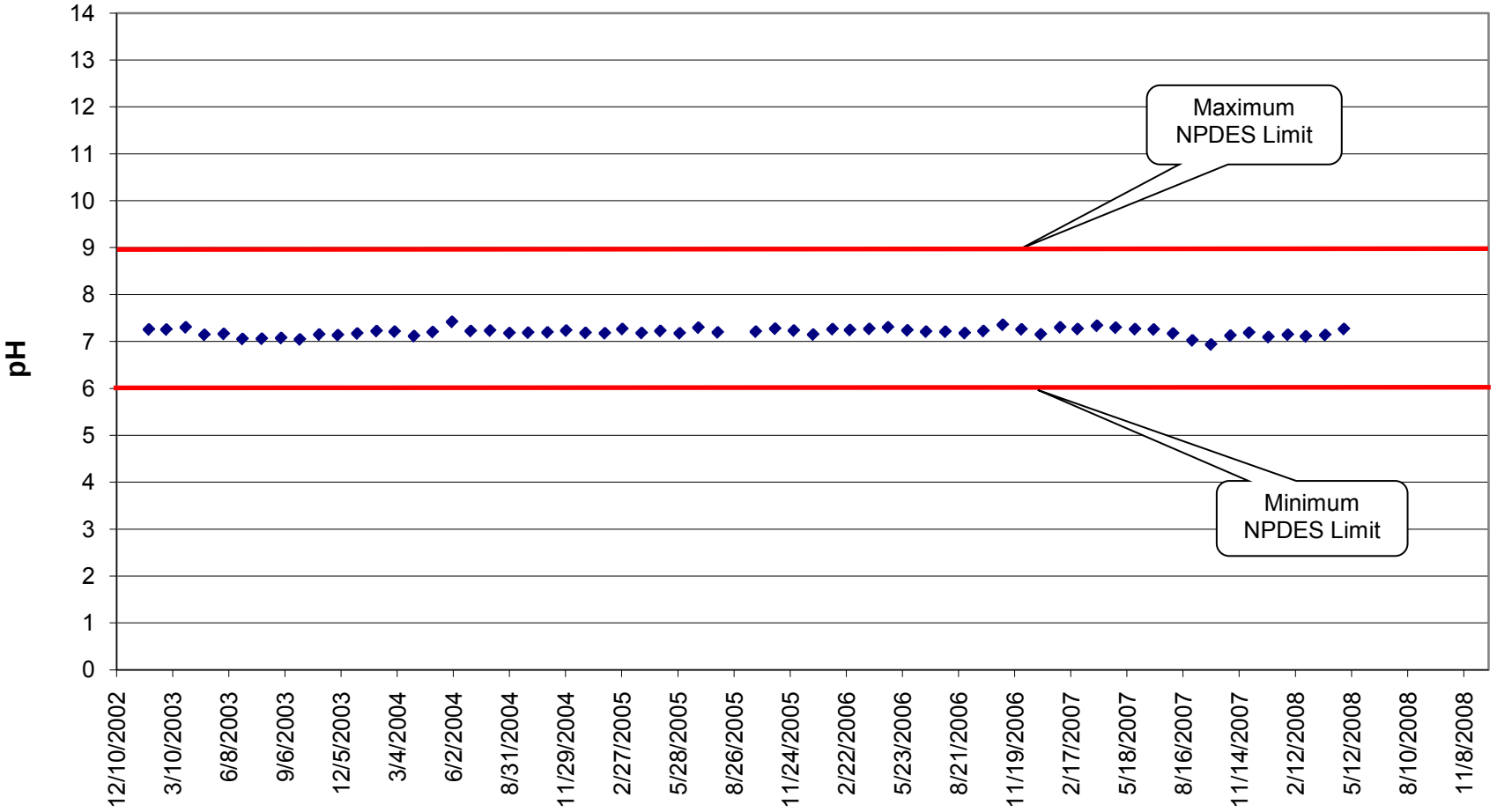

Figure 2.17
EFFLUENT pH (MONTHLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

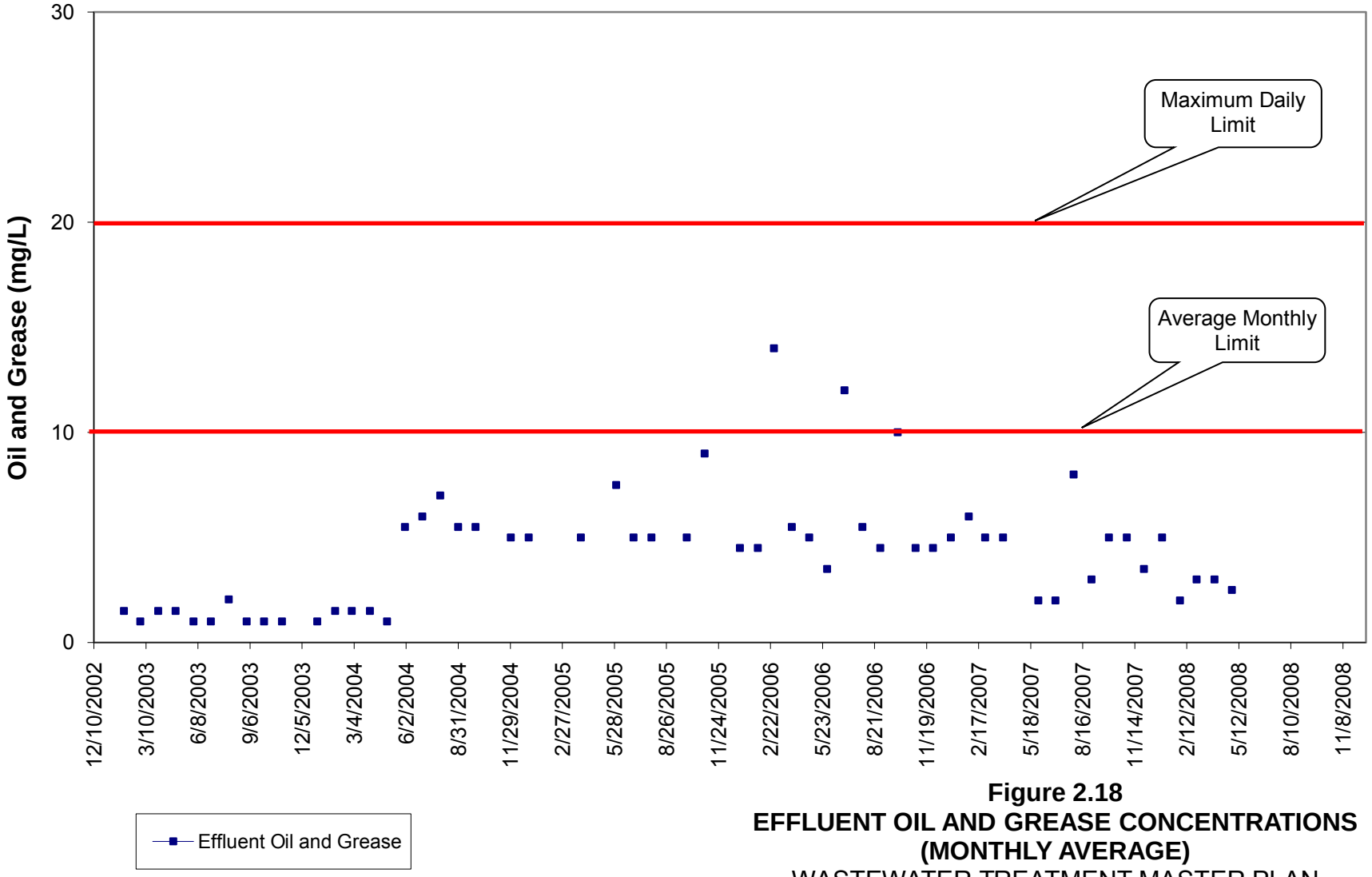

Figure 2.18
EFFLUENT OIL AND GREASE CONCENTRATIONS (MONTHLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

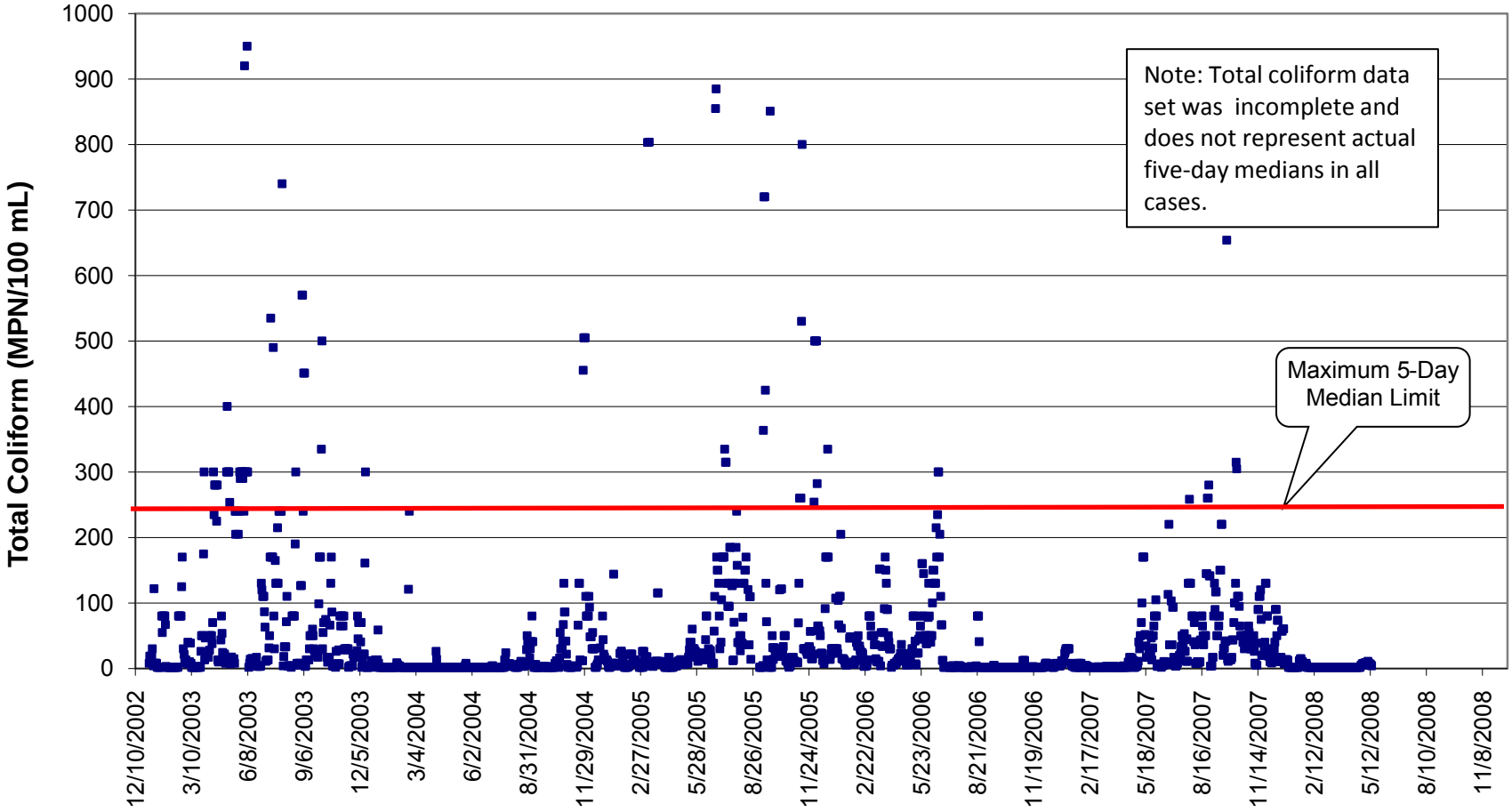

Figure 2.19
TOTAL COLIFORM BACTERIA (5-DAY MEDIAN)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Table 2.10 City of Richmond's Levels of Toxics in the Effluent Richmond Wastewater Treatment Master 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	--	--	1.97	7.7
Copper	4.93	6.20	8.66	76.0
Cyanide	1.53	2.70	3.89	13.0
Heptachlor			Non-Detect	Non-Detect
Lead	0.49	0.73	0.68	5.20
Mercury	0.008	0.0096	0.01	0.02
Nickel	7.98	12	6.81	14.0
Selenium	1.75	3.0	1.89	**9.0**
Dioxin-TEQ	0.0069	**0.0324**	-	-
4,4-DDD	**0.0036**	**0.01**	Non-Detect	Non-Detect

Notes:
(1) All units are µg/L, except dioxin, which is pg/L.
(2) Detection limits are 0.05 and 0.01 for 4,4-DDD and Heptachlor, respectively.

The new MDEL for dioxin was exceeded once during the study period - however, because the MDEL for dioxin does not become effective until November 20, 2011, this did not result in a permit excursion.

The MDEL for 4,4-DDD was exceeded once during the study period- however, because the MDEL for 4,4-DDD does not become effective until May 18, 2010, this did not result in a permit excursion.

2.4.2 Individual Unit Process Performance

This section includes a review of plant process performance and a discussion of treatment process reliability based on a 1974 Technical Bulletin published by the Environmental Protection Agency (EPA). The bulletin defines three classes of reliability based on the consequences of degradation of the effluent quality on the receiving waters. For the purpose of this evaluation, it was assumed that the WPCP is subject to Reliability Class II regulations. It is important to note that meeting reliability standards is required for facilities undergoing upgrades funded by Federal grants.

2.4.2.1 Liquid Process Evaluation

Each liquid unit process is described in the following sections. Included in the process review 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.

The WPCP liquid treatment processes consist of the following:

- Mechanical bar screens.
- Grit removal.
- Primary clarification.
- Aeration basins and secondary sedimentation basins.
- Disinfection.

2.4.2.1.1 *Mechanical Bar Screens*

Process Description

There is one mechanically cleaned bar screen, located upstream of the wet well of the influent pump station, at the RSSD WPCP. This bar screen is designed for the removal of rags, sticks, leaves, bottle caps, rocks, etc., that may otherwise cause damage to downstream pumping or other mechanical equipment. The bar screen was manufactured by US Filter and was installed in 2002. The bar screen has a bar spacing of 1 inch.

Design Performance

Bar screens are typically designed so that the approach velocity is 1 to 1.5 feet per second (fps). According to the manufacturer's recommendations, the design capacity with the existing influent configuration is 33 mgd based on the above criteria. Thus, the bar screens are able to satisfy ADWF and ADMMF, but they do not provide sufficient capacity for PHWWF, where the approach velocity is estimated to reach 2.5 fps. In addition, there is no redundant bar screen in case the existing bar screen is out of operation. If the flow exceeds the capacity during the wet weather conditions, the unscreened water will overflow over/around the bar screen into the wet well. This may lead to clogging of the pumps located downstream of the wet well.

To prevent pass-through of debris at peak flow rates, the velocity through the bars should not exceed the design values. As seen in Table 2.11, the flow velocity through the bar screen was 2.5 fps during PHWWF, which exceeds the typical design criteria.

An average of 37.2 cubic feet (cf) per day of screenings was removed from the RSSD WPCP influent on a daily basis. This corresponds to approximately 4.6 cf of screenings for every MG of influent, which is in the range of 2 to 10 cf typical for other treatment plants.

Table 2.11 Bar Screen Performance Data Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water			
Design Parameter	**Design Flow**	**Typical Design Criteria**	**Existing Performance**
Bar Screen Approach Velocity (fps)	ADWF	1.0 to 1.5	0.34(1)
	ADMMF	1.0 to 1.5	0.65(2)
	PHWWF	1.0 to 1.5	2.50(3)
Notes: (1) ADWF velocity based on screening capacity of 7 mgd. (2) ADMMF velocity based on screening capacity of 14 mgd. (3) PHWWF velocity based on screening capacity of 55 mgd.			

Because the bar screen has a bar spacing of 1 inch, some trash and debris can pass through the screen. This debris fouls downstream processes (e.g., suction pipes 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.

With respect to reliability and redundancy design standards from the EPA, an additional backup bar screen should be provided in the treatment train to allow the WPCP to adequately screen flows during the PHWWF, and to provide redundancy in the WPCP. It is permissible for the backup bar screen to be designed for manual cleaning only. The addition of a second bar screen will be referred to as Project 1.2 throughout the Master Plan.

Operational Problems

The bar screen and the screenings bin are not enclosed and contribute to odors according to the 2007 Odor Evaluation Report by Webster Environmental Associates. In addition, the HVAC system is corroded and out of service; therefore the bar screen chamber does not have any ventilation. This may result in a safety hazard for operations staff due to a buildup of sewage gases.

2.4.2.1.2 *Grit Removal*

Process Description

There are three grit chambers in operation at the WPCP. The grit chambers were constructed in 1953. The grit removal process is designed to remove heavier particles such as sand and stones prior to the primary clarifiers. A grit collector and grit washing screw assembly is used to remove grit from the grit basins. Design parameters for grit removal include horizontal flow velocity and hydraulic retention time (HRT).

Design Performance

Good design practice for grit systems is to provide a HRT of 45 to 90 seconds at peak instantaneous flow rates, with approach velocities less than 1 fps. This conventional approach will reliably capture 95 percent of 0.008-in grit (specific gravity of 2.6). Because the grit basins are sized to handle wet weather flows, during dry weather the grit basins do not effectively remove grit from the wastewater.

An average of 27.1 cf of grit was removed from the RSSD WPCP influent on a daily basis. This corresponds to approximately 3.3 cf of grit for every MG of influent. Typical grit quantities range from 0.5 to 27 cf of grit for every MG.

Operational Problems

Because the grit basins are sized to treat wet weather flows, during dry weather flow periods the water levels are low in the basins. The low water levels result in localized areas of high velocity flow around the grit collectors. The high velocities result in poor grit removal performance. In addition, the middle grit chamber is covered by a concrete walkway, which makes maintenance difficult. The project to rehabilitate the grit basins is identified as Project 1.4 in the Master Plan.

2.4.2.1.3 *Primary Clarification*

Process Description

There are two rectangular, primary clarifiers, both 223 feet in length and 18 feet in width. The clarifiers were constructed in 1953. These primary clarifiers are designed to remove settleable solids, floating debris, and grease prior to secondary treatment. The important design parameters affecting primary clarification performance include surface overflow rate and hydraulic detention time.

Design Performance

The overflow rate with both clarifiers in service is 410 gallons per day per square foot (gpd/ft^2) at ADWF. The Ten State Standards suggest a maximum surface overflow rate of 1,000 gpd/ft^2 at ADAF, and 1,500 to 3,000 gpd/ft^2 at peak hourly flows. Figure 2.20 presents the 7-day and 30-day average surface overflow rates from 2003 through 2008. Accordingly, both the ADWF and ADMMF overflow rates and detention times during the above period were found to be well within the design criteria as shown in Table 2.12.

The horizontal velocity, weir-loading rate, and hydraulic detention time exceed the design values during the PHWWF. The performance of the clarifiers in terms of BOD removal has been above the design removal rates, however, the TSS removal was below the design

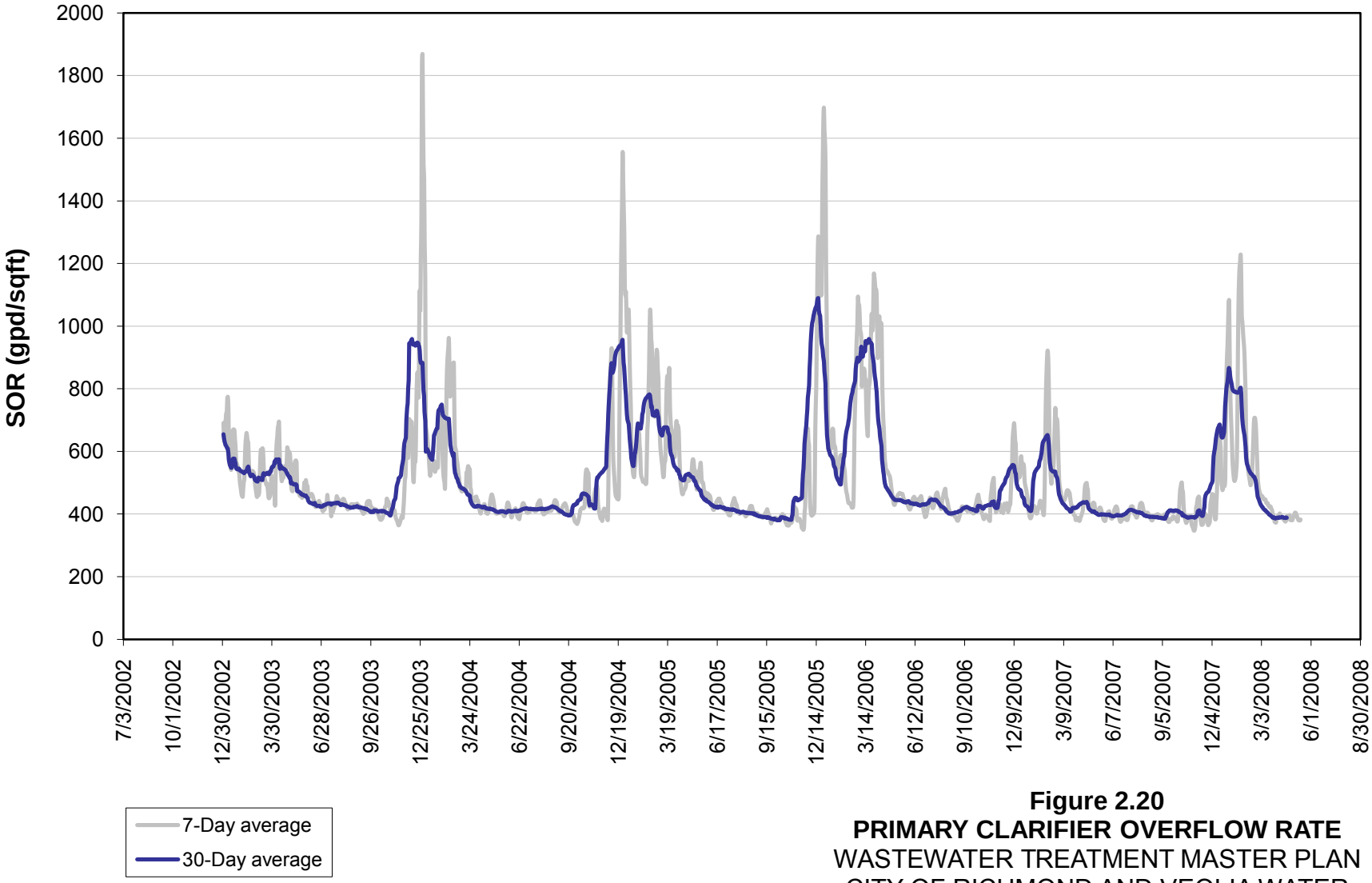

Figure 2.20
PRIMARY CLARIFIER OVERFLOW RATE
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Table 2.12 Primary Clarification Performance Data
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Design Parameter	Design Flow	Design Criteria	Existing Performance
Overflow Rate (gpd/ft^2)	ADWF	800-1200	470
	ADMMF	800-1200	760
	PHWWF	2,000-3,000	3,450
Hydraulic Retention Time (hr)	ADWF	1.0-2.5	4.6
	ADMMF	1.0-2.5	2.6
	PHWWF	1.0-2.0	0.6
Weir Loading Rate (gpd/lf)	ADWF	10,000-40,000	7,300
	ADMMF	10,000-40,000	13,700
	PHWWF	10,000-40,000	62,000
Horizontal Velocity (fps)	ADWF	4-5	0.8
	ADMMF	4-5	1.66
	PHWWF	4-5	6.5
BOD_5 Removal (%)	ADWF	35%	55%
	ADMMF	30%	55%
	PHWWF	<20%	30%
TSS Removal (%)	ADWF	70%	60%
	ADMMF	60%	56%
	PHWWF	<35%	20%

Notes:
(1) Average dry weather flow.
(2) Peak hourly flow.

removal rates for all flow conditions. The performance of the primary sedimentation units under low flow, i.e., ADWF and ADMMF conditions, is adequate.

With respect to reliability and redundancy, the EPA states that “there shall be a sufficient number of units of a size that with the largest flow capacity unit out of service, the remaining units shall have a design flow capacity of at least 50 percent of the total design flow to unit operations.” The WPCP meets both requirements. Based on the EPA criteria, and assuming a design flow of 40 mgd, the surface overflow rate of the remaining clarifier would be 2,500 gpd/ft^2 (50 percent of the design flow capacity), which is acceptable.

An enhanced sedimentation system utilizing coagulants, such as ferric chloride, can be incorporated into the existing primary system to increase removal efficiencies or obtain higher overflow rates, which in return may lead to greater primary clarifier removals and decreased loadings to secondary treatment. In addition, the additional removal of solids in the primaries may assist the WPCP in meeting the MDEL for dioxin. Disadvantages of enhanced sedimentation would be increased mass of primary sludge and an increase in chemical costs. Particle size distribution and bench scale jar testing of various chemicals should be conducted to determine if adding chemicals would be cost effective or significantly impact process performance. Enhanced coagulation is identified as Project 1.5 in the Master Plan.

Operational Problems

The primary scum pumps pump directly to the anaerobic digesters. Because a large amount of trash passes through the bar screen, much of the trash is captured by the primary scum skimmers and pumped to the digesters. The City and Veolia should consider installing a disposal system to capture the primary scum debris and disposing of the debris in a landfill.

2.4.2.1.4 *Secondary Treatment*

Aeration Basin Process Description

The aeration basins were constructed in 1967. 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.

The primary function of the aeration basins is to remove BOD_5 via converting soluble organics into settleable biomass and floc. The objective of this process at the WPCP is to remove BOD_5. The process is not designed to remove ammonia or nutrients.

Aeration Basin Design Performance

The principal parameters in evaluating an activated sludge system are solids retention time (SRT), HRT, volumetric loading, and food to microorganism (F/M) ratio. Table 2.13 presents the design criteria, as well as the existing performance for aeration basins and secondary clarifiers from 2003 through 2008.

From January 2003 to May 2008, the activated sludge system has treated an average influent flow of 8.1 mgd. The HRT averaged 6.5 hours over analysis period. The HRT ranged from 2 to 8 hours over the analysis period. The HRT is plotted on Figure 2.21.

The SRT is defined as the mass of solids in the aeration tanks divided by the mass of solids leaving the system. This parameter is the most important one for an activated sludge

Table 2.13 Aeration Basins and Secondary Clarification Performance Data
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Design Parameter	Design Load	Typical Design Criteria	Existing Performance[(1)] (Range)
Activated Sludge			
Hydraulic Detention Time (hr)	ADWF	4-8	6-8
	ADMMF	4-8	4-6
	PHWWF	4-8	2-4
Volumetric Loading (lb BOD_5 /1000 ft^3/d)	ADWF	20-40	20-40
	ADMMF	20-40	20-40
Biological Loading (lb BOD/lb MLVSS)	ADWF	.2-.5	0.15-0.5
	ADMMF	.2-.5	0.15-0.5
MLSS (mg/L)	ADWF	1,000-3,000	1,500-3,000
	ADMMF	1,000-3,000	1,500-3,000
Recycle Ratio	ADWF	.25-.75	.04-.06
	ADMMF	.25-.75	0.4-.06
SRT (days)	ADWF	3-15	5-8
	ADMMF	3-15	4-6
Secondary Clarifiers			
Solids Flux (lb/sf/d) - Square Clarifiers	ADWF	<24	5.2
	ADMMF	<24	14.3
	PHWWF	<40	19.8
Solids Flux (lb/sf/d) - Circular Clarifier	ADWF	<24	5.2
	ADMMF	<24	14.4
	PHWWF	<40	19.9
Overflow Rate (gpd/sf) - Square Clarifiers	ADWF	400-600	226
	ADMMF	400-600	430
	PHWWF	400-600	607
Overflow Rate (gpd/sf) - Circular Clarifier	ADWF	400-600	226
	ADMMF	400-600	430
	PHWWF	800-1000	608
Weir Loading Rate (gpd/lf) - Square Clarifiers	ADWF	10,000	3,574
	ADMMF	10,000	6,800
	PHWWF	20,000	9,607
Weir Loading Rate (gpd/lf) - Circular Clarifier	ADWF	20,000	6,515
	ADMMF	20,000	12,394
	PHWWF	30,000	17,511
Total Secondary Treatment			
BOD_5 Removal (%)	ADAF	85 minimum	85 to 95

Note:
(1) Average.

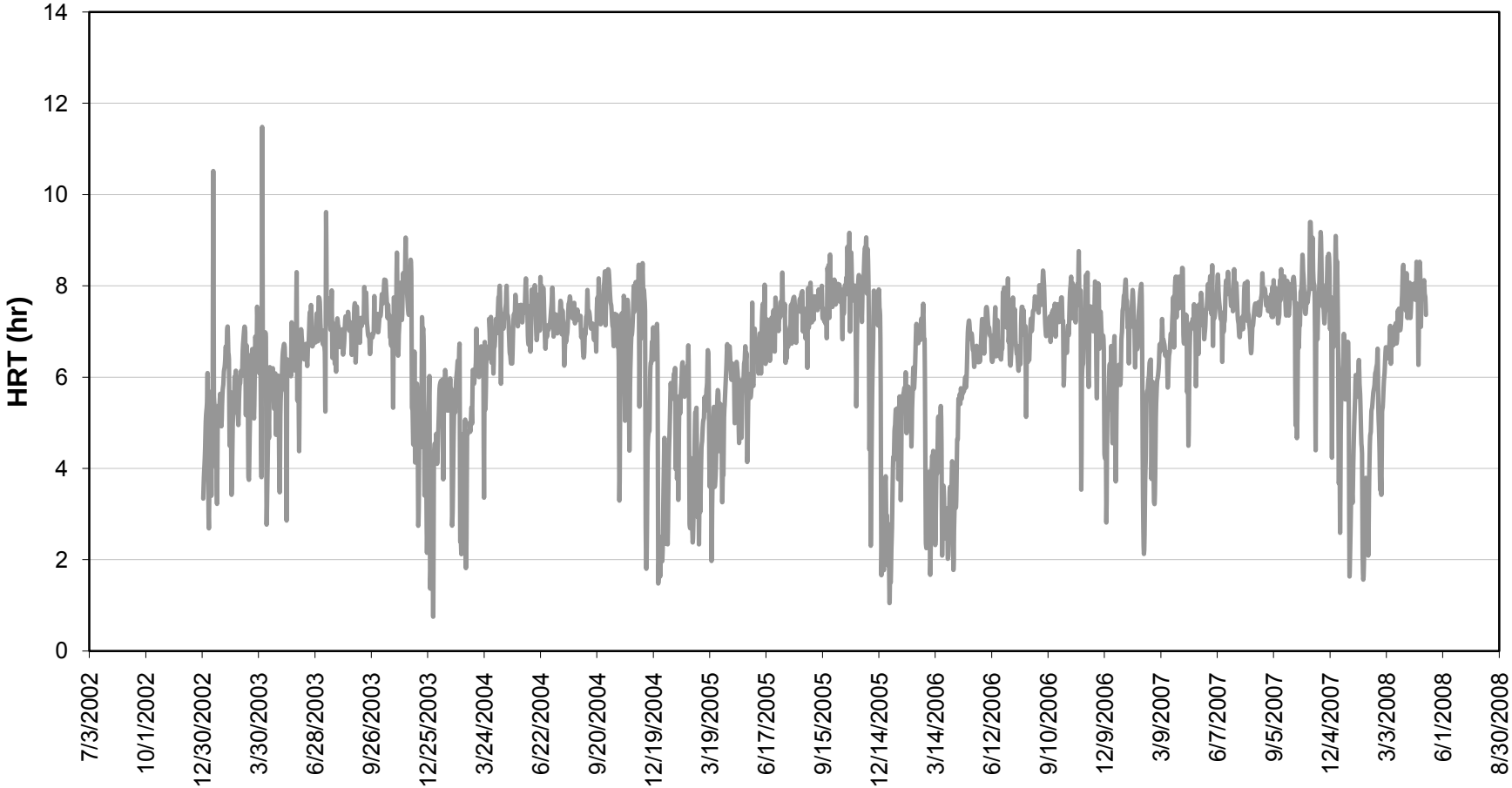

Figure 2.21
AERATION BASIN HRT
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

process and is controlled by the waste activated sludge (WAS) flowrate. The average SRT is about 5.5 days, which is sufficient for no nitrifying facilities. Figure 2.22 shows the variation of SRT over the evaluation period. Conventional, non-nitrifying, activated sludge facilities typically operate with SRT in the range of about 2 to 6 days. At an SRT of 5.5 days, adequate and sufficient oxidation is not of concern. The plant effluent has consistently met effluent requirements since 2003.

The volumetric loading rate (VLR) is the ratio of biological oxygen demand to aeration basin volume. The VLR has ranged from 15 to 50 lb BOD_5/1,000 cf/day since 2003. The average VLR over the study period is 30 lb BOD_5/1,000 cf/day. The VLR is plotted on Figure 2.23

Over the last three years the F/M ratio has varied between 0.15 and 0.40 BOD_5/day/lb mixed liquor volatile suspended solids (MLVSS). The five-year average is 0.30 BOD_5/day/lb MLVSS. The F/M ratio and MLSS are plotted on Figures 2.24 and 2.25.

Aeration Basin Operational Problems

At times during the study period, the secondary treatment process has produced poor settling solids, exhibited by high sludge volume index (SVI). To determine the cause of the settling problems, samples of the mixed liquor were taken from both the effluent end of the aeration basins and sent to Dr. David Jenkins for a microbial analysis. Dr. Jenkins is a professor emeritus at the University of California at Berkeley and a specialist in activated sludge analysis. Copies of the reports (samples were taken on two different dates) are included in Appendix B.

The reports concluded that the mixed liquor contained abundant amounts of filamentous organisms. The two major filaments present were *Microthirix parvicella* and nocardioform organism. Per Dr. Jenkin's analysis, "any settling problems in this sludge are due to the presence of *Microthrix pavicella*." He also states that he has "seen an activated sludge like this on several previous occasions. In all of these cases the aeration basins were aerated mechanically. The *Microthrix parvicella* filaments…are favored by the presence of anaerobic zones. 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 both *Microthrix parvicella*…*Microthrix parvicella* requires an SRT of approximately 10 to 12 days to become established in activated sludge. You can get rid of it by lowering the SRT to below these levels."

Dr. Jenkins' analysis is consistent with DO readings from the aeration basins that show the aeration basins do not have a uniform DO concentration in the aeration basins. Figure 2.26 shows average DO readings in each section of the aeration basins. Large portions of the aeration basins, especially the lower third of the first cells of both aeration basins, have very limited DO.

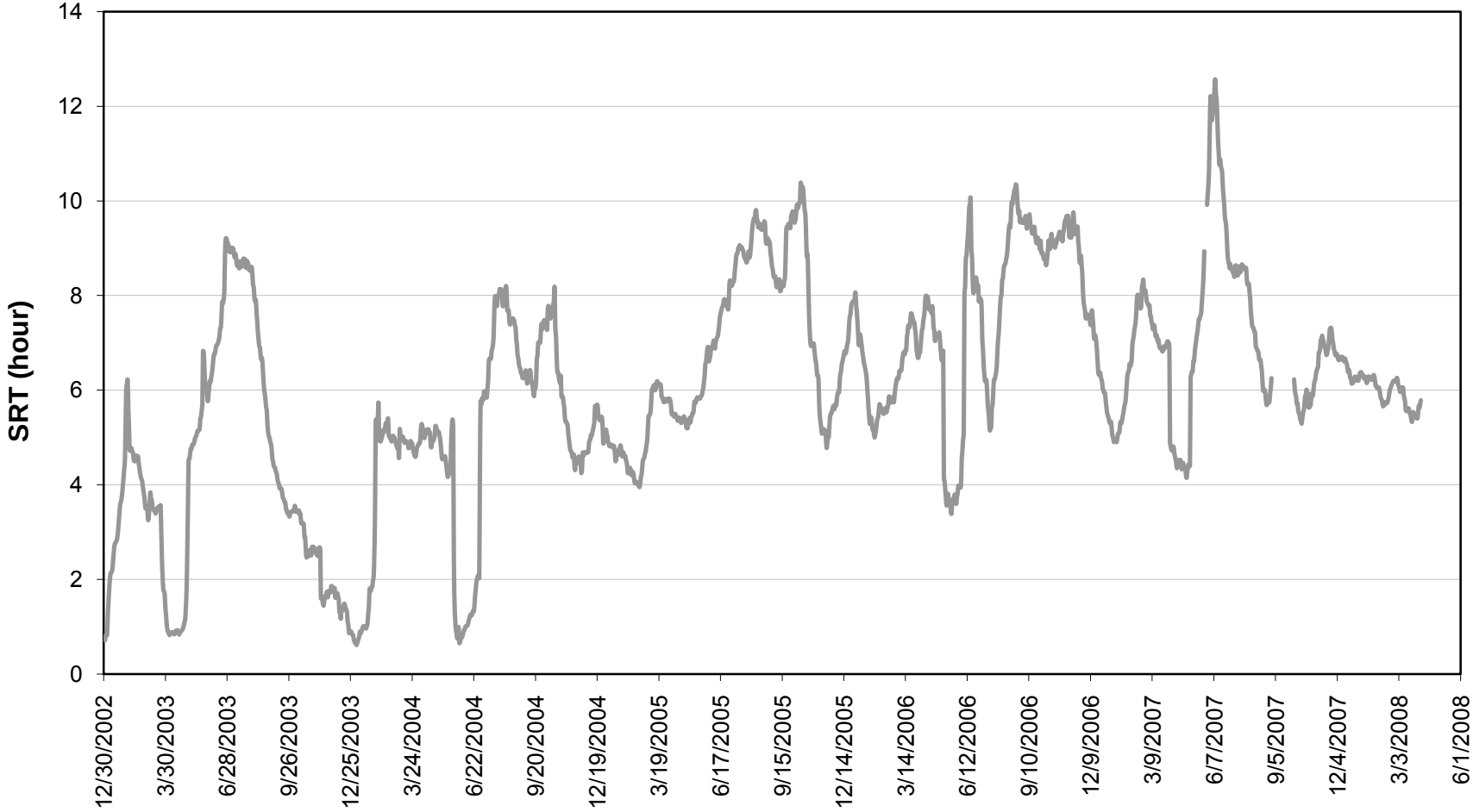

Figure 2.22
SRT (30-DAY RUNNING AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

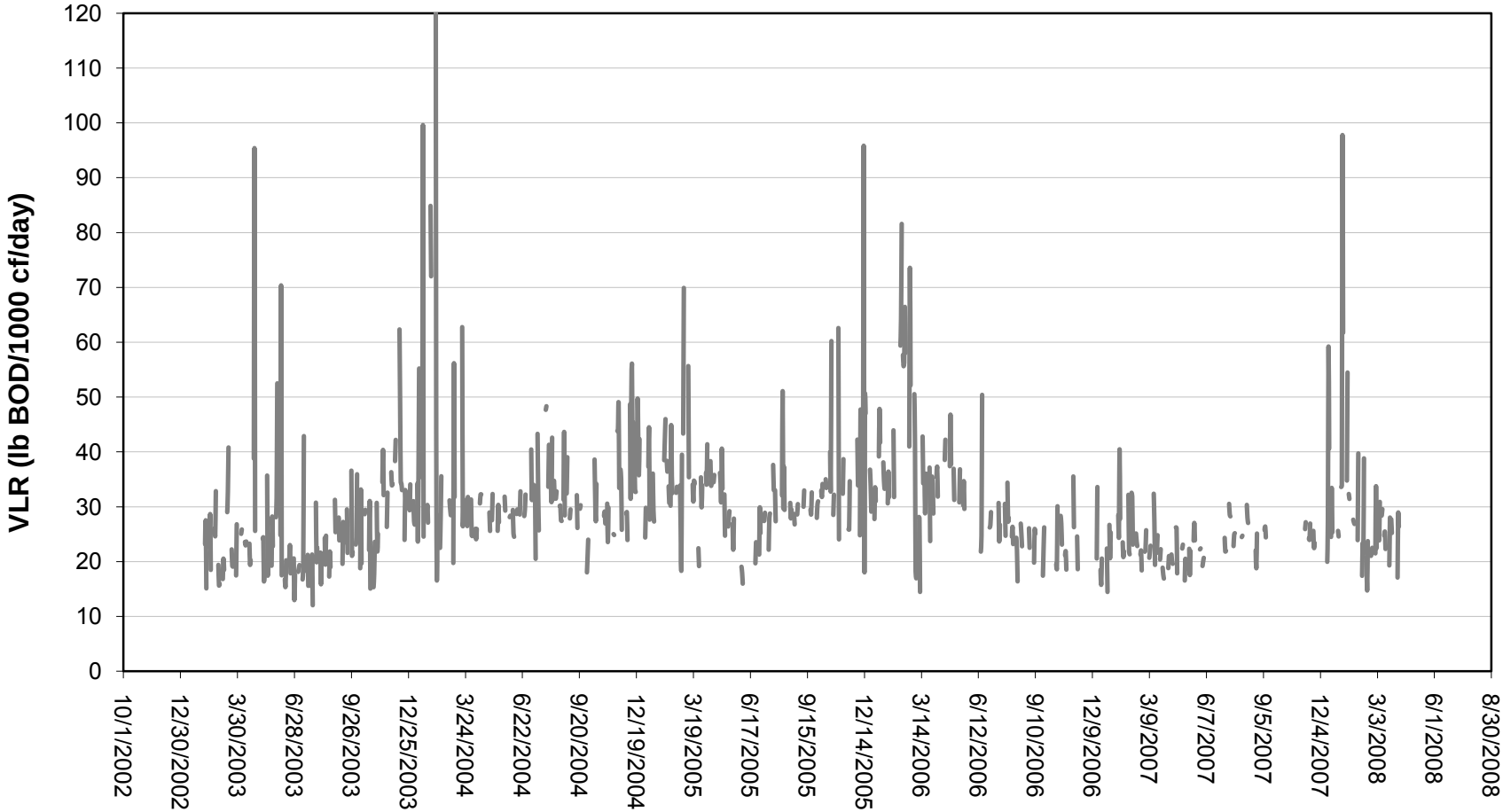

Figure 2.23
VOLUMETRIC LOADING RATE
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

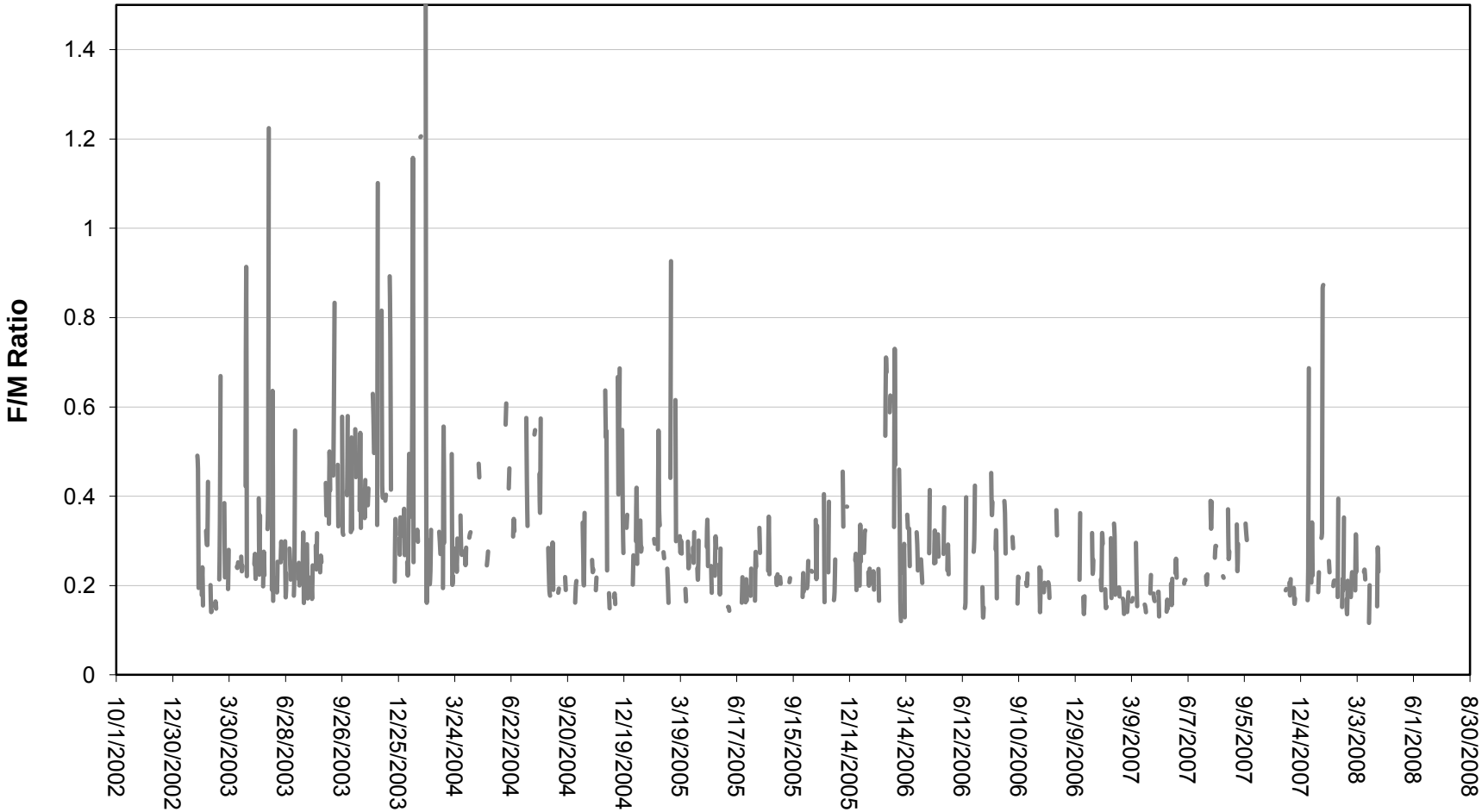

Figure 2.24
F/M RATIO
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

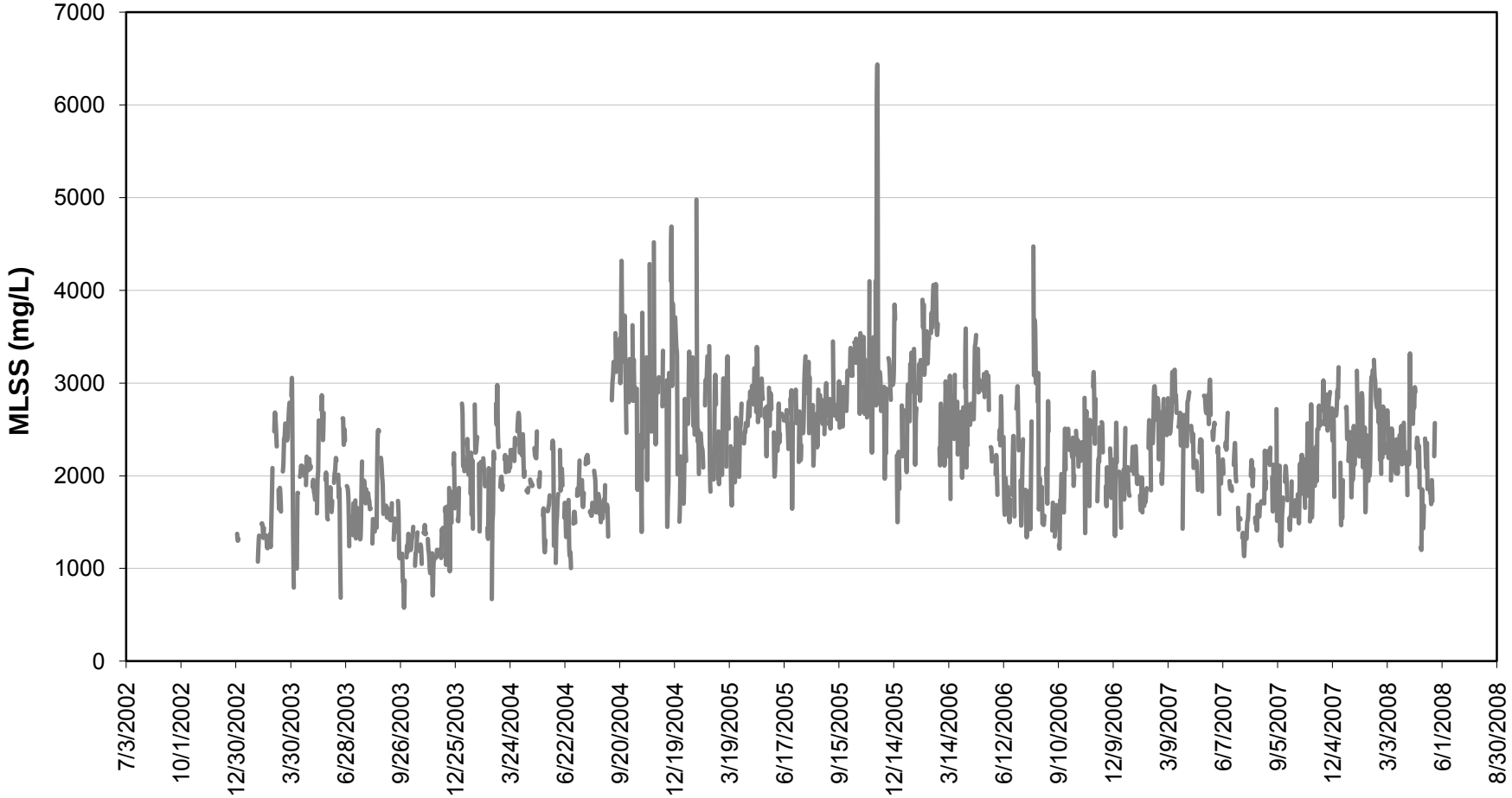

Figure 2.25
MLSS CONCENTRATION
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

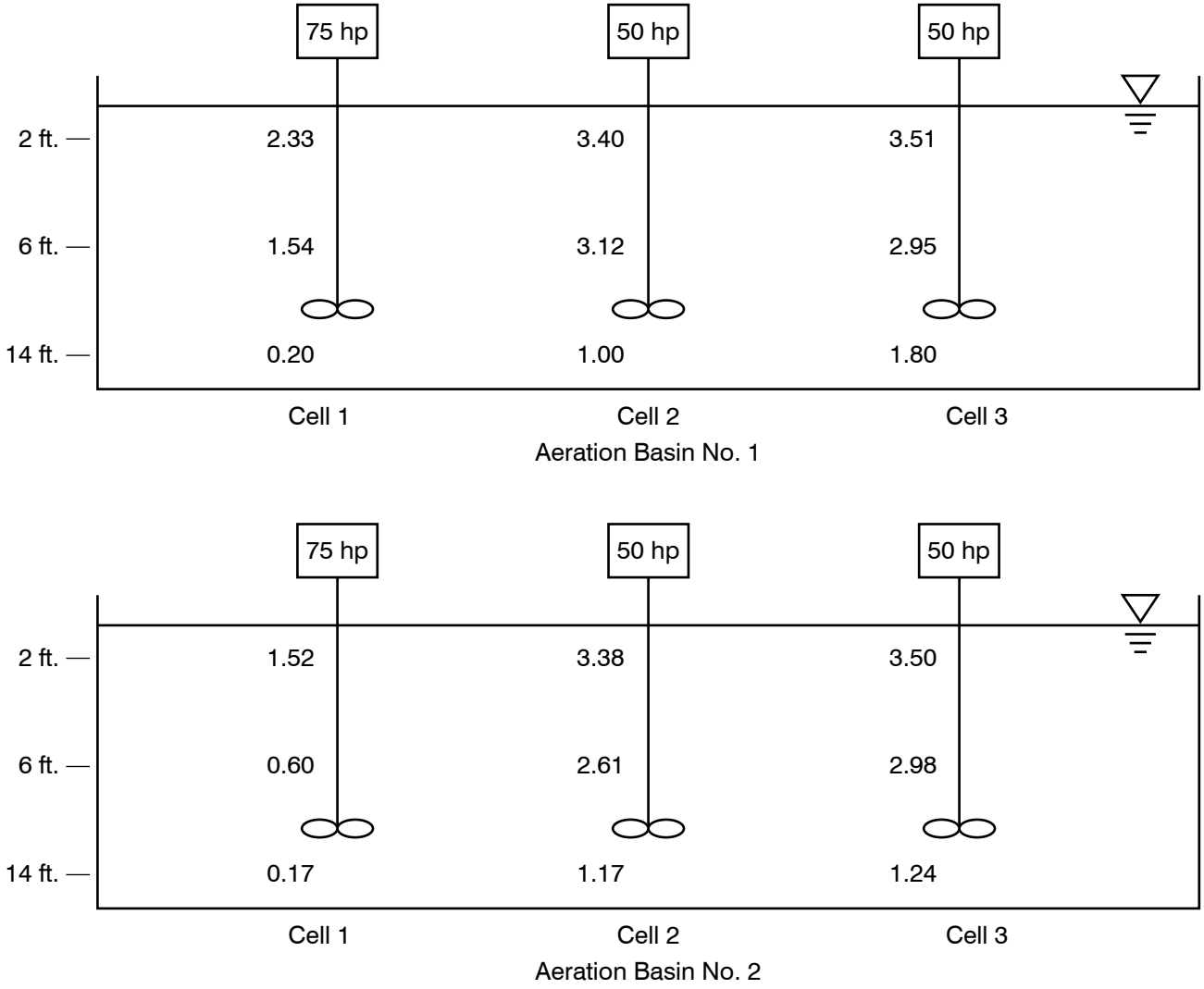

Figure 2.26
DO CONCENTRATIONS (mg/L)
IN AERATION BASINS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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There are two possible solutions to minimize the growth of filaments in the activated sludge:

- Turn the aerators up to full power. The aerators currently are operated at approximately 60 percent power. Based on typical design criteria for mechanically aerated aeration basins, each aeration basin should require at least three 75 horsepower (hp) aerators running at full power to keep the aeration basins well mixed. Disadvantages of this alternative include higher power costs and the possibility of floc shear due to the high mixing energy. Also, this alternative would not deliver enough aeration capacity during ADMML events. For mechanical aerators, up to 777 hp, or six mechanical aerators at 125 to 150 hp each, would be required to provide enough oxygen to keep the DO at 2.0 mg/L distributed throughout the basins under these conditions.
- Convert mechanical aeration to fine bubble diffused aeration. Converting to fine bubble-diffused aeration would result in a better mixed tank with a more uniform and adequate distribution of DO. The overall performance of the secondary process, including settling, should improve. Fine bubble aeration is typically 15 percent more energy efficient than mechanical aeration. Disadvantages of this option include high capital costs. Installation of a fine bubble aeration system is identified as Project 1.6 in the Master Plan.

In addition to the DO issues, nocardioform bacteria can cause foaming in the aeration basins. The foam traps the nocardioform in the secondary process. A chlorine spray system could be installed to alleviate this problem.

If the aeration upgrades do not improve the settleability of the sludge, the installation of a selector (or anoxic zone) should be considered.

Secondary Clarification Process Description

The WPCP has three secondary clarifiers that were constructed in 1967. There are 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 to return activated sludge (RAS) and waste activated sludge (WAS) to wetwells at the center of the clarifiers. Clarifier Nos. 1 and 2 are shallower than Clarifier No. 3. However, Clarifier Nos. 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.

Secondary Clarification Design Performance

Important design parameters for the secondary clarifiers include overflow rate, solids loading rate, and weir overflow rate.

Hydraulic calculations for the existing channels and weirs indicate that approximately 70 percent of the flow naturally splits to Clarifier Nos. 1 and 2, and the remaining 30 percent of the flow goes to Clarifier No. 3. Calculations show that the HRT of the clarifiers is adequate.

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 mixed liquor suspended solids (MLSS) concentration and to the sludge volume index (SVI). The combined MLSS in the aeration basins averages 2,271 mg/L. The average SVI is 172 mL/g. For an SVI of 100 mL/g, a return ratio (Qr/Q) of 0.5, and a MLSS of 2,500 mg/L, the overflow rate allowed under maximum day conditions is about 600 gpd/ft^2. Calculations show that at peak flows of 20 mgd, the overflow rate in all three clarifiers is about 608 gpd/ft^2. This overflow rate indicates that the clarifiers are operating at their maximum capacity during wet weather periods.

The solids loading rates for all three clarifiers is within design parameters. At peak flows, the solids loading is 20 lb/sf/day which is below the maximum solids loading rate of 24 lb/sf/day.

Due to the double weirs on Clarifier Nos. 1 and 2, the weir loading is acceptable for these clarifiers. However for Clarifier No. 3, during peak flow the weir loading is about 17,500 gpd/lf, which is at the upper end of the design criteria for secondary clarifiers. The high weir overflow rate may be causing short-circuiting and solids carryover in this clarifier at peak flows.

For secondary sedimentation basin reliability and redundancy, the EPA states that “there shall be a sufficient number of units of a size, such that with the largest flow capacity unit of service, the remaining units shall have a design flow capacity of 50 percent of the total design flow to that unit operation.” Based on that criterion and assuming a peak flow of 20 mgd and one of the square clarifiers out of service, the surface overflow rate to the remaining two clarifiers would remain within design parameters.

Operational Problems

Overall, the loadings on the clarifiers are within typical design standards. However, for several reasons, the clarifiers are not performing well.

- 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. Figure 2.27 shows the average monthly sludge blanket height in each clarifier. The figure shows the sludge blanket in Clarifier No. 3 is consistently higher than the blankets in Clarifiers 1 and 2. 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

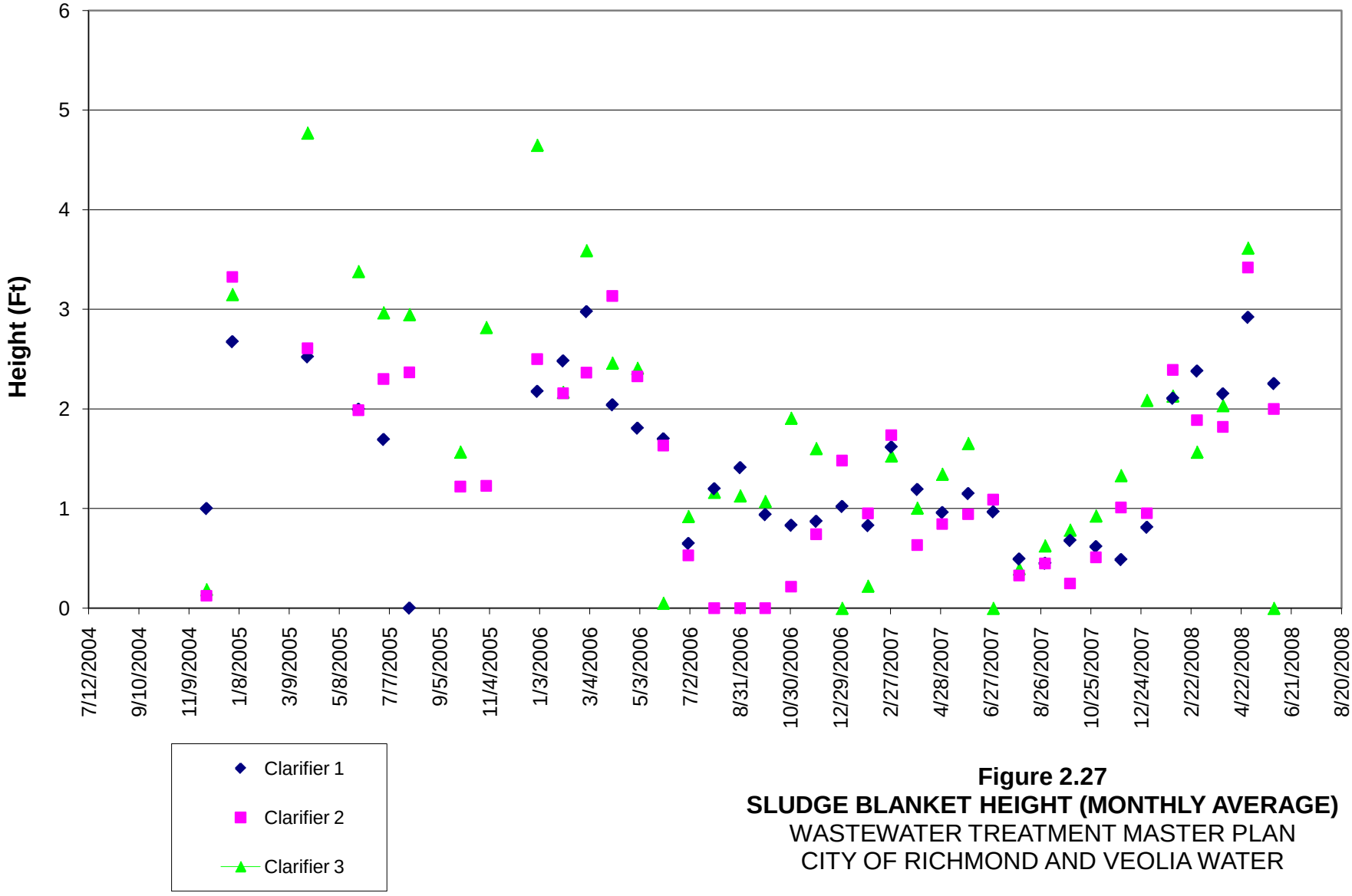

Figure 2.27
SLUDGE BLANKET HEIGHT (MONTHLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

large amount of debris passes through the influent bar screen. A possible solution to the draft tube issue is to change the type of clarifier mechanism to a blade type collector that moves the sludge to the center of the clarifier for removal (Project 1.10B). It is possible that the short-circuiting can be mitigated by installing a Stamford baffle in Clarifier No. 3 to direct the solids current back toward the bottom of the clarifier. A computational fluid dynamics (CFD) analysis should be performed prior to installation of the baffles to confirm that a Stamford baffle will improve the performance of Clarifier No. 3 (Project 1.11).

- 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. A picture of this condition is shown in Figure 2.28. To remedy this problem, new corner sweeps can be installed relatively inexpensively but they must be maintained frequently. The corners can also be grouted-in to prevent solids accumulation in these areas (Project 1.10A); however, this is more expensive than installing new corner sweeps.

- Flow control to the clarifiers is limited. The WPCP 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 through each clarifier. Installing flow control weirs in the clarifier influent channel would assist in allowing more flow control through the clarifier (Project 1.9).

- 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. Figure 2.29 shows the SVI for Aeration Basin Nos. 1 and 2. The SVIs in recent years have been very high. Operations staff has indicated that the SVIs are now lower since the practice of recycling digester overflow to the headworks has been discontinued. Switching from mechanical aeration to diffused aeration should help reduce the SVIs.

2.4.2.1.5 *Disinfection*

Process Description

The purpose of disinfection of wastewater is to protect public health by inactivating pathogenic organisms. The chlorine contact basin was constructed in 1978. The disinfection of wastewater at the WPCP is accomplished through sodium hypochlorite addition. The disinfected effluent is dechlorinated with sodium bisulfite to protect the wildlife in the San Francisco Bay.

Figure 2.28
RISING SLUDGE IN SECONDARY CLARIFIER NO. 2
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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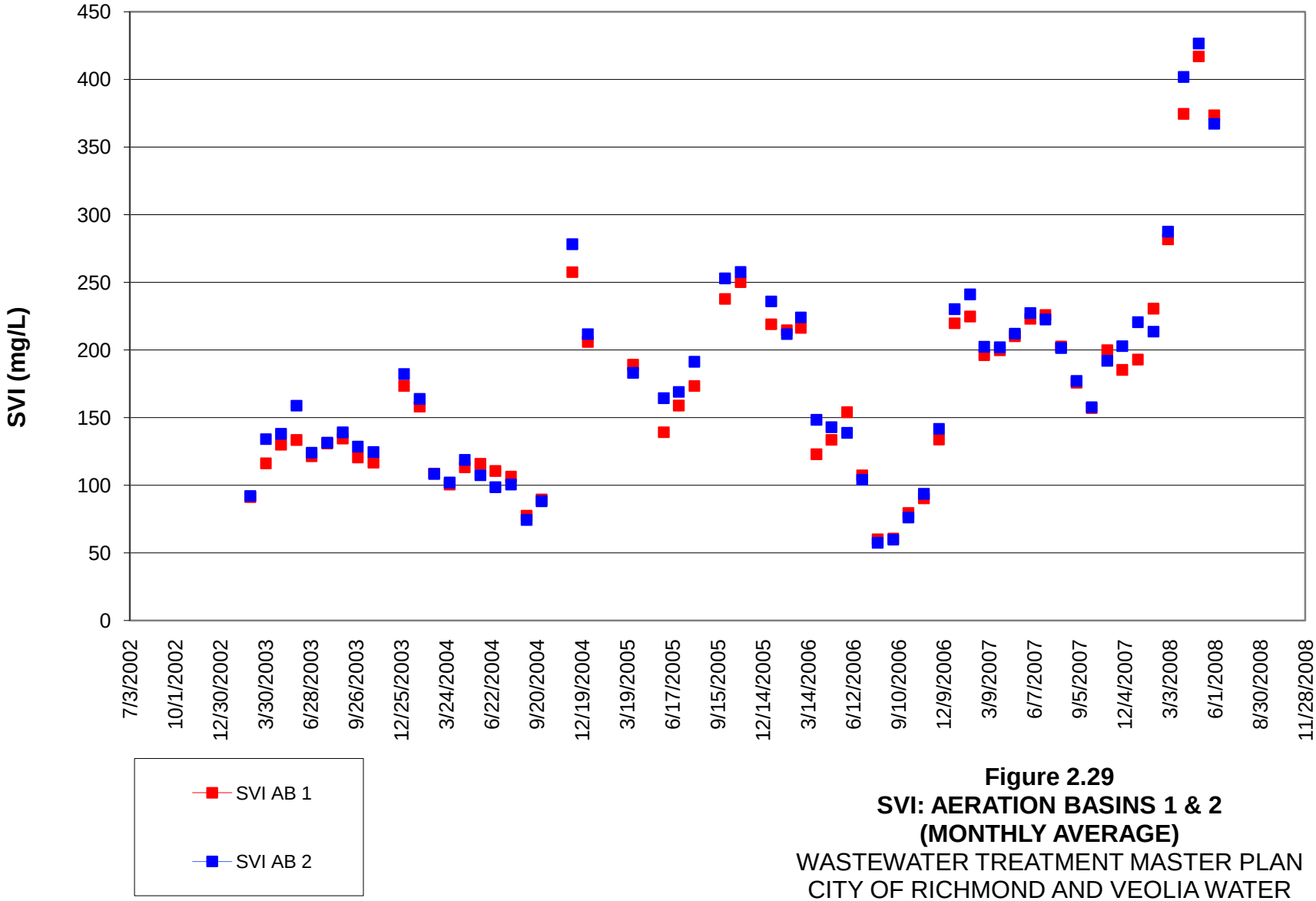


Figure 2.29
SVI: AERATION BASINS 1 & 2
(MONTHLY AVERAGE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Design Performance

The average chlorine dosage concentration during the study period was 7.3 mg/L (as indicated in Table 2.14), 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. Enhanced modeling and analyses, such as CFD, can be utilized to optimize and evaluate contact basins and disinfection operations.

Table 2.14 Disinfection Performance Data
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Design Parameter	Design Load	Typical Design Criteria	2003 - 2008 Performance
Chlorine Dose (mg/L)	ADAF	6 - 12	7.3
Sodium Bisulfite Dose (mg/L)	ADAF	8 - 18	11.2

The contact time at 40 mgd and 55 mgd is 35 min and 25 min, respectively.

Under the EPA guidelines for reliability and redundancy for disinfectant contact basins, "there shall be a sufficient number of units of a size, such that with the largest flow capacity unit out of service, the remaining units shall have a design flow capacity of at least 50 percent of the total design flow to that unit operation." The existing contact tank meets that criterion.

Operational Problems

The major issue with the disinfection facility is that effluent Parshall flumes submerge during wet weather events and at high tide. This is a hydraulic issue and will be discussed later in this section (Project 1.13). In addition, due to the solids carryover from the secondary clarifiers, solids settle out in the chlorine contact basins and need to be cleaned frequently.

2.4.2.2 Solids Treatment Process

In the following sections, each solids unit process is described, including a discussion of design loading rates. Since the solids process is not within the scope of this project, the evaluation is brief.

The WPCP solids treatment and handling processes consist of the following:

- Waste activated sludge thickening.
- Anaerobic digestion.

2.4.2.2.1 *Waste Activated Sludge Thickening*

Process Description

One DAFT unit of two units is functional and available for thickening operations at the WPCP. DAFTs No. 1 and No. 2 were constructed in 1967 and 1978, respectively. The DAFT units are circular with 35-foot diameter. The DAFT units reduce the volume of WAS to be handled by increasing the solids concentration. Thickening is accomplished at the WPCP without use of a coagulant aid.

Design Performance

Typically, the WAS feed to the DAFTs at the WPCP has a solids concentration of less than 1 percent. After thickening, the thickened WAS (TWAS), at an average solids concentration of 4.4 percent, is pumped to the digester, where it is combined with primary sludge for anaerobic digestion.

The operation of the DAFT falls within the industry standards for loading rates at ADAF. The average loading rate during the evaluation period was 6.25 $lb/ft^2/d$, respectively, compared with an industry standard of 10.0 to 20.0 $lb/ft^2/d$. SCADA records show a percent capture of 78 percent, which is below 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 $lb/ft^2/d$.

There are no EPA reliability and redundancy requirements for sludge thickening. To allow the existing unit to be taken out of service for maintenance it is recommended that duplicate units be provided at the WPCP. Accordingly it is suggested that the out-of-service DAFT unit be rehabilitated, an additional DAFT unit be constructed, or a gravity belt thickener (GBT), be provided at the WPCP plant to satisfy this requirement.

Operational and Unit Problems

DAFT No. 1 is not functional and the electrical and mechanical equipment on DAFT No. 2 is heavily corroded. Sludge Thickening improvements are identified as Project 1.14 in the Master Plan.

2.4.2.2.2 *Anaerobic Digestion*

Process Description

The WPCP has two anaerobic digesters of which were both constructed in 1967. Only anaerobic digester No. 2 is currently in service. The digesters are used to stabilize combined primary sludge and TWAS. Each digester has a maximum operating volume of 1.7 MG with a diameter of 100 feet.

Design Performance

To analyze digester performance, the destruction of volatile solids has to be determined. This analysis requires the determination of the total and volatile solids fractions of the raw sludge (including both primary sludge and WAS) and the digested sludge. Digester data is very limited. Based on the available data and operation of Digester No. 2 only, an average volatile solids reduction of 47.5 percent occurs in the Digester. The average hydraulic residence time is 28 days. The average volatile solids loading is approximately 0.08 lb VSS per cf per day.

The U.S. EPA Part 502 Sludge Regulations require that anaerobic digestion provide a retention time of 15 days and achieve a 38 percent destruction of volatile suspended solids (VSS) for a facility to meet Class B criteria. Based on the available data, the digester meets the 15-day criterion and 38 percent destruction. In addition, the volatile solids loading is below 0.12 lb VSS per cf per day, which is a commonly used design criterion for high rate anaerobic digesters. A discussion of digester gas production is provided in Chapter 6.

With respect to reliability and redundancy, the EPA suggests that at least 2 digestion tanks be provided for anaerobic digestion. At the WPCP, Anaerobic Digester No. 1 needs to be available for operation to meet this condition.

Operational Problems

Digester No. 2 has heating and mixing deficiencies. Mixing is ineffective because the suction line for the mixing pumps does not draw from the bottom of the digester causing accumulation of grit in this portion of the digesters. Veolia O&M Staff have indicated that boilers and heat exchangers are heavily scaled with mineral deposits and are not able to exchange enough heat to maintain proper digester temperatures. In addition, because the grit basin is not operating optimally and the primary scum skimmers/pumps send trash to the digesters, the digester is being filled with inert material, which is reducing the digester treatment capacity. Because only one digester is in service, Digester No. 2 cannot be taken off-line to be cleaned. To fix these issues, the City has authorized, and Veolia is currently implementing, the Digester Rehabilitation Project (Project 1.15).

2.5 CAPACITY ANALYSIS

2.5.1 Introduction

The treatment capacity of the WPCP is subject to a variety of conditions. Parameters affecting a plant's ultimate 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.

2.5.2 Plant Hydraulics

2.5.2.1 Hydraulic Modeling Analysis

As part of the hydraulic analysis, a hydraulic profile, or water surface elevation, of the plant and its various processes was developed. The resulting hydraulic profile determined the hydraulic gradient through the treatment facility at specific flow rates and water surfaces in the effluent wet well and outfall. The profiles were used to determine whether the plant facilities or treatment processes would be flooded during high flow periods. Specifically, the hydraulic evaluation determined how much flow could be sent through the plant, independent from treatment process considerations.

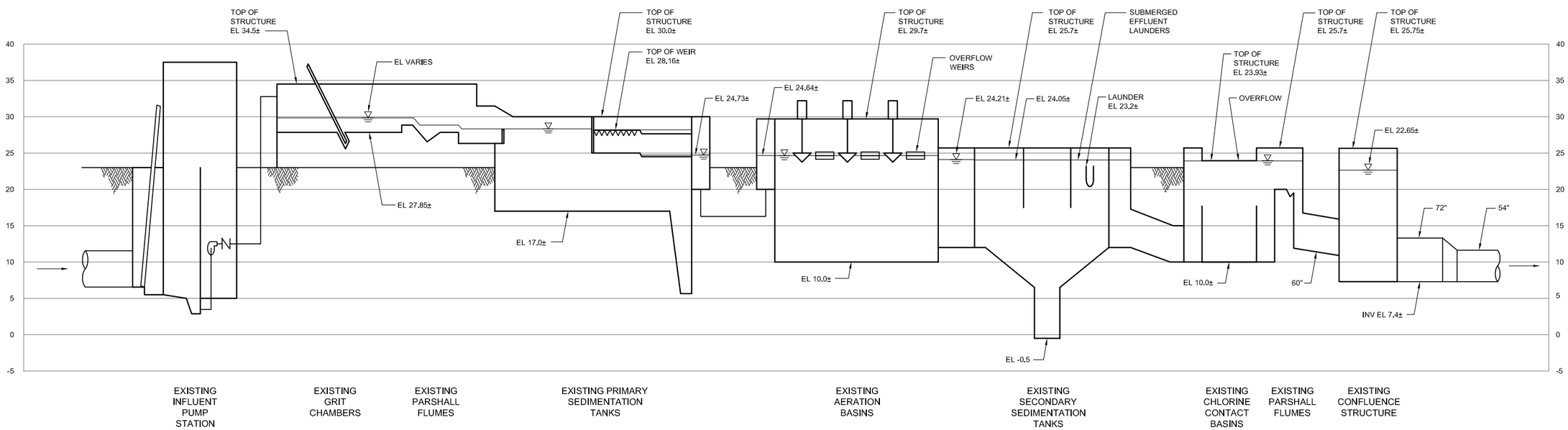
A hydraulic model of the liquid treatment train was developed using MathCAD software (Excel was used for the outfall hydraulics). Hydraulic computations consisted of calculating headlosses using empirical methods. Hydraulic profiles were generated from the model for flows of 7.0 and 55 mgd. The model incorporated the agreement between RSSD and the WCWD, which allows WCWD to discharge 21 mgd of effluent. Thus, the total flow through the outfall can be as much as 76 mgd under wet weather conditions.

Hydraulic modeling began at the outfall, where a worst-case maximum tide elevation was assumed and headloss computations proceeded upstream through the WPCP. Model parameters included:

- The hydraulic profile was prepared at flow rates of 7 mgd and 55 mgd.
- The hydraulic profile is prepared for the “critical” path (or greatest headloss) of flow through the plant.
- The assumption that no units were out of service.
- The total headloss through the plant was the sum of headlosses in the treatment train and in connecting piping and appurtenances.
- The total headloss through connecting piping, channels, and appurtenances included entrance, exit, contraction and enlargement, friction, minor, and weir losses. All minor losses were calculated in terms of velocity head.
- The outfall exit condition was assumed to be the worst-case scenario of maximum high tide, which is 8.5 feet above mean low water level.

2.5.2.2 Hydraulic Results

To determine the WPCP hydraulic capacity, various flows were simulated using the hydraulic model. Under each flow condition, water depth was compared to basin depth to determine hydraulic bottlenecks and/or basin overflows. Model results indicated that the plant is hydraulically limited by the outfall. Previous studies of the outfall showed that the outfall had a capacity of approximately 62 mgd under maximum tide conditions and a water level of +23.0 in the confluence structure. Under this scenario WCWD would be entitled to 21 mgd of flow and Richmond would be entitled to 41 mgd (or alternatively 7 mgd for WCWD and 55 mgd for Richmond). However, a water level of +23.0 in the confluence structure, as shown in Figure 2.30 significantly impacts the hydraulics of the WPCP.



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

This water level and flow rate submerges the effluent Parshall flumes (which have a base elevation of +20.0 feet), causes the water level in the chlorine contact basins to reach the top of the structure, and submerges the effluent launders in the secondary clarifiers. Under these conditions, the WPCP is subject to basin overflows and poor secondary clarification, which could result in NPDES permit violations. To avoid adverse impacts on the treatment train, 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 WPCP and 21 mgd for WCWD).

Because flows regularly meet and 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 due to 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 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.

Solutions to this hydraulic limitation include the installation of a low lift pump station at the confluence structure (Project 1.13) or the construction of a new outfall. The low lift pump station would only operate when the water level in the confluence structure is high.

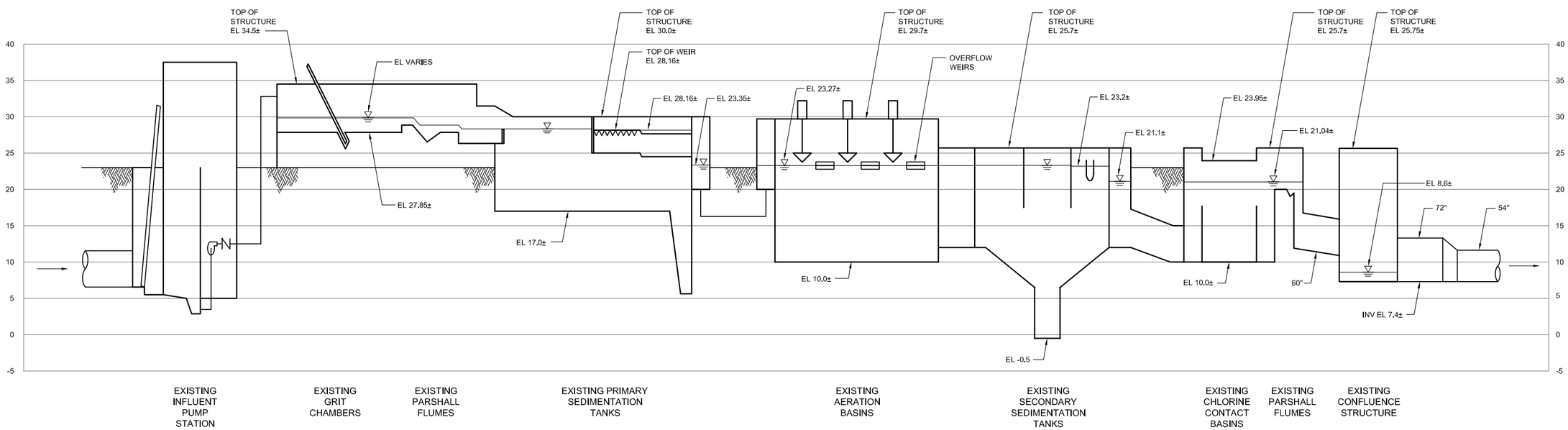
Water surface elevations were also generated through the WPCP treatment train at the ADWF of 7.0 mgd. Figure 2.31 presents the water elevations at these flows for the various treatment structures in the facility.

2.5.3 Plant Treatment

2.5.3.1 Process Model and Analysis

A treatment plant process model was constructed based on the existing unit processes at the WPCP. Existing and future flows and loadings (presented in Chapter 3) were used to determine the treatment capacity of the WPCP.

The plant modeling was completed with an in-house modeling program developed by Carollo called BioTran™. Observed treatment process performance and data inputs were derived from the plant data from the period of January 1, 2003 through May 15, 2008. This data were used in calibrating the model to simulate plant performance. Physical dimensions for the existing basins and processes were obtained from record drawings and other available information sources. Additional model input components such as kinetic parameters and reaction coefficients were based on Carollo experience and recommended values published within technical literature.



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

Specific design criteria that were used in the determination of unit capacities included:

- Primary clarification surface overflow rate (SOR).
- SRT.
- Clarifier safety factor (CSF).
- Secondary clarification SOR.
- DAFT solids loading.
- Digester HRT.
- Digester volatile solids loading.

2.5.3.2 Process Model Results

Table 2.15 presents the treatment capacity results for three scenarios in which the WPCP provides carbonaceous removal of the entire flow stream, as required by the NPDES permit. The scenarios that were evaluated are as follows:

- All major process units are in-service at ADMM flows and loads.
- One major process unit was assumed out of service at ADWF; however, no two processes could have a unit out of service at the same time (e.g., primary clarifier and aeration basin). Average dry weather loadings were used for evaluation and the corresponding ADWFs were determined.
- All major process units are in service. Peak wet weather flow loadings of 40 mgd (primary) and 20 mgd (secondary) were used. A PHWWF of 55 mgd was not used because, as will be discussed in Chapter 6, it is more feasible to provide equalization storage for flows over 40 mgd than it is to treat these flows.

2.5.3.2.1 *Existing Capacity Rating*

The NPDES permit states that the WPCP is rated to 16 mgd ADWF and 20 mgd PWWF (secondary treatment). The unit processes that fall short of meeting the 16.0 mgd ADWF capacity rating are the aeration basins, the secondary clarifiers, the DAFTs, and the digesters. The aeration basins fail to meet the 16.0 ADWF design criteria because the original design criteria for the WPCP included the construction of six aeration basins. Currently only two are in operation (two were never built and two are used as equalization basins). The influent loads over the past three years are also much higher than the process was originally designed to handle (current loads are 250 mg/L BOD_5 and 400 mg/L TSS versus design values of 245 mg/L BOD_5 and 180 mg/L TSS). With regards to the DAFTs and the digesters, only one of each is functional, so the capacity has been derated accordingly.

Table 2.15 Treatment Capacity Rating
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Unit Process	All Units In Service[1] (mgd ADMMF)	One Unit Out of Service[1] (mgd ADWF)	All Units In Service[2] (mgd PWWF)	Design Criteria
Bar Screen[3]	--	--	33	Approach velocity of 1.5 ft/sec
Influent Pump Station[3]	--	--	30	With largest pump out of service
Grit Basin[3]	--	--	40	
Primary Clarifiers	20	8.75	39	SOR of 1000 gal/sf-d at ADWF (2500 at PWWF)
Aeration Basins[4]	12.3	6.5	20	SRT = 3 days and MLSS = 3500 mg/L
Secondary Clarifiers	12.3	10	20	SOR of 400 gal/sf-d (600 at PWWF) with SVI of 150 mg/L
Chlorine Contact Basin	24	--	72	HRT of 1 hr at ADMMF and 20 min at PWWF
Outfall[3]	--	--	35	At a water level of +20.0 ft in the confluence structure
Dissolved Air Flotation Thickeners	11.0[5]	0[5]	N/A	Loading of 18 lb/sf-d
Digesters	9.0[5]	0[5]	N/A	Loading of 0.12 lb VSS/cf-d and HRT of 15 d

Notes:
(1) Based on ADAF BOD_5 and TSS concentrations of 250 mg/L and 400 mg/L..
(2) Based on wet weather conditions (ADAF loadings under higher hydraulic loads).
(3) For simplicity, processes that are designed based on hydraulic capacity were excluded from the ADMMF/ADWF analysis because these unit processes are not designed based on BOD_5 or solids loading.
(4) Existing mechanical aeration system is undersized at ADMMF and at ADWF if one aeration basin is out of service.
(5) Only one DAFT and digester are functional. DAFT and digester capacities determined by ADWF.

2.5.3.2.2 *Revised Capacity Ratings*

The analysis showed that the plant is at capacity during ADMMF conditions (the current average ADMMF is 12.1 mgd while the capacity is 12.3 mgd). Because the ADMMF varies from year to year (in 2006 the ADMMF was 14.2), the secondary process should be expanded immediately to accommodate flows during wet winters. Expansion of the secondary treatment process would include a fine bubble aeration system and a third aeration basin. The conversion to fine bubble aeration and the conversion of one of the existing equalization basins to a third aeration basin are identified as Projects 1.6 and 1.7, respectively. The construction of a new equalization basin to replace the basin that is converted to an aeration basin is identified as Project 1.8.

There were three problem areas identified in the scenario that analyzed WPCP performance under average dry weather loading conditions when one unit is out of service. The first is that the capacity of one aeration basin is equal to the current ADWF, which leaves no margin for additional flow. In addition, the existing aeration system is not capable of providing sufficient oxygen levels to the aeration basin. This conclusion was corroborated during the summer of 2008 when only one aeration basin was in service. During this period, the secondary process had difficulty meeting effluent requirements. In addition, the DAFTs and Digesters do not the current ADWF of 6.5 mgd. The DAFT and the digester do not meet reliability requirements because there are no backup units for either of these processes. DAFT No. 1 needs to be replaced with a new DAFT or gravity belt thickener (GBT), and Digester No. 1 needs to be rehabilitated and put online (the Digester Rehabilitation project has already been approved by the City). The DAFT replacement and Digester Rehabilitation projects are Projects 1.14 and 1.15, respectively.

At peak weather flows, 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 the primary clarifiers. The influent pump station is being upgraded to increase the firm capacity to 40 mgd (Project 1.1). A second bar screen is required to increase screening capacity (Project 1.2). While the primary clarifiers will still function when flows are higher than 39.0 mgd, their removal efficiencies will be reduced somewhat. While the analysis showed that the secondary processes are capable of treating 20 mgd during wet weather conditions, this analysis assumes that the secondary process equipment is in good working condition (e.g., modifications to secondary clarifiers have been made to improve their performance) and the process is operating optimally (e.g., the sludge has an SVI of 150 mg/L). No unit processes are capable of treating the evaluated peak wet weather flow of 55 mgd.

2.5.3.2.3 *Conclusions*

Based on both hydraulic and process evaluations, it appears that the WPCP can adequately treat an ADMMF of 12.3 mgd to the current discharge standards when all units are in service with the exception of the secondary treatment process which is undersized at

ADMM flows and loads. Over the last five years, the ADMMF has averaged 12.1 mgd but it has been as high as 14.2 as recently as 2006. Therefore, the secondary treatment capacity should be expanded to meet existing ADMMFs.

With one unit out of service at ADWF, liquid stream and solids treatment capacity is reduced to 6.5 mgd and 0.0 mgd, respectively. Since the current ADWF is 6.5 mgd, most process units need to be improved to treat existing flows and for reliable operation. In addition, the aeration system is undersized at ADWF if only one aeration basin is in service.

With regard to peak wet weather flows, if the secondary process is expanded and sufficient improvements are made to the treatment process (as discussed in Chapter 6), the plant should be able to fully treat wet weather flows up to 20 mgd and treat an additional 20 mgd to primary treatment standards. However, a second bar screen and outfall improvements are required to treat and discharge peak wet weather flows.

It is recommended that this capacity analysis be revisited once the new influent sampling station is online. A reduction in influent load may increase the capacity of the plant.

Chapter 3

PROJECTED WASTEWATER FLOWS AND CHARACTERISTICS

3.1 INTRODUCTION

The purpose of this chapter is to present population and flow projections for the Richmond Sanitary Sewer District's (RSSD) service area and to project future wastewater flows and loads. The population and flow projections performed for this analysis are complementary to the projections developed by Boyle Engineering for the 2006 City of Richmond (City) Sewer System Master Plan (SSMP). The projections extend to the year 2040 in five-year increments and are used, in conjunction with the SSMP, to assist in master planning future facilities at the Water Pollution Control Plant (WPCP). This chapter uses existing and historical data, as well as projected population growth, to develop flow and pollutant load projections. The flows and conventional wastewater characteristics projected include:

- Average day dry weather flow (ADWF).
- Average day maximum month flow (ADMMF).
- Peak Wet Weather Flow (PWWF).
- Five-day biochemical oxygen demand (BOD_5).
- Total suspended solids (TSS).

3.2 SUMMARY OF SSMP PROJECTIONS

As part of the SSMP, a land use analysis was completed. The analysis compared existing land uses to allowable/ultimate land uses, which were defined in the City's General Plan. Based on unit flow criteria assigned to each land use type, flow projections were developed for the sewer system service area under two scenarios: 1) present conditions and 2) buildout conditions. The flow projections were calibrated by comparing the projects to a collection system flow monitoring study. A summary of the flow projections contained within the SSMP is included in Table 3.1

Table 3.1 Summary of Project ADWFs from the Sewer System Master Plan Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water

Flow Scenario	Projected ADWF (mgd)
Existing Conditions - 2006	7.22
Buildout Conditions - 2020	11.28

The projected ADWF compares favorably to the existing ADWF of 6.5 million gallons per day (mgd), which was determined from WPCP flow data in Chapter 2 of this Master Plan.

3.3 OVERALL APPROACH TO FLOW AND LOAD PROJECTIONS

To verify the flow projections developed in the SSMP, existing flows were projected based on population projections for the service area. Using average annual growth data from Association of Bay Area Governments (ABAG) and Department of Finance (DOF) population data, future service area population growth factors were estimated until 2040.

The WPCP treats both residential and industrial flows. Industrial pollutant concentrations are typically higher than non-industrial concentrations. Flow data on industrial flows and loads were not available. Therefore, future flows and loads to the Richmond Wastewater Treatment Plant (WWTP) facilities were not divided into different components (i.e., residential, commercial and industrial), but treated as a composite flow consistent with historical per capita flows and loads.

3.4 POPULATION PROJECTIONS

The SSMP estimated populations until 2030 based on United States Census data and California DOF data. The future growth rate was estimated from the yearly average growth rate extrapolated from Richmond's historical population from 1980 to 2005. Based on this report, the Richmond historical population averaged approximately 1.5 percent per year.

As part of this study, the historical populations were updated using DOF values for the years 1990 through 2008. The populations prior to 1990 were obtained from the previous SSMP. Analysis of the population trends from 1980 to 2008 showed an annual average growth rate of 1.5 percent. Thus, a 1.5 percent yearly average growth was used to estimate the populations to the year 2040. Table 3.2 presents the City of Richmond historic and projected populations from 1905 to 2040.

It is important to note that the population served by the RSSD is less than the population of the City of Richmond. In the 2008 NPDES permit, the population of the RSSD's service area is stated to be 68,000. The purpose of this analysis is not to determine the population of Richmond but to determine the relative growth rate. The relative growth rate will be used to estimate future wastewater flows. This analysis is intended to supplement the more sophisticated wastewater flow analysis contained within the SSMP. The SSMP analysis projected flows based on land use, flow monitoring studies, and information contained within the Richmond General Plan. The SSMP analysis was limited to areas with the RSSD's service area.

Although the City population grew by over 17 percent in the years between 1980 and 1990 and by 13 percent in the years from 1990 to 2000, the City's population growth rate was slightly below the growth rate for Contra Costa County of approximately 20 percent.

Table 3.2 Historical and Projected Populations
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Year	Total Population[(1)]	Annual Growth Rate (%)
1905	2,150	---
1910	6,802	25.9
1920	16,843	9.5
1930	20,093	1.8
1940	23,642	1.7
1950	99,545	15.5%
1960	71,854	-3.2
1970	79,043	1.0
1980	74,676	-0.6
1990	87,425	1.6
1995	93,015	1.3
2000	99,216	1.3
2001	100,363	1.2
2005	102,269	0.5
2006	102,230	0.0
2007	103,351	1.1
2008	103,577	0.2
2010	106,708	1.5
2015	114,954	1.5
2020	123,839	1.5
2025	133,409	1.5
2030	143,720	1.5
2035	154,827	1.5
2040	166,793	1.5

Notes:

(1) Population information for years prior to 1990 was obtained from the City of Richmond Sewer System Master Plan (Boyle Engineering, 2006). Populations from 1990 to 2008 were obtained from DOF records.

Between 2010 and 2040, Contra Costa County is expected to increase its population by nearly 50 percent. Based on DOF information, the City is expected to increase its population by approximately 56 percent over the same period.

3.5 PROJECTED WASTEWATER FLOWS

Population based flow projections were used to verify future WPCP flows that were calculated in the SSMP. To develop population based flow projections, projected population is multiplied by per capita flow. The projections were developed for ADWF. Historical per capita ADWF values were determined for 2003 through 2007. The per capita flow values for the last five years were calculated by dividing the ADWF for the year by the population for that year. These results are presented in Table 3.3. The per capita flow value accounts for residential, commercial, and industrial users.

Table 3.3 Historical Per Capita Flow
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Year	ADWF (mgd)	Population[(1)]	Per Capita Flow (gpcd)
2003	6.6	66,447	99
2004	6.7	66,848	100.2
2005	6.2	67,252	92.2
2006	6.6	67,252	98.1
2007	6.3	68,000	93.6
Average	6.5	---	96.6

Notes:

(1) Population data based on Department of Finance Records.

The per capita flow in the five year period ranged from 92 gallons per capita day (gpcd) in 2005 to 100 gpcd in 2004. Due to this variability, a value of 100 gpcd was selected as a per capita flow for master planning.

Figure 3.1 plots the historical and projected ADWFs and ADMMFs. The combined wastewater flow projections for the Richmond WPCP are presented in Table 3.4. The ADAF and ADMMF were calculated using peaking factors of 1.26 and 1.85 previously presented in Table 2.4. The table shows that in 2040 the ADWF is projected to be 10.8 mgd. This is slightly less than the buildout ADWF of 11.2 mgd projected for buildout in the SSMP. Because the two flow projections are within 4 percent of each other and the planning period is over 30 years, the two numbers can be considered the same. Because growth rates are highly variable, the population growth in the RSSD service area and influent flow to the WPCP should be evaluated at regular intervals to verify that the flow projections remain on target.

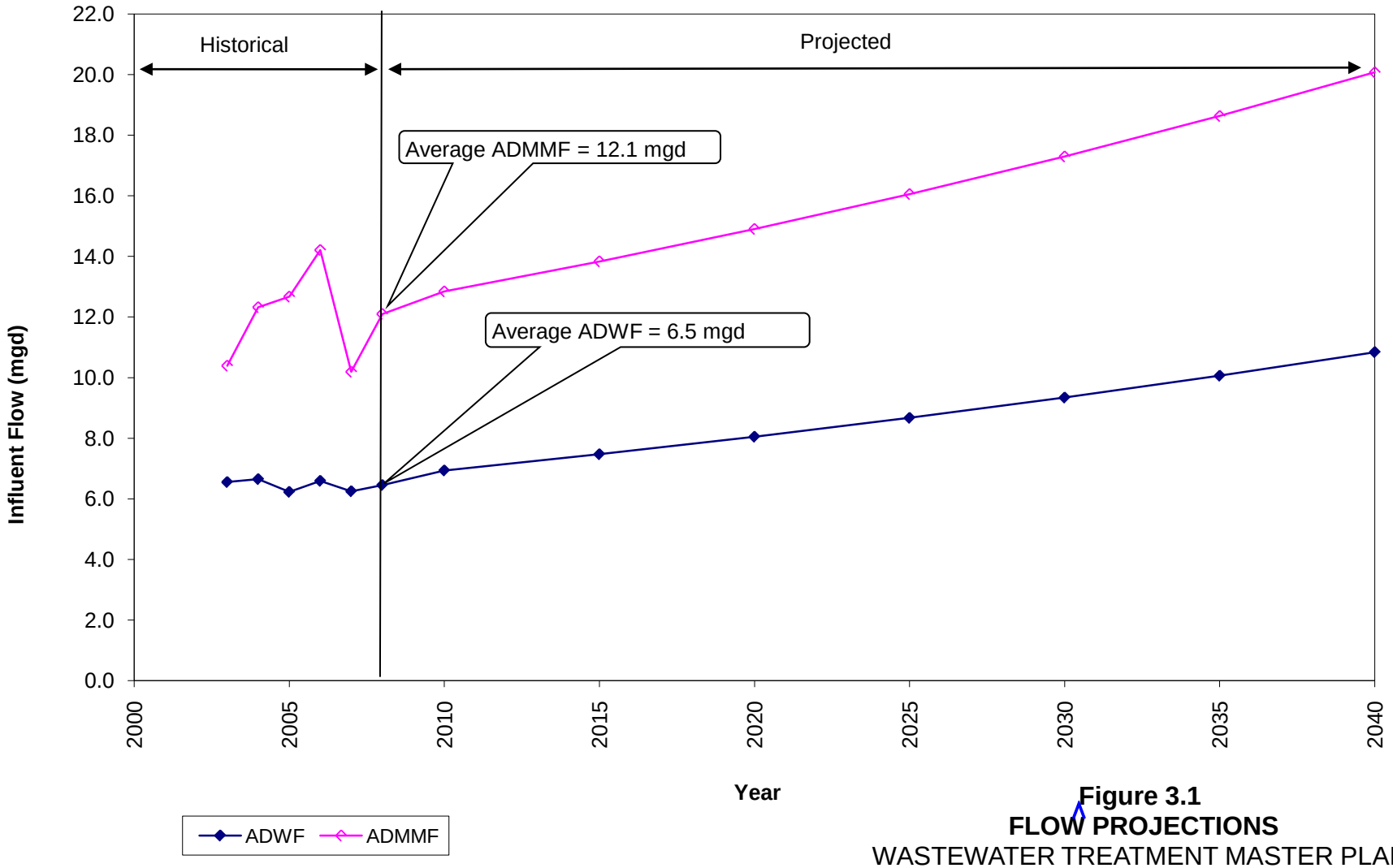


Figure 3.1
FLOW PROJECTIONS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Table 3.4	Projected Average Dry Weather, Average Day Annual and Average Day Maximum Month Flows Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water			
Year	Service Area Population	Projected ADWF[(1)] (mgd)	Projected ADAF[(2)] (mgd)	Projected ADMMF[(3)] (mgd)
2010	69,200	6.9	8.7	12.8
2015	74,354	7.5	9.4	13.8
2020	80,101	8.0	10.1	14.9
2025	86,291	8.7	10.9	16.1
2030	92,460	9.3	11.8	17.3
2035	100,144	10.1	12.7	18.6
2040	107,884	10.8	13.6	20.1

Notes:
(1) Projected ADWF calculated by multiplying the population by a per capita flow of 100 gpcd.
(2) ADAF calculated by multiplying the projected ADWF by 1.26.
(3) ADMMF calculated by multiplying the projected ADWF by 1.85.

3.6 PROJECTED WET WEATHER FLOWS

In order to estimate the wet weather flows expected at the WPCP, storm events and blending data between 2003 and 2007 were evaluated. As stated in the SSMP, during wet weather events, the plant flow can rapidly rise to 36 mgd as result of just a 2-year storm event, corresponding to 1.47 inches of rain in a six-hour period or 2.77 inches of rain in a 24-hour period. Collection system modeling has shown that flows as high as 53.3 mgd could occur at the WPCP after or during a 5-year 24-hour storm event. Flow monitoring at the WPCP effluent flow meter has reported flows higher than 55 mgd.

Since the plant secondary capacity during peak flow periods is only 20 mgd, when the influent flow exceeds this value, flow equalization and sometimes blending is required. When the plant influent reaches 20 mgd, the primary effluent is partially diverted to two equalization basins for storage. Each basin holds 1.0 million gallons (MG). Once these basins are filled, the overflow is blended with secondary effluent and disinfected prior to discharge to the San Francisco Bay. To meet National Pollutant Discharge Elimination System (NPDES) permit requirements, the WPCP is operated to ensure that all flow, including blended flow during wet weather events, meets effluent limit requirements.

For master planning purposes, a peak hour wet weather flow (PHWWF) of 55 mgd was selected. This flowrate was selected based on the SSMP model results and the

understanding that the Regional Water Quality Control Board (RWQCB) may require the WPCP to have the capacity to treat flows during a 10-year, 24-hour wet weather event. After the installation of the influent flow metering station and the on-going sewer system improvements are completed, the collection system model should be calibrated based on the new influent flow data. New model runs, for both 5 and 10-year 24-hour wet weather events, should be completed based on this data. Once this data is available, the Master Plan should be updated to reflect the updated PHWWF.

3.7 PROJECTED WET WEATHER EVENT VOLUMES

The purpose of this section is to estimate the volume of wastewater that is blending during wet weather events. This information is important because the total volume will be used to develop alternatives to reduce the number of wet weather blending events.

From 2002 through 2006, the plant experienced 12.4 blending events annually (Swinerton Management & Consultants 2007). Figure 3.2 presents the effluent hydrograph for a wet weather event in January 2003. Figure 3.3 presents the effluent hydrograph for four wet weather events between December 2003 and January 2004.

In several of the storm events, recorded plant effluent exceeds 55 mgd. Because it is assumed that a surcharge of the effluent Parshall flumes, due to the outfall's hydraulic capacity limitation, is causing faulty readings, any flows exceeding this flow were not considered in the wet weather flow analysis. Table 3.5 summarizes a series of five wet weather events where bi-hourly flow data was available in SCADA data obtained from the WPCP. By integrating the area of the hydrographs above 20 mgd (the secondary capacity of the WPCP) for these events, the total blending volume for each event was estimated. By this method, it can be determined that the maximum volume of storm flow that was blended during the observed period was approximately 20.8 mgd.

Table 3.5 also includes the daily blended flow obtained from the SCADA system for these storms. This blended flow is calculated by a totalizer algorithm using the data from the flowmeter on the primary effluent bypass pipeline. The table shows that there is no correlation between the hydrographs and the flowmeter data. Based on the SCADA data, the maximum blended flow during these events was 20.5 MG. Table 3.6 shows a summary of the daily blended data for the last five years.

By combining the hydrograph estimates and the SCADA data, wet weather flow blending volumes were estimated. Based on the available data, the maximum storage required is approximately 21 MG. Based on this methodology, the WPCP would need to increase storage volume by over 19 MG (including the 2 MG of existing storage) to ensure that all flow receives secondary treatment. Note that it is common to provide excess equalization storage capacity for unexpected flow variations, storage consumption prior to the storm event, equipment considerations, solids deposition, and for flexibility of return operations.

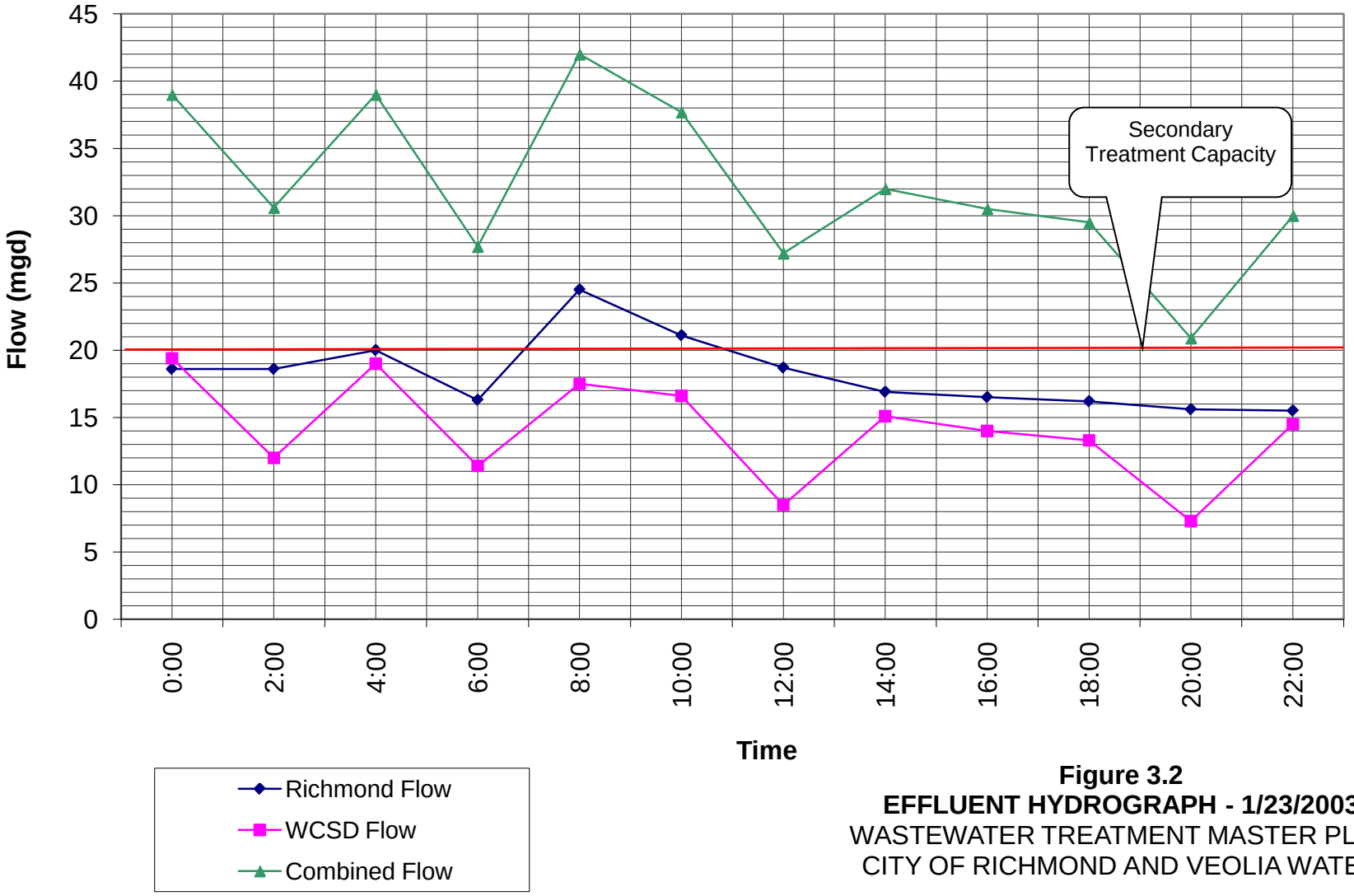


Figure 3.2
EFFLUENT HYDROGRAPH - 1/23/2003
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

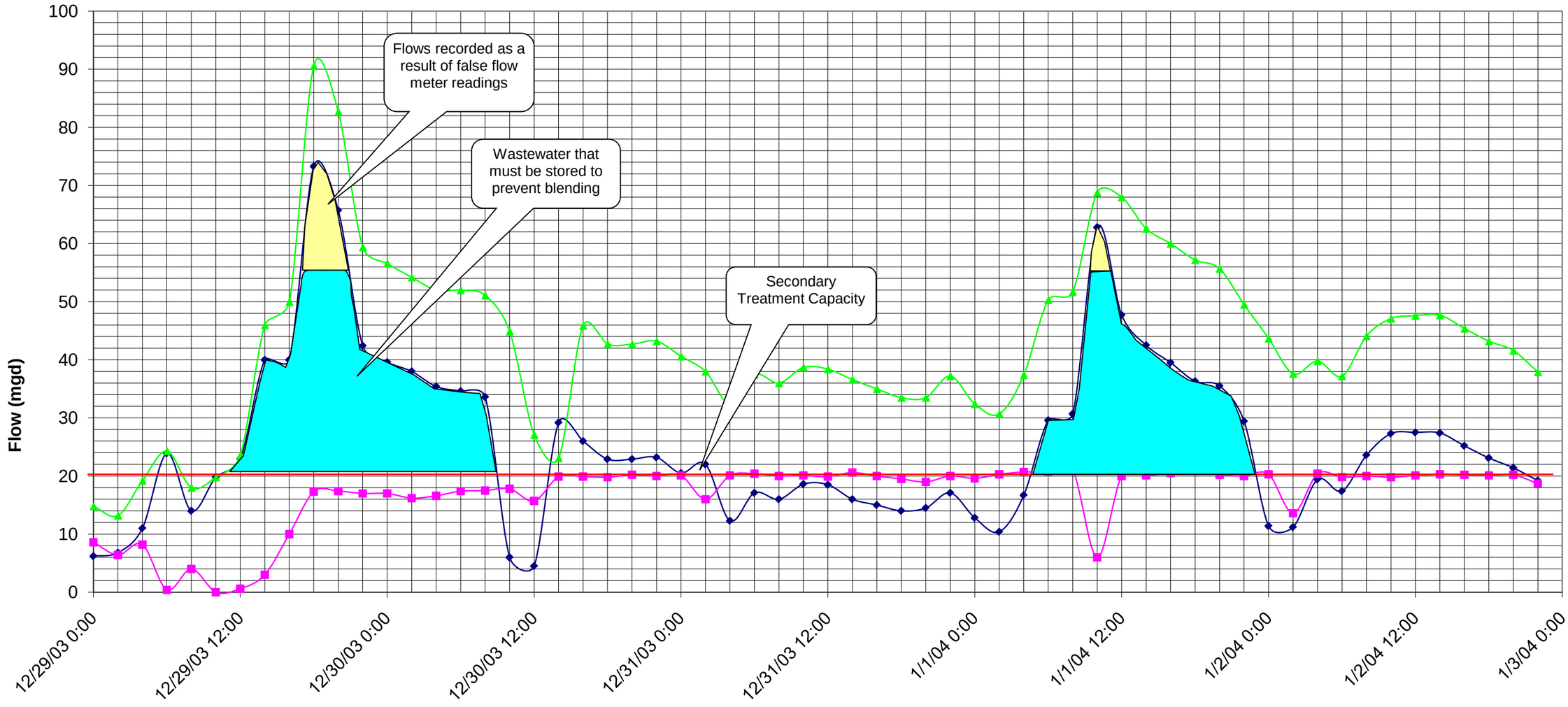


Figure 3.3
EFFLUENT HYDROGRAPH - DEC/JAN 2003/2004
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Table 3.5 Summary of Select Wet Weather Events (Secondary Capacity = 20 mgd) Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water				
Date of Occurrence	**Duration**	**Measured Rainfall (Inches)[(1)]**	**Estimated Stormwater Volume Requiring Storage (MG)**	**Blended Flow from SCADA (MG)**
1/10/2003	5 hours	N/A	3.6	6.1
12/29/2003	23 hours	2.0	20.8	1.4
12/30/2003	13 hours	N/A	2.1	0.0
1/1/2004	16 hours	2.0	14.6	20.5
1/2/2004	14 hours	N/A	3.0	1.2

Notes:

(1) Rainfall as measured from the on-site rain gage. Data not available (N/A) on 1/10/2003, 12/30/2003 and 1/2/2004.

Table 3.6 Summary of Blending Data from Primary Effluent Bypass Flowmeter Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water	
Number of Blending Events	61
Average Blended Volume (MG)	4.6
Maximum Blended Volume (MG)	20.5

Following the comparison of excess flow generated from wet weather events and blending requirements, the effect of increasing secondary treatment capacity to 40 mgd was evaluated. Using the same set of wet weather events summarized in Table 3.4, the expected stormwater volume requiring blending/storage was determined. If the treatment plant secondary capacity were increased to 40 mgd, only two wet weather events required blending. Table 3.7 summarizes the expected storage and blending volume for this scenario. Based on the limited data available, the total storage required is 2.3 MG the secondary capacity is increased to 40 mgd. For the planning purposes, it was assumed a 3.5 MG equalization basin would be sufficient to reduce peak influent flows to 40 mgd.

These values will be used in the development of alternatives to minimize blending events in Chapter 5. Because the WPCP does not have an influent flow meter and the analysis was based on a number of assumptions (maximum flow rate of 55 mgd, limited sample of storm hydrographs, and SSMP modeling results that have not been updated with collection system improvements), it is critical that, once the new influent flow meter is online, influent

Table 3.7 Summary of Select Wet Weather Events (Secondary Capacity = 20 mgd) Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water			
Date of Occurrence	**Duration**	**Measured Rainfall (Inches)**	**Estimated Stormwater Volume Requiring Storage (MG)[(1)]**
12/29/2003	23 hours	2.0	3.0
1/1/2004	16 hours	2.0	1.8

Notes:

(1) Represents the theoretical stormwater requiring storage/blending if the treatment plant secondary capacity was increased to 40 mgd.

data is recorded and analyzed to update the analysis contained within this chapter. The wet weather volumes contained within this section are acceptable for master planning but not for facility design.

It is important to note that this analysis does not account for an increase in base wastewater flow (ADWF) due to population growth. It is assumed that the reduction in infiltration and inflow (I&I) due to collection system improvements will cancel out any increases in wet weather flows due to population growth.

3.8 PROJECTED CONVENTIONAL POLLUTANT LOADS

This section uses the flow projections developed by the Sewer System Master Plan and verified by the population analysis to develop future conventional pollutant load projections. The conventional pollutants evaluated are the five-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS). The same rationale used in projecting flows is used to project loads for average dry weather loads (ADWL) and average day maximum month loads (ADMML).

The average dry weather and average day maximum month BOD_5 and TSS loadings for the last five years were averaged and projected over the planning period based on population growth. Due to the large variability in influent loading data that the averages may not be representative of the actual influent load. More sampling and investigation is required to determine the cause of the variable influent loads. It is hoped that data from the new influent sampling station will result in a more consistent loading information. The master plan should be updated once this data becomes available.

The results of the historical BOD_5 data for dry weather loading are presented in Table 3.8. The BOD_5 concentrations in 2003 and 2004 are much lower than in subsequent years. Based on this data, an average day annual BOD_5 concentration of 250 milligrams per liter (mg/L) was assumed to calculate the BOD_5 loading for future projections.

Table 3.8	Historical BOD_5 Loading Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water	
Year	Average Day Annual Concentration (mg/L)	Average Dry Weather Load (lb/day)
2003	146	9,444
2004	197	12,643
2005	276	20,540
2006	331	21,255
2007	297	15,393

The results of the historical TSS data for dry weather loading are presented in Table 3.9. Similar to the BOD_5 data, the ADWL and thus the per capita load is significantly lower in 2003 and 2004 than the subsequent years (as discussed in Chapter 2). Based on this data, an average day annual concentration of 400 mg/L was assumed as the TSS loading for future projections.

Table 3.9	Historical TSS Loading Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water	
Year	Average Day Annual Concentration (mg/L)	Average Dry Weather Load (lb/day)
2003	183	10,540
2004	192	12,639
2005	458	34,380
2006	582	37,579
2007	590	31,829

Using the assumed BOD_5 and TSS concentrations of 250 mg/L and 400 mg/L for average day annual concentrations, respectively, the average dry weather, average day annual and average day maximum month BOD_5 and TSS concentrations were projected until 2040.

Tables 3.10 and 3.11 provide BOD_5 and TSS projections, respectively. The BOD_5 loading is expected to increase from approximately 16,400 lbs/day during ADWF in 2010 to approximately 25,700 lbs/day in 2040. Figure 3.4 presents the historical and projected BOD_5 loading. The TSS loading is expected to increase from approximately 26,000 lbs/day during ADWF in 2010 to approximately 41,000 lbs/day in 2040. Figure 3.5 presents the historical and projected TSS loading.

Table 3.10 Projected Average Dry Weather and Average Day Maximum Month BOD_5 Loads Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water			
Year	**Population Projection**	**Average Dry Weather Load (lb/day)**	**Average Day Maximum Month Load (lb/day)**
2010	106,708	16,400	26,100
2015	114,954	17,700	28,100
2020	123,839	19,100	30,300
2025	133,409	20,500	32,700
2030	143,720	22,100	35,200
2035	154,827	23,800	37,900
2040	166,793	25,700	40,800

Table 3.11 Projected Average Dry Weather and Average Day Maximum Month TSS Loads Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water			
Year	**Projected Population**	**Average Dry Weather Load (lb/day)**	**Average Day Maximum Month Load (lb/day)**
2010	106,708	26,200	45,200
2015	114,954	28,300	48,700
2020	123,839	30,400	52,500
2025	133,409	32,800	56,500
2030	143,720	35,300	60,900
2035	154,827	38,100	65,600
2040	166,793	41,000	70,700

3.9 SUMMARY OF FLOW AND LOAD DESIGN CRITERIA

A summary of existing and future flow and load design criteria is included in Table 3.12. The design criteria were used to develop alternatives to reliably treat existing and future flows and loads.

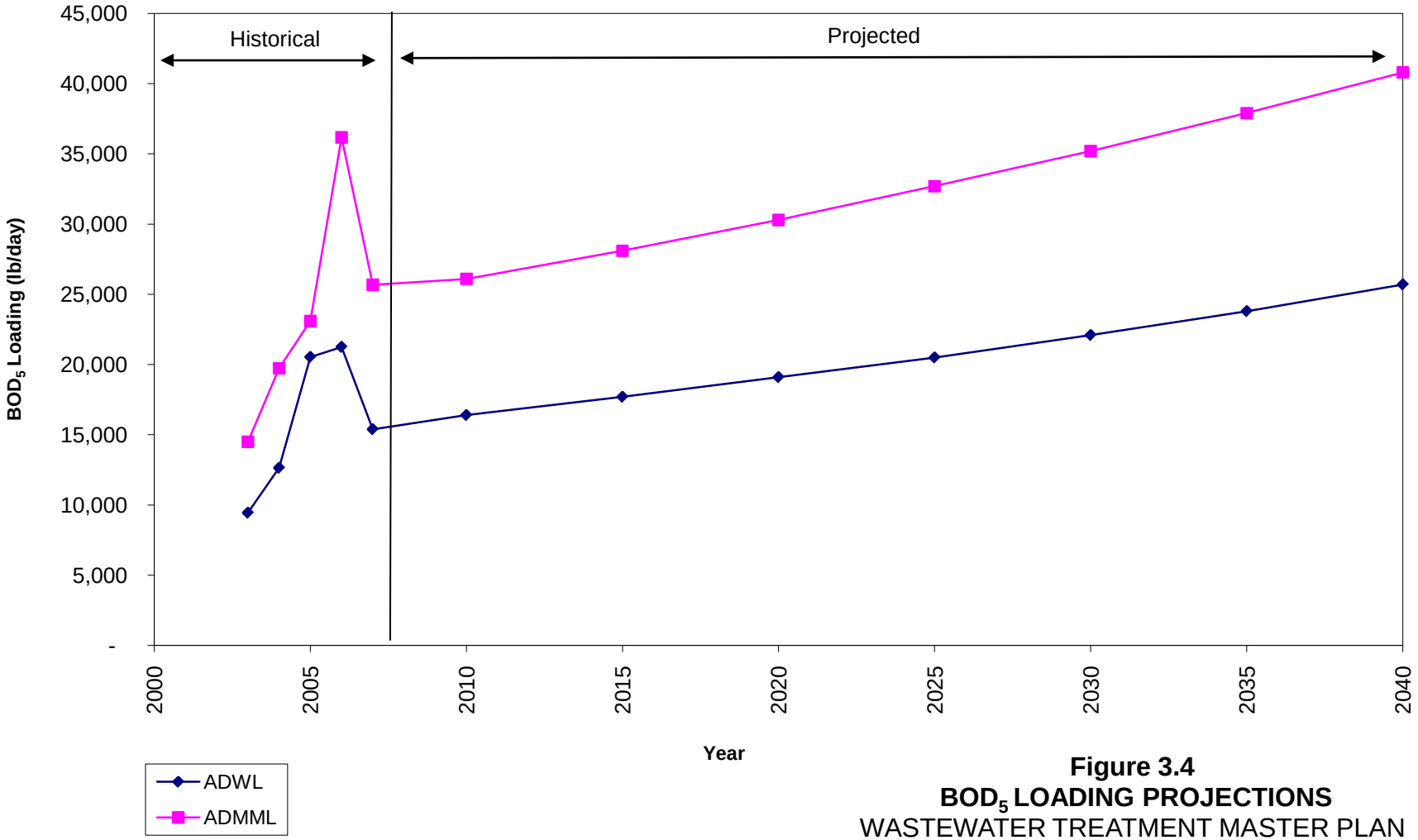


Figure 3.4
BOD_5 LOADING PROJECTIONS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

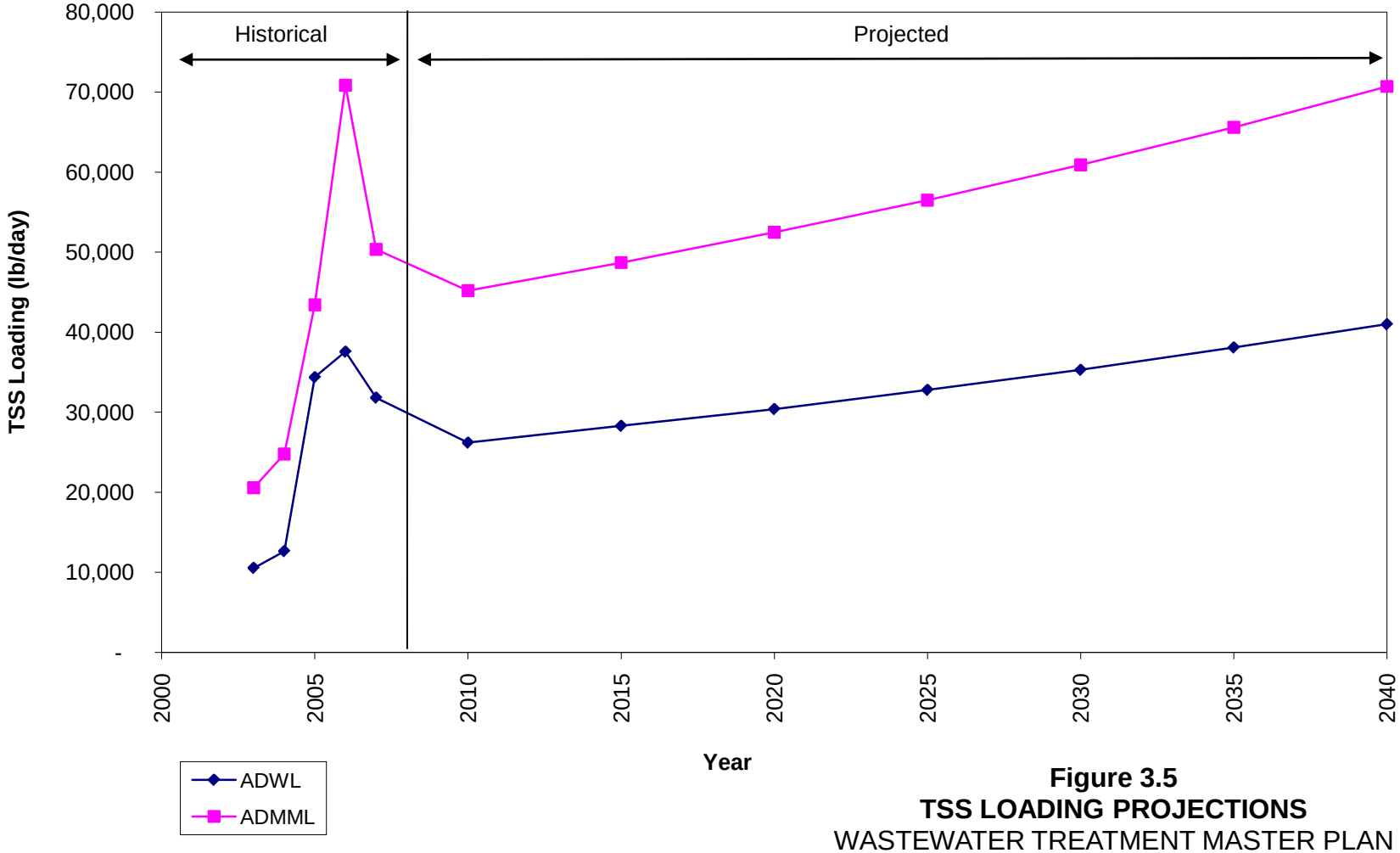


Figure 3.5
TSS LOADING PROJECTIONS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Table 3.12 Summary of Design Wastewater Flows and Characteristics
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

		Existing Conditions			Projected 2040 Values		
Parameter	**Units**	**ADW**	**ADA**	**ADMM**	**ADW**	**ADA**	**ADMM**
Flow	mgd	6.5	8.1	12.1	10.8	13.6	20.1
BOD_5	mg/L	292	250	250	285	250	243
	lb/d	15,855	17,235	25,329	25,700	28,356	40,800
TSS	mg/L	468	400	434	455	400	421
	lb/d	25,394	27,345	43,836	41,000	45,370	70,700

Note:

(1) Flows represent Average Dry Weather Flow (ADWF), Average Day Maximum Month Flow (ADMMF), Average Daily Annual Flow (ADAF) and loads in lb/d represent Average Dry Weather Load (ADWL), Average Day Maximum Month Load (ADMML), and Average Day Annual Load (ADAL).

Chapter 4

REGULATORY REQUIREMENTS

4.1 INTRODUCTION

The purpose of this chapter is to summarize the major regulatory requirements for the Richmond Sanitary Sewer District (RSSD). The Master Plan will provide an implementation plan to meet existing regulatory requirements with the flexibility to meet potential future regulation requirements. Examination of current and future regulatory requirements is critical to the development of appropriate treatment processes. A comprehensive review of the regulations governing final effluent, treatment plant residuals, and process air emissions was conducted to evaluate the impact on future discharge limits.

Table 4.1 summarizes the federal, state, and regional regulations that apply to water quality, reuse, biosolids, and air quality. A copy of the current National Pollutant Discharge Elimination System (NPDES) permit can be found in the Appendix A.

4.2 SUMMARY OF REGULATORY FINDINGS AND CONCLUSIONS

This section summarizes the main findings and conclusions of this regulatory review of water quality, water reuse, biosolids, and air quality regulations and their possible future impacts on the RSSD.

4.2.1 Water Quality Regulations

Findings and conclusions of the review of water quality regulations are summarized as follows:

- In the future, the City of Richmond (City) will likely be faced with additional source control requirements for mercury.
- The City must implement data collection for PCBs.
- The City should collect samples from the Richmond effluent and test for selenium to determine if selenium in the combined effluent is from the Richmond Water Pollution Control Plant (WPCP) or the West County Water District (WCWD) WPCP.
- The City must continue to monitor improvements to analytical techniques for measuring dioxin and 4,4-DDD.
- It will be important for the City to keep up with the rapidly changing water quality regulatory environment (e.g., through publicly-owned treatment works (POTW) collaboration efforts).

The master planning process will have to proceed without knowledge of the final future effluent limits for toxic constituents and the types of controls that the regulatory agencies will eventually require for compliance. Accordingly, the Master Plan will need to address a

Table 4.1 Summary of Federal, State, and Regional Regulation Applicable to the WPCP
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	Receiving Water	Discharge to Land	Air Emissions
Federal	• Clean Water Act (CWA) • National Toxics Rule (40 CFR 131) • California Toxics Rule (40 CFR 131) • Water Quality Standards Regulations • National Pollutant Discharge Elimination System (NPDES) • Section 303(d) and TMDL Process • Antibacksliding (CWA Section 402(o)) • Pretreatment Requirements (40 CFR 403)	• Sludge Technical Regulations (40 CFR Part 503) • Landfill Requirements (40 CFR Parts 257 and 258) • Clean Air Act (CAA) • Resource Conservation and Recovery Act (RCRA) • Clean Water Act (CWA) • 40 CFR Part 761 (promulgated under Toxic Substances Control Act) 40 CFR Parts 220-228 (Marine Protection Research, and Sanctuaries Act)	• Clean Air Act (CAA) and National Ambient Air Quality Standards (NAAQS) • National Emission Standards for Hazardous Air Pollutants (NESHAPS) • Sludge Technical Requirements (40 CFR Part 503) • Occupational Safety and Health Administration (OSHA)
State	• Porter-Cologne Water Quality Act • Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy) • Clean Water Enforcement and Pollution Prevention Act & Amendments (State Senate Bill 709) • Reclaimed Water Requirements (CCR Title 22)	• CCR Title 23, Division 3, Chapter 15 • CCR Title 22 • Porter-Cologne Water Quality Act • Department of Public Health Manual of Good Practice for Land Spreading of Sewage Sludge	• CARB State Implementation Plan (SIP) • CARB Air Toxic Pollutant Program (Tanner Bill AB 1807) • Air Toxics "Hot Spots" Information and Assessment Act of 1987 (Connelly/Stirling Bill AB 2588) • California Clean Air Act of 1988
Regional	• Water Quality Control Plan (Basin Plan) for The San Francisco Basin		• BAAQMD Rules and Regulations (New Source Requirements, etc.)

Notes:
CARB = California Air Resources Board
CCR = California Code of Regulations
CFR = Code of Federal Regulations
RWQCB = Regional Water Quality Control Board
SWRCB = State Water Resources Control Board
BAAQMD = Bay Area Air Quality Management District

range of wastewater management strategies to meet a range of future water quality-related regulatory requirements. It is assumed that the following requirements will be adopted within 10 years.

- Wet weather blending of primary and secondary effluents will be prohibited. In other words, full secondary treatment and/or equalization storage would be required to allow for full treatment of peak wet weather flows.
- Site-specific water quality objectives (WQOs) for copper and cyanide will be adopted.

In addition, nutrient limits (ammonia and nitrate/nitrite) removal may be required in the future to reduce impacts on the San Francisco Bay.

4.2.2 Biosolids Regulations

The main findings and conclusions of the review of biosolids regulations, policies, and procedures, and their possible future impact on the City, are summarized as follows:

- The WPCP currently pumps digested sludge to WCWD for dewatering and disposal. Since WCWD has terminated the digested sludge disposal agreement, the City will be responsible for treatment and disposal of the biosolids produced by the WPCP. If the City selects to perform sludge dewatering, it will be in the City's best interest to reduce the volume of solids to reduce its exposure and related risk to future biosolids regulations.
- Nineteen counties in California have developed, or are developing, ordinances restricting land application of biosolids. If this trend continues, the City may be faced with more stringent biosolids handling regulations.

4.2.3 Air Quality Regulations

The findings and conclusions of this review of air quality permitting regulations, policies, and procedures, and their possible future impact on the City, are summarized as follows:

- If BAAQMD receives a sufficient number of odor complaints, the WPCP may be required to comply with BAAQMD odor regulations. These regulations will likely require the WPCP to install an odor control system for the influent pump station, grit basins, and primary clarifiers.
- The Final Toxics Rule for POTWs was promulgated in October 1999. This regulations requires that "major" source POTWs must either 1) include covers and controls on primary treatment processes of new or reconstructed POTWs; or 2) demonstrate an overall fraction emitted (hazardous air pollutants emitted divided by total influent load) of 0.014 or less from such new processes. Should air emissions from the City WPCP increase to the point of "major" source classification as determined by Bay Area Air Quality Management District (BAAQMD), the City must comply with this rule. Note that this rule only applies if the POTW is new or reconstructed.

- In October 1999, the Environmental Protection Agency (EPA) promulgated National Emission Standards for Hazardous Air Pollutants (NESHAP) for new and existing POTWs. The City must now comply with limits set for xylenes, methylene chloride, toluene, ethyl benzene, chloroform, tetrachloroethylene, benzene, and naphthalene. These limits are included in the current BAAQMD permit.

- BAAQMD Regulation 2, Rule 2 was modified May 17, 2000. Under specific conditions, new or modified sources (or treatment processes) must apply Best Available Control Technology (BACT). Section 4.5.3.4 provides more discussion on these conditions.

- Because it does not appear likely that the State of California Assembly Bill 32 (AB32) will require the WPCP to report or reduce its GHG emissions, both the City and Veolia are in position to voluntarily reduce emissions that can then be marketed and sold. It is recommended that the City and Veolia evaluate the potential for voluntary offsets and participation in a future cap and trade carbon market as part of the GHG emission analysis and strategy study.

4.3 ASSESSMENT OF WATER QUALITY REGULATIONS

4.3.1 Regulatory Setting

Both state and federal regulatory authority exists for the control of water quality in surface waters of California, including the San Francisco Bay. Key elements of the state and federal regulatory processes are described in this section. The basic approach used in both state and federal processes is 1) to designate beneficial uses to be protected, 2) to set water quality objectives that are protective of the most sensitive uses, and 3) to control municipal, industrial, and other sources to meet these objectives. Municipal and industrial discharges to waters of the United States are controlled through effluent limits contained in waste discharge permits issued under the authority of the federal National Pollutant Discharge Elimination System (NPDES).

4.3.2 Overview of Regulation of Toxic Pollutants

This section describes the policies that have the potential for impacting the regulation of toxic pollutants discharged by the WPCP. Conventional pollutants such as suspended solids and five-day biochemical oxygen demand (BOD_5) are not impacted by current regulatory programs in terms of changing their effluent limits, but recent state legislation regarding mandatory minimum penalties has made complying with all effluent limits much more critical. Recent guidance has been issued from EPA regarding regulation of nutrients (which is discussed later in this section). The various federal, state, and regional policies that concern the discharge of toxic pollutants are listed in Tables 4.2 and 4.3.

In formulating the Master Plan, it is important to recognize that two significant changes are taking place regarding the regulation of waste discharges. The first is a shift in regulatory

Table 4.2 Federal Policies Applicable to the Discharge of Toxic Pollutants to Surface Waters
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Law or Regulations	Application	Relevance
Clean Water Act	Establishes national policy that discharge of toxic pollutants in toxic amounts be prohibited.	Impacts regulation of water discharges to surface waters.
	Requires states to adopt numerical water quality criteria for EPA priority pollutants.	Inland Surface Waters Plan, National Toxics Rule, and California Toxics Rule.
	Requires states to list waters not meeting water quality standards and adopt total maximum daily loads (TMDLs) that will result in achievement of standards.	May lead to more stringent Effluent limitations for discharges to listed waters.
40 CFR Part 122 - NPDES Permit Regulations	Requires NPDES permits to contain effluent limits necessary to meet water quality criteria.	Allows effluent limits to be incorporated into NPDES permit limits
	Requires NPDES permits to be consistent with waste load allocations (WLA) and in TMDLs approved by EPA.	Allows WLAs to be incorporated into NPDES permit limits.
	Requires NPDES permits to contain effluent limits for whole effluent toxicity when discharge has reasonable potential for causing toxicity in the receiving water.	Allows toxicity requirements to be incorporated into NPDES permit.
	Establishes a consistent national approach for controlling Combined Sewer overflow (CSO) discharges (i.e., CSO Control Policy)	Regulates CSO discharges within NPDES permit.
40 CFR Part 131 - Water Quality Standards Regulations, National Toxics Rule, and California Toxics Rule	Requires state to base water quality criteria on either EPA national guidance, national guidance modified to reflect site-specific conditions, or other scientifically defensible methods.	Provides potential relief from statewide objectives on a scientific basis.
	Allows de-designation of uses due to economic and social considerations.	Provides potential relief from statewide objectives on an economic/social basis.
	Requires states to adopt antidegradation policies which will maintain existing water quality unless necessary to accommodate important economic and social development.	California has adopted an antidegradation policy which has been accepted by EPA as satisfying this provision.
	Establishes statewide water quality criteria for certain priority toxic pollutants in 14 states, including California.	Applicable to dischargers to surface waters. Will impact NPDES permit limits.
	Establishes statewide water quality criteria for the remainder of the priority toxic pollutants for California.	Applicable to dischargers to surface waters. Will impact NPDES permit limits.

Table 4.3 State and Regional Policies Applicable to the Discharge of Toxic Pollutants to Surface Waters
Wastewater Facilities Master Plan Update
City of Richmond and Veolia Water

Law or Regulations	Application	Relevance to CITY
STATE		
Porter-Cologne Act	Establishes policy to regulate waters of state so as to attain the highest water quality which is reasonable and authorizes preparation of basin plans and issuance of waste discharge requirements.	Federal law and policies appear more restrictive.
State Implementation Policy	Contains provisions for establishing NPDES permit limits necessary to achieve the objectives for toxic pollutants.	Serves as the primary basis for future NPDES permit limits for toxic pollutants.
Clean Water Enforcement and Pollution Prevention Act (SB709)	Mandates the imposition of mandatory minimum penalties of $3,000 each, for most exceedances of NPDES effluent limitations.	Could impose costly fines for NPDES violations.
Bay-Delta Pollutant Policy	Requires Regional Boards 2 and 5 to develop mass emissions strategies.	May lead to reduction, freeze, or controlled increase in mass emissions of certain toxic pollutants.
Antidegradation Policy (SRWCB Resolution No. 69-16)	Requires existing high quality waters to be maintained to the maximum extent practicable.	May lead to more stringent permit limits than needed to meet water quality objectives. Applies to both surface water and groundwater.
REGIONAL		
Basin Plans	Contains water quality objectives for several toxic pollutants and salinity for groundwater and surface waters.	Serves as the primary basis for NPDES permit limits for non-toxic pollutants. Applicable to groundwater and surface waters.

concern from conventional pollutants (such as BOD_5 and suspended solids), to toxic pollutants (particularly trace metals and trace organics). The second change is a shift from a technology-based to a water quality-based method of controlling waste discharges. Under a water quality-based method of control, conditions in ambient receiving waters together with the character of the waste discharge dictate the effluent limits. Both of these shifts in regulatory policy were prompted by the 1987 Amendments to the federal Clean Water Act (CWA) but have only recently started to be implemented in California.

The water quality-based method of toxics control, implemented in accordance with the policies described in this section of the Master Plan, has the potential to greatly impact the City and other municipal waste dischargers. In the worst case, the City could be faced with having to construct costly additional treatment processes, such as reverse osmosis, to comply with future effluent limits for toxic pollutants.

The actual impact of the water quality-based approach on the City is dependent upon the specific effluent limits for toxic pollutants that the Regional Water Quality Control Board (RWQCB) places in the West County Agency's (WCA) NPDES permit. The effluent limits, in turn, are dependent upon 1) the developing policies described in this section, 2) the actions taken by the RWQCB to implement the policies, and 3) the results of additional monitoring for toxic constituents in the receiving waters and the treatment plant effluent. The Master Plan, therefore, will have to be based on a best estimate of the range of possibilities presented by developing policies and their implementation.

4.3.3 Federal Laws and Regulations

4.3.3.1 Clean Water Act

The Clean Water Act ("the Act", 33 U.S.C. § 1251 et seq.) is the federal law that governs and authorizes water quality control activities by EPA. Congress originally passed the CWA in 1972 as PL 92-500. The Act was last re-authorized and substantially amended in 1987. Pursuant to federal law, EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations (40 CFR).

The CWA regulates water pollution through two different and supplementary approaches: water quality and technology-based standards. Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards include two key elements: 1) designated beneficial uses of the water body in question, and 2) water quality criteria that protect the designated uses. Section 304(a) requires the EPA to publish water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. Water quality standards are typically numeric, although narrative criteria may be employed where numerical standards cannot be established or where they are needed to supplement numeric standards.

The CWA also regulates water pollution through the use of technology-based standards. These standards apply a specific type of pollution control technology to specific types of wastewater discharges. These standards are not dependent on the water quality of the receiving water, but rather set a technological baseline to be followed nationwide. For municipal discharges, this technology-based standard is secondary treatment, as defined in 40 CFR Part 131.

The two approaches to regulating water pollution are implemented through the use of discharge permits, which contain mass or concentration-based limits known as "effluent limitations," for the pollutants contained in the permitted entity's wastewater. These approaches are applied to pollutant dischargers through the implementation of the national wastewater discharge permitting program set up under the CWA.

The CWA requires that states review and modify, if necessary, water quality standards every three years. In reviewing the standards on water quality limited segments (water bodies in which standards cannot be attained even with the application of technology-based controls as specified in the CWA), states are required to perform a use attainability analysis if the states wish to remove a designated use, to adopt subcategories of uses which require less stringent criteria than are currently adopted, or to designate a use that does not reflect the "fishable/swimmable" goals of the CWA. In only limited situations may states downgrade an existing beneficial use. Additionally, states are encouraged to adopt site-specific standards where local conditions warrant a change from statewide or national standards.

Section 303(c)(2)(b) of the CWA, which was added in the 1987 revisions, requires states to adopt numerical water quality standards for toxic pollutants for which EPA has published water quality criteria and which reasonably could be expected to interfere with designated uses in a water body. The deadline for adoption of such numerical standards by states was February 1990. States that did not comply with this deadline were notified by the EPA that it would promulgate standards if the state failed to do so.

4.3.3.2 National Toxics Rule (NTR)

On December 22, 1992, EPA promulgated the NTR to establish numeric criteria for priority toxic pollutants for California and 13 other states and territories that were not in complete compliance with Section 303(c)(2)(b) of the CWA. For California, the NTR established water quality standards for protection of aquatic life and/or human health for 36 pollutants for which 304(a) water quality criteria exist, but which were not covered under California's statewide water quality regulations.

A subsequent revision (1995) of the NTR changed the metals criteria from total recoverable to a dissolved basis. The change represents a significant alteration in the scientific approach for trace metals regulation formerly advocated by EPA. After careful consideration, EPA concluded that it was in the public interest to revise the metals criteria

contained in the NTR. The NTR also includes default conversion factors for individual metals to facilitate the adjustment of EPA criteria from total recoverable to dissolved values.

4.3.3.3 California Toxics Rule (CTR)

As a result of the court-ordered revocation of California's statewide water quality control plans in September 1994 (see State Regulatory Framework/Statewide Water Quality Control Plans, below), EPA Region IX initiated efforts to promulgate additional federal water quality standards for California. On May 18, 2000, EPA issued the CTR. The standards contained in the CTR include all priority pollutants (trace metals, pesticides, PCBs, other trace organics) for which EPA has issued 304(a) numeric criteria which are not already included in the December 1992 NTR. There are 126 constituents listed in the CTR criteria which include the previously issued NTR criteria for California. The CTR criteria can be found in Appendix D.

Some of the key elements of the CTR include:

- Amended numeric standards for 30 toxic pollutants and added new criteria for 8 toxic pollutants to protect aquatic life and human health uses for water bodies.
- Dissolved-based standards for most trace metals and endorsement of the use of translator mechanisms for determination of local metals objectives.
- Provisions for compliance schedules to provide time for permittees to meet the new toxics standards.
- Provisions for mixing zones when calculating toxic constituent effluent limitations.
- Use of interim effluent limits to provide time for dischargers to take actions to meet final limits.

The impact of both the NTR and the CTR on NPDES permit requirements are dependent on how these federal regulations are implemented by California's regulatory agencies. The implementation of these criteria under California's State Implementation Policy (SIP) and the RWQCB permitting processes are described in the state law section set forth later in this chapter.

4.3.3.4 NPDES Permits

The NPDES permit system was established under section 402 of the CWA amendments of 1972 to regulate municipal and industrial discharges to surface waters of the United States (U.S.). The discharge of wastewater to surface waters is prohibited unless an NPDES permit has been issued which allows that discharge. Each NPDES permit contains limits on allowable concentrations and/or mass emissions of pollutants contained in the discharge.

Under the NPDES program, dischargers are required to monitor and provide reports on compliance with their permit limits. These Discharge Monitoring Reports (DMRs) provide effluent quality and often receiving water quality data. Receiving water monitoring requirements are common in many NPDES permits for both wastewater and storm water

discharges. Data obtained through discharger monitoring are reported to the appropriate regulatory agency. The regulatory agency or any interested citizen can review these data to determine whether or not the discharger has complied with its NPDES permit requirements, and, if appropriate, pursue action to enforce compliance.

The RWQCB last reissued the NPDES permit for the WCA in April 2008. The permit is currently scheduled to be reissued again in 2013. A copy of the current NPDES permit can be found in the Appendix A.

4.3.3.5 Section 303(d) Impaired Waters List and TMDLs

Under Section 303(d) of the CWA, states are required to develop lists of water bodies which will not attain water quality objectives after implementation of required levels of treatment by point source dischargers (municipalities and industries). The most recent Section 303(d) list in California was issued by the SWRCB in 1998, and amended and approved by EPA Region IX in May 1999. 303(d) constituents for the vicinity of San Francisco (which the WCA Combined Outfall discharges to) include: chlordane, copper, DDT, diazinon, dieldrin, dioxin compounds, exotic species, furan compounds, mercury, PCBs, selenium.

Section 303(d) requires that the state develop a total maximum daily load (TMDL) for each of the listed pollutants. The TMDL is the cumulative loading that the water body (in this case the Bay) can receive and still be in compliance with water quality objectives. The TMDL prepared by the state must include an allocation of allowable loadings to point and non-point sources, with consideration of background loadings and a margin of safety. The EPA must either approve a TMDL prepared by the state or must disapprove the state's TMDL and issue its own. The waste load allocation process would establish WCA's allowable loading of the pollutants of concern into the Bay. These limitations would then be placed in the WCA's NPDES permit as water quality-based effluent limitations.

Based on the 303(d) list of pollutants impairing the Central San Francisco Bay, the RWQCB plans to adopt TMDLs for these pollutants no later than 2010, with the exception of dioxin and furan compounds, for which the RWQCB defers development to the U.S. EPA. The RWQCB has initiated work on a TMDL to address mercury levels in the Bay.

4.3.3.6 Antibacksliding

Under the CWA Section 402(o), the relaxation of water quality-based permit effluent limitations during the permit renewal process is permissible only if the requirements for exceptions to the antibacksliding rule are met. Congress adopted the general prohibition against backsliding by enacting section 402(o) under the 1987 amendments to the CWA. The intent of these amendments was to preserve pollution control levels achieved by dischargers by prohibiting the adoption of less stringent treatment or control limitations, standards, or conditions than those already contained in their discharge permits, except in certain narrowly defined circumstances. A key component of the antibacksliding rule is CWA section 402(o)(3), which sets a floor on permit relaxation such that no permit may be

reissued to contain a less stringent effluent limitation if that limit would result in a violation of a water quality standard.

4.3.3.7 Pretreatment Requirements

A large number of nationwide industries discharge their industrial wastes indirectly into POTWs. Often, POTWs, which were designed primarily to treat sewage from domestic users, have difficulty treating the toxic, hazardous, or highly concentrated conventional wastes (e.g., BOD, total suspended solids [TSS]) that are discharged by industrial users. Industrial pretreatment programs evolved out of congressional concern that industrial wastes would "pass through" POTWs without adequate treatment, would interfere with a POTW's operations, or might otherwise contaminate a POTW's biosolids and limit the disposal options for such biosolids.

Under the CWA, the EPA was required to establish pretreatment standards[1] to prevent the discharge into a POTW of any pollutant which would interfere with, pass through untreated, or otherwise be incompatible with such treatment works (33 U.S.C. § 1317(b); 40 C.F.R. § 401.12(f)).

To control the pollutants covered by general and specific water quality-related EPA regulatory prohibitions, each POTW over 5 million gallons per day (mgd) is required to develop and enforce specific local limits for discharges to the POTW. These local limits are then deemed to be Pretreatment Standards for the purposes of the CWA. Local limits are used and enforced to ensure that the POTW can meet its NPDES permit requirements and water quality-based effluent limitations.

The development and implementation of local limits by POTWs is a federal requirement under the General Pretreatment Regulations of the CWA (40 C.F.R. § 403). The EPA is responsible for enforcing the National Pretreatment Program at the federal level. At the state level in California, Pretreatment Program enforcement is the responsibility of the California Regional Water Quality Control Boards.

4.3.4 State and Regional Laws and Regulations

4.3.4.1 State Regulatory Setting

In California, the SWRCB has broad authority over water quality control issues for the state. Regional authority for planning, permitting, and enforcement is delegated to the nine RWQCBs.

[1] EPA regulations define "pretreatment" as a reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. This reduction may be obtained by physical, chemical, or biological processes. 40 C.F.R. § 403.3(q).

The SWRCB consists of a full time five-member board appointed by the Governor. The lead staff position is the Executive Officer, who directs divisions responsible for water quality, legal, water rights, loans and grants, public affairs, and administration. The SWRCB is responsible for statewide water quality policy development and exercises the powers delegated to the state by the federal government under the CWA, including development and issuance of NPDES permits through the RWQCBs.

Each of the nine RWQCBs consists of nine members appointed by the Governor. The Regional Boards are required to formulate and adopt water quality control plans for all areas within the region. RWQCBs are required to establish water quality objectives in the water quality control plans. The RWQCB responsible for the San Francisco Bay Area is the San Francisco Bay Regional Board (Region 2), headquartered in Oakland. NPDES permits issues by the RWQCBs must be consistent with the respective regional water quality control plan, and with state and federal water quality laws, regulations, and policies.

Other state agencies with jurisdiction or involvement in water quality regulation in California include the Department of Public Health (DPH) (drinking water regulations and water reclamation criteria), the Department of Pesticide Regulation, the Department of Fish and Game, and the Office of Environmental Health and Hazard Assessment.

4.3.4.2 Porter-Cologne Act

The Porter-Cologne Water Quality Control Act (California Water Code § 13000 *et seq*.) is California's statutory authority for the protection of water quality. Under the Porter-Cologne Act, the state must adopt water quality policies, plans, and objectives that will provide protection to the state's waters for the use and enjoyment of the people of California. The Act authorizes the SWRCB and the nine RWQCBs to issue permits containing waste discharge requirements, and to enforce these permits.

The Porter-Cologne Act states that the quality of all waters of California shall be protected and that the activities and factors which may affect water quality shall be regulated to attain the highest water quality which is reasonable, considering all demands on those waters and "the total values involved, beneficial and detrimental, economic and social, tangible and intangible."

Sections 13170 and 13240 to 13244 of the Porter-Cologne Act set forth the obligations of the state and RWQCBs pertaining to the adoption of water quality control plans (Basin Plans). Section 13240 requires that each RWQCB formulate water quality control plans for all areas within the region. Section 13241 specifically addresses the requirements for setting water quality objectives in these water quality control plans and requires the establishment of objectives that ensure the reasonable protection of beneficial uses and the prevention of nuisance. It is acknowledged in this section that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses.

Section 13170 allows the SWRCB to adopt statewide water quality control plans for waters for which water quality standards are required by federal law. Section 13170 requires that such plans adhere to the requirements of Sections 13240 through 13244.

4.3.4.3 Inland Surface Waters and Enclosed Bays and Estuaries Plan

In April 1991, the SWRCB adopted two statewide water quality control plans, the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP), which included narrative and numerical objectives for allowable concentrations of toxic pollutants in the state's receiving waters. In 1994, a Superior Court in Sacramento ruled that the plans had not been adopted in conformance with three state laws (the Porter-Cologne Act, California Environmental Quality Act (CEQA), and the Administrative Procedures Act), and required that the SWRCB rescind the statewide plans. In September of 1994, the SWRCB withdrew the statewide plans and initiated actions to reformulate the plans. As discussed below, the plans were reissued, after considerable stakeholder input, in early 2000.

4.3.4.4 State Implementation Policy

The SWRCB adopted its Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Policy or SIP) on March 2, 2000. This State Implementation Policy was approved by the Office of Administrative Law and became effective on May 18, 2000, the date EPA published the CTR. EPA Region IX partially approved the SIP in May 2001.

Although issued as a SWRCB "Policy", the provisions of this document have full regulatory effect. The SIP outlines procedures for NPDES permitting for toxic pollutant objectives that have been promulgated by EPA in the NTR, the CTR, and by the RWQCBs in their respective Basin Plans. The SIP contains procedures for determining for each POTW which toxic pollutants must have effluent limits, for calculating water quality-based effluent limitations (WQBELs), for establishing mixing zones and dilution credits, for using translators for metals and selenium, for controlling chronic toxicity, and for establishing site-specific water quality objectives.

The implementation procedures outlined in the SIP generally require WQBELs to be established for any constituent for which the ambient or effluent concentration exceeds the lowest applicable criteria in the CTR or NTR. The SIP sets forth the procedures for calculating effluent limits for any such constituent. Where there is insufficient information to calculate final water quality-based effluent limits, the SIP allows the imposition of interim, performance-based effluent limits. These limits are to remain in effect while the necessary information (e.g., ambient monitoring, effluent monitoring, translator studies, or TMDLs) is being developed.

The impact of the SIP, and interim (pre-TMDL) NPDES permitting procedures currently used by the RWQCB, are discussed later in this section.

4.3.4.5 Clean Water Enforcement and Pollution Prevention Act and Amendments

State Senate Bill (SB) 709, the Clean Water Enforcement and Pollution Prevention Act, became effective on January 1, 2000. This legislation mandated the imposition of mandatory minimum penalties of $3,000 each, for most exceedances of NPDES effluent limitations. Further, this legislation has removed enforcement discretion by the RWQCB, and, as a result, may turn out to be costly for dischargers with chronic violations of permit limits.

SB709 also allows the State Board, a Regional Board, or a POTW the discretionary authority to require a discharger to complete and implement a pollution prevention plan for toxic constituents. The legislation defines what constitutes a pollution prevention plan.

Amendments to SB709 (Senate Bill 2165) became effective January 1, 2001. These amendments allow an exemption from mandatory minimum penalties under specific conditions and allow flexibility by the RWQCB when dealing with small communities. In lieu of assessing all or a portion of the penalty, the RWQCB may require the small community POTW to spend the equivalent amount of the mandatory minimum penalty on a compliance project that is designed to correct the violations.

4.3.4.6 Citizen Lawsuits

The CWA authorizes citizens to file lawsuits against any discharger without an NPDES permit or in alleged violation of an NPDES permit. The Act allows the Courts to assess penalties of up to $32,500 per day per violation plus award attorney's fees to the plaintiff. Since the mid-1990s, there has been a major increase in the number of citizen suits against NPDES permittees, including POTWs. These suits are often settled before trial with the defendant agreeing to pay all legal fees, correct the permit violations and, in a number of cases, mitigate the alleged environmental damage by agreeing to pay for a water quality-related environmental remediation project. Citizen suits can even be brought for permit violations where SB709 fines and certain other types of RWQCB enforcement actions have already been taken.

To minimize the threat of citizen suits, NPDES permittees must ensure that their permit terms are unambiguous and that permit requirements are attainable for the entire term of the permit. During the current transition in California to water quality based NPDES effluent limits for toxic constituents, dischargers should insist on interim performance-based limits until attainable final limits can be developed.

4.3.4.7 Bay-Delta Pollutant Policy Document

In June of 1990, the SWRCB adopted a Pollutant Policy Document (PPD) for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. The PPD was designed to provide solutions to specific pollutant problems in the Bay-Delta. The PPD is a product of the state's Bay-Delta Hearings. While the primary focus of the hearings was the development of salinity standards for the Delta, and hence the regulation of water exports from the Delta,

another important purpose of the hearings was to develop a pollutant policy for the Bay-Delta. The PPD identified and characterized pollutants with the greatest potential biological significance. These pollutants include: arsenic, cadmium, chromium, copper, chlorinated dibenzodioxins and dibenzofurans, hydrocarbons, lead, mercury, nickel, organochlorines, selenium, silver, tributyltin, and zinc.

The other purposes of the PPD were to ensure consistency in the regulatory approaches used by the San Francisco and Central Valley RWQCB's, to provide a basis for future regulatory effort, and to establish a monitoring program to assess the progress of the programs instituted under the PPD. A number of the requirements in the San Francisco Bay RWQCB Basin Plan derive from the PPD.

For the City, the Mass Emission Strategy (MES) contained in the PPD is probably the most significant provision of this plan. The MES aims to control the accumulation of toxic pollutants in sediments and in the tissues of aquatic organisms. The premise of this policy is that compliance with water quality objectives for toxic pollutants (developed under the statewide water quality control plans) does not necessary mean that such pollutants are not accumulating to harmful levels in sediments and tissue.

4.3.4.8 Antidegradation Policy

The SWRCB adopted a policy (Resolution 68-16) with respect to maintaining high quality waters in California in 1968 that is known as the state *antidegradation policy*. The antidegradation policy states that the disposal of wastes into the waters of the state shall be regulated so as to achieve the highest water quality consistent with maximum benefit to the people of the state and so as to promote the peace, health, safety, and welfare of the people of the state. The policy prescribes the following:

- Where the existing quality of water is better than required under existing water quality control plans, such quality will be maintained until it has been demonstrated that any change will be consistent with maximum benefit to the people of the state and will not unreasonably affect present and anticipated beneficial uses of such water.
- Any activity which produces waste or increases the volume or concentration of waste and which discharges to existing high quality waters will be required to meet waste discharge requirements which will assure 1) a pollution or nuisance will not occur and 2) the highest water quality consistent with the maximum benefit to the people of the state will be maintained.

The SWRCB considers Resolution 68-16 to incorporate the mandatory federal antidegradation policy, which is applicable if a discharge, which began after November 28, 1975, will lower existing surface water quality.

The SWRCB issued guidance to RWQCBs (Administrative Procedures Update 90-004) regarding the implementation of the state and federal antidegradation policies in the

NPDES permitting process. This guidance provides a tiered approach to the analysis of compliance with the antidegradation policies. In brief, the guidance indicates that the complexity of the analysis depends on the magnitude of water quality change associated with a proposed action. The guidance also states that actions which produce minor effects and do not result in a significant reduction in water quality require a simpler level of analysis and may be found to be consistent with the intent and purpose of the antidegradation policies. For actions which produce significant changes in water quality, the guidance states that a showing must be made that such changes result in the maximum benefit to the people of the state and are necessary to the social and economic welfare of the community to be consistent with the antidegradation policies.

Any significant change in the WPCP or WCA's discharge, including a plant capacity expansion, must be approved by the RWQCB as meeting the state antidegradation policy. Such RWQCB approval would be based on an antidegradation analysis which the City would need to prepare. The antidegradation analysis would likely need to include water quality modeling of the effect of the WCA's effluent on the Bay.

4.3.4.9 Water Quality Control Plan for the San Francisco Bay (Basin Plan)

Water Quality Control Plans (Basin Plans) are the regional water quality control plans required by both the CWA and the Porter-Cologne Act (Section 13240) for each of the nine regions in California. The San Francisco Bay RWQCB Basin Plan is the master policy document that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the San Francisco Bay region. The Basin Plan contains the beneficial water uses the RWQCB will protect, the water quality objectives needed to protect the designated beneficial uses, and the strategies and time schedules for achieving the water quality objectives.

The San Francisco Regional Board adopted a revised Basin Plan on December 22, 2006. This Basin Plan establishes beneficial uses, water quality objectives and policies for the waters of San Francisco Bay. The Basin Plan's designated existing beneficial uses of the Central Bay, into which WCA discharges, include:

- Ocean, commercial, and sport fishing (COMM).
- Estuarine habitat (EST).
- Industrial supply (IND), including process waters and service supply.
- Fish migration (MIGR).
- Navigation (NAV).
- Industrial process supply (PROC).
- Preservation of rare and endangered species (RARE).
- Contact and non-contact recreation (REC-1 and REC-2).
- Shellfish harvesting (SHELL).

- Fish spawning (SPWN).
- Wildlife habitat (WILD).

The 1986 Basin Plan categorized toxic pollutant effluent limits based on whether the discharge was upstream or downstream of the Carquinez Straight and the 1995 Basin Plan categorized effluent limits based on a salinity definition. The 2006 Basin Plan established water quality objectives for Marine water (≥10 parts per thousand [ppt] at least 95 percent of the time) and freshwater (≤ 1 ppt at least 95 percent of the time) for the Bay. Limits for marine water are contained in Table 4.4. These objectives generally take precedence over the objectives established in the 1986 and 1995 Basin Plan.

Currently, the Basin Plan water quality objectives and the NTR and CTR criteria are the only formally adopted and valid water quality criteria, since the Inland Surface Waters Plan was overturned in 1994. Thus, the NTR and CTR criteria along with the Basin Plan numeric and narrative objectives are the criteria currently being used by the RWQCBs to set waste discharge requirements in the NPDES permits.

4.3.5 Waste Discharge Requirements (WDRs)

The quality of treated wastewater discharged from the WCA is subject to the array of federal and state regulatory requirements described above and is regulated under a NPDES permit issued by the RWQCB. The NPDES permit includes findings, discharge prohibitions, effluent limitations, provisions and self-monitoring requirements. The findings of the NPDES permit provide information about the design and operation of the treatment plant, protection of beneficial uses, and compliance with applicable standards.

The discharge prohibitions and limitations in the permit are designed to ensure the maintenance of public health and safety, protection of receiving water resources, and safeguarding of the designated beneficial uses. Discharge limitations define allowable effluent concentrations for flow, biochemical oxygen demand (BOD), total suspended matter, residual chlorine, settleable matter, total coliform, oil and grease, pH, and toxic substances. Limitations also encompass toxicity to aquatic life.

The provisions provide stipulations for the disposal of solid materials, and limitations on effects caused to receiving waters.

The permit also specifies the sampling, monitoring, and reporting requirements for the WPCP and WCA to demonstrate compliance with waste discharge regulations. The monitoring program entails sampling influent, effluent, and receiving water.

4.3.5.1 Recent Regulatory Changes

Recent changes have significantly changed the rules for calculating effluent limits for NPDES permits. The most significant change that affected the 2008 permit, is that the Enclosed Bays and Estuaries Plan was rejected by the Courts and replaced by the

Table 4.4 Marine[1] Water Quality Objectives for Toxic Pollutants for Surface Waters
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Compound	4-Day Average[3] (μg/L)	1-Hour Average[3] (μg/L)	24-Hour Average (μg/L)
Arsenic[2][3][4]	36.0	69.0	
Cadmium[2][3][4]	9.3	42.0	
Chromium (VI)[2][3][4][5]	50.0	1,100.0	
Copper[3][4][6]		(6)	
Cyanide[7]			
Lead[2][3][4]	8.1	210.0	
Mercury[8]	0.025	2.1	
Nickel[2][3][4]	8.2	74.0	
Selenium[9]			
Silver[2][3][4]		1.9	
Tributyltin[10]			
Zinc[2][3][4]	81.0	90.0	
PAHs[11]			15.0

Notes:

(1) Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. Unless a site-specific objective has been adopted, these objectives shall apply to all marine waters except for the South Bay south of Dumbarton Bridge, where the CTR applies. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater (Table 5-4) or marine objectives.

(2) Source: 40 CFR Part 131.38 (CTR), May 18, 2000.

(3) These objectives for metals are expressed in terms of the dissolved fraction of the metal in the water column.

(4) According to the CTR, these objectives are expressed as a function of the water-effect ratio (WER),which is a measure of the toxicity of a pollutant in site water divided by the same measure of the toxicity of the same pollutant in laboratory dilution water. The 1-hour and 4-day objectives = table value X WER. The table values assume a WER equal to one.

(5) This objective may be met as total chromium.

(6) Water quality objectives for copper were promulgated by the CTR and may be updated by U.S. EPA without amending the Basin Plan. Note: at the time of writing, the values are 3.1 μg/L (4-day average) and 4.8 μg/L (1-hour average). The most recent version of the CTR should be consulted before applying these values.

(7) Cyanide criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 1.0 μg/L (4-day average) and 1.0 μg/L (1-hour average).

(8) Source: U.S. EPA Ambient Water Quality Criteria for Mercury (1984).

(9) Selenium criteria were promulgated for all San Francisco Bay/Delta waters in the NTR. The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.0 μg/L (4-day average) and 20 μg/L (1-hour average).

(10) Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations. U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.

(11) The 24-hour average aquatic life protection objective for total PAHs is retained from the 1995 Basin Plan. Source: U.S. EPA 1980.

CTR/SIP. Additionally, there is a new emphasis by the RWQCB on setting TMDLs, a new Basin Plan, and permit appeal decisions (most notably the Tosco permit remand), all of which are resulting in changes to permitting policy and implementation. Additionally, a significant driving force necessitating increased regulatory awareness and compliance for the WPCP and WCA is the enactment of State Senate Bill (SB) 709, for which implementation began on January 1, 2000. This legislation mandates the imposition of mandatory minimum penalties by the RWQCB of $3,000 each for most exceedances of NPDES permit effluent limitations.

The regulatory climate for NPDES permitting in California is still very dynamic, and uncertainty still exists regarding future permit conditions. Further, the WCA's new NPDES permit contains effluent limits for several constituents, for which effluent limits can either not be immediately complied with or are awaiting completion of a TMDL.

4.3.5.2 Determining Reasonable Potential

The CTR and SIP dictate a new approach to calculating effluent limits for toxic substances in NPDES permits. The first step in the process is to conduct a reasonable potential analysis (RPA) in order to determine which of 126 possible CTR toxic constituents in the effluent are causing or contributing to the violation of a water quality objective. For those constituents showing reasonable potential, an effluent limit is generally computed for that constituent.

The RPA is used to analyze each of the 126 CTR priority pollutants. The SFRWQCB is also treating tributyltin, chlorpyrifos, and diazinon like CTR constituents, and including them in the RPA analysis. For the purposes of this section, these three constituents are treated like CTR constituents.

4.3.5.2.1 RPA Method

The method for determining RPA involves identifying the observed maximum pollutant concentration in the effluent for the last three years (generally) for each toxic constituent. The RPA for all constituents is based on zero dilution of effluent at the point of discharge in accordance with Section 1.3 of the SIP. There are three triggers in determining reasonable potential.

- The first trigger is activated when the maximum effluent concentration (MEC) for the toxic constituent is greater than the lowest applicable WQO, which has been adjusted for pH, hardness (assumed in this permit analysis at 100 milligrams per liter [mg/L]), and translator data, if appropriate. An MEC that is greater than the (adjusted) WQO means that there is reasonable potential for that constituent to cause or contribute to an excursion above the WQO and a WQBEL is required.
- The second trigger is activated if observed maximum ambient background concentration (B) for the toxic constituent is greater than the adjusted WQO and the MEC is less than the adjusted WQO, or the pollutant was not detected in any of the

effluent samples and all of the detection levels are greater than or equal to the adjusted WQO. If B is greater than the adjusted WQO, then a WQBEL is required.

- The third trigger is activated if a review by the RWQCB staff of other information determines that a WQBEL is required even though both MEC and B are less than the WQO. A limit is only required under certain circumstances to protect beneficial uses.

4.3.5.2.2 Freshwater vs. Saltwater Criteria

Some constituents have different water quality objectives based on whether the receiving water is freshwater or saltwater. The 1995 Basin Plan states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water shall be considered in determining the applicable water quality objectives. Freshwater objectives apply to discharges to waters both outside the zone of tidal influence and with salinities lower than 5 parts per thousand (ppt) at least 75 percent of the time. Saltwater objectives shall apply to discharges to waters with salinities greater than 5 ppt at least 75 percent of the time. The CTR, however, defines freshwater as waters with salinities equal to or less than 1 ppt at least 95 percent of the time. Saltwater criteria shall apply under the CTR 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 in between freshwater and saltwater categories, or tidally influenced freshwaters that support estuarine beneficial uses, the criteria shall be the lower of the salt or freshwater criteria, (the latter calculated based on ambient hardness), for each substance.

The San Francisco RWQCB has been applying the CTR definition of salinity to selection of the appropriate water quality objective, even if the objective is based on the Basin Plan. Additionally, some freshwater criteria for metals are dependent on the hardness of the receiving water, and therefore require calculation based on hardness data.

4.3.5.3 Reasonable Potential for WCA's Effluent

The Regional Board adopted WCA's NPDES permit on April 1, 2008. An RPA using the SIP approach was performed, based on effluent monitoring data from January 2004 through December 2006 for most inorganic pollutants, and data from February 2002 through September 2006 for most organic pollutants.

According to the permit, based on salinity results from Regional Monitoring Program (RMP) and the CTR definition of salinity, the receiving water is considered saltwater. Therefore, the saltwater criteria applies to the WCA discharge.

Based on the RWQCB's RPA methodology described above and in the SIP, the following toxic constituents have been found to have reasonable potential to cause or contribute to an excursion above water quality objectives:

- Copper.
- Mercury.
- Nickel.

- Selenium.
- Cyanide.
- Dioxin.
- 4,4-DDD.
- Heptachlor.
- bis(2-ethylhexyl)phthalate.

Based on the RPA, numeric water quality based effluent limits are required to be included in the permit for these constituents. Of these toxic constituents, the detection limits for Heptachlor and 4,4-DDD are greater than the effluent limitations. Therefore, interim limits have been set at the detection limits.

4.3.5.4 Effluent Limits for WCA's NPDES Permit [2]

Based on the RPA the RWQCB calculated effluent limits for these constituents. Final limits are calculated using a multi-step procedure (similar to the RPA) which takes into account the water quality objective, whether or not dilution credit is provided, the background receiving water concentration, variability of the data, frequency of data collection, and the total number of data points. Final limits are computed for maximum daily and average monthly conditions.

4.3.5.4.1 Dilution Credit

In response to the SWRCB's 2001 decision on the Tosco NPDES permit appeal (appealed by Tosco and other interested parties, SB Order #RW 2001-06, also known as the Tosco Remand), the RWQCB has recently evaluated the assimilative capacity of the receiving water for 303(d) listed pollutants. Regarding the use of dilution in calculation of final effluent limits, the RWQCB has established the following approach, which remains in effect as of August 1, 2001:

- 10:1 dilution is allowed for non-bioaccumulative constituents, such as copper, nickel, zinc, and cyanide.
- 10:1 dilution is not given to 303(d)-listed bioaccumulative constituents, such as mercury, selenium, and dioxin.
- 25:1 dilution (actual) is given to non-persistent pollutant ammonia and cyanide.

4.3.5.4.2 Effluent Limits

[2] Effluent quality for the WPCP is regulated through a NPDES permit issued to the WCA, the City of Richmond treatment plant, which discharges through a common deep water outfall to San Francisco Bay. The WCA permit limits apply to the combined effluent for the two treatment plants, therefore, there is not a specific set of permit limits for only the City effluent. While permitted effluent concentration limits mentioned in this section actually mean WCA limits, they are also effectively WPCP's limits if the City wants to ensure that it does not cause WCA effluent concentrations to violate the NPDES permit.

The WCA's effluent limits for toxic constituents were computed by the RWQCB in the January 2008 permit based SIP procedures. A summary of effluent limits is presented in Table 4.5.

Table 4.5 City of Richmond's Final and Interim Limits
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	Water Quality-Based Effluent Limits (WQBELs)			
	Final Limits		Interim Limits	
Constituent	Daily Maximum (µg/L)	Monthly Average (µg/L)	Daily Maximum (µg/L)	Monthly Average (µg/L)
Copper	100	71		
Mercury	0.038	0.021		
Selenium	8.9	3.8		
Nickel	59	34		
Cyanide	15	7.8		
Bis(2-ethylhexyl)phthalate	150	55		
4,4-DDD	0.0017	.00084	.05	
Heptachlor	0.0041	.0020	.01	
Dioxin - TEQ	0.00028	0.00014		
Total Ammonia	59	32		

Note:
All units are µg/L, except dioxin, which is pg/L, and ammonia, which is mg/L as N.

4.3.5.4.3 Mass Limits

The permit also imposes interim (until the TMDL is adopted) performance-based mass limits for mercury and selenium on the WCA discharge. The interim mass limits, per the January 2008 permit, are:

- Mercury: 0.72 kg/month.
- Selenium: 15.2 kg/month.

4.3.5.4.4 Compliance Schedule

The permit requires WCA to submit information on sampling and laboratory analysis for 4,4-DDD, heptachlor, and dioxin-TEQ. If this information, combined with the new data, shows that WCA does not comply with the final limits for these constituents, WCA must submit a plan to identify all sources of these constituents and implement a program to reduce and prevent these pollutants from being discharged to the sewer system. If the Richmond WPCP can demonstrate that the pollutants in its individual effluent stream do not exceed final effluent limits, than the WPCP does not have to participate in this effort.

4.3.6 Activities Which Will Impact Final Limits

Ongoing regulatory activities in the San Francisco Bay Area for certain CTR constituents will likely impact final effluent limits for local dischargers, including the City and WCA, during the next 0 to 10 years. These activities include:

Copper - A site-specific objective for copper is currently under development for San Francisco Bay north of the Dumbarton Bridge. The permit indicates that if the site-specific objective (SSO) becomes legally effective, The MDEL and AMEL for copper will be reduced to 76 micrograms per liter (μg/L) and 53 μg/L, respectively. Based on available data, WCA should be able to comply with these limits.

Mercury - In February 2008, a TMDL and Implementation Plan for San Francisco Bay became effective. The TMDL is documented in *Mercury in San Francisco Bay - Proposed Basin Plan Amendment and Staff Report for Revised TMDL and Proposed Mercury Water Quality Objectives* (Staff Report), April 21, 2006.

Mercury is a legacy pollutant issue in the San Francisco Bay. The RWQCB found that POTW discharges in the entire area collectively contribute only approximately 1.5 percent of the total mercury discharged to the San Francisco Bay and already reduce mercury in their treatment processes by nearly 99 percent.

In the Staff Report, the RWQCB provided waste load allocations collectively for different groups. For example, all San Francisco Bay Area POTW dischargers have one waste load allocation applied to their discharges collectively, with all urban stormwater given a separate allocation. The TMDL also includes individual mass loadings and triggers for each POTW. If an individual mass limit or an effluent mercury trigger concentration is exceeded, the facility must report the exceedance in its Self-Monitoring Report and submit a report that:

- Evaluates the cause of the trigger or mass 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 current interim waste load allocation to be met collectively by San Francisco Bay Area POTWs is 17 kilograms per year (kg/yr). In ten years the interim waste load allocation will reduce to 14 kg/yr, and the final allocation to be met in 20 years is 11 kg/yr.

If the collective, or aggregate, mass limit is exceeded, the RWQCB will pursue enforcement actions against those dischargers whose individual mass discharges exceed their individual mass limits. The individual mass limit for the WPCP is 0.38 kg/yr. In 10 years this mass limit will be replaced by the interim limit of 0.30 kg/yr. The final limit, effective in 20 years, is 0.23 kg/L. Based on an average annual flow of 16.5 mgd for both facilities (8.0 for Richmond and 8.5 for WCWD) and an average mercury concentration of .01 μg/L, the WCA

effluent is projected to equal final effluent limits provided mercury loads do not increase. However, because growth in the service area of WCA is anticipated, measures to decrease mercury discharge will be required in the next 10 to 20 years.

The effluent mercury trigger concentrations for tertiary treatment facilities are a weekly average of .066 μg/L total mercury and monthly average of 0.072 μg/L total mercury. These limits are higher than the limits described in the January 2008 NPDES permit. If the effluent exceeds these limits, then an action plan must be put in effect to help control mercury discharges. Pollution prevention programs are required of all dischargers, and are anticipated by the RWQCB to be the mechanism for plants to meet their interim limits.

Cyanide - A site-specific objective for cyanide is currently under development for San Francisco Bay north of the Dumbarton Bridge. The permit indicates that if the SSO becomes legally effective, The MDEL and AMEL for cyanide will be increased to 41 μg/L and 21 μg/L, respectively.

PCBs - Polychlorinated biphenyls (PCBs) are 303(d) listed in San Francisco Bay due to PCB contamination of San Francisco Bay area fish. On February 13, 2008, the RWQCB adopted Resolution R2-2008-12 to amend the Basin Plan to account for the PCB TMDL. The TMDL has not yet been adopted by the SWRCB, the OAL, or the EPA. The proposed TMDL gives a waste load allocation of 0.05 kg/yr to the WCA.

As proposed in the draft TMDL documents, NPDES permits will include the following requirements to be implemented as part of the TMDL:

- Implementation of best management practices (BMPs) to maintain optimum treatment performance for solids removal.
- Identification and management of controllable sources.
- An effluent limit based on current performance.
- Quantification of PCB load to the San Francisco Bay.
- Support of actions to reduce the health risks of people who consume PCB-contaminated San Francisco Bay fish.
- Conduct or support of monitoring and studies to fill criteria data needs.

4.3.7 Other Water Quality-Related Permitting Issues to Watch

4.3.7.1 Wet Weather Blending

For the last several years, the EPA has been working to finalize a regulation, 40 CFR Parts 122 and 123, addressing the practice of bypassing primary effluent around secondary process units during wet weather events. The EPA is considering giving NPDES permitting authorities (SWQCB), the power to approve wet-weather flow diversions. However, due to significant public interest in this policy, the policy has not been finalized. A copy of the draft rule is included in Appendix C.

The draft rule states:

> *(The) EPA strongly discourages reliance on peak wet weather flow diversions around secondary treatment units as a long-term wet weather management approach at a POTW treatment plan serving separate sanitary sewer conveyance systems and that such diversions should be minimized to the maximum extent feasible…*

The rule also states that that the:

> *EPA does not expect diversions at POTW treatment plants serving separate sanitary sewer conveyance systems to be used for routine rain events."*

The rule allows the NPDES authority (RWQCB) to determine, based on a No Feasible Alternatives Analysis, if peak wet weather flow diversions are acceptable. The rule also grants the RWQCB the authority to determine what constitutes a peak wet weather event; the underlying message being that blending following events of limited magnitude will not be encouraged.

The RWQCB has stated, in both the NPDES permit and in draft permit discussions, that the city of Richmond and RSSD No. 1 should minimize wet weather blending events. To this end, the City is currently investing $20 million to reduce infiltration and inflow (I&I) in the collection system. While this investment is anticipated to result in a reduction to the wet weather flows, it is anticipated that additional measures will be required at the WPCP to sufficiently minimize blending events to avoid regulatory scrutiny. Therefore, the Master Plan will incorporate facilities to minimize blending events at the WPCP.

4.3.7.2 Nutrient Criteria

In January 2003, the EPA finalized nine water quality criteria documents for lakes and reservoirs, and rivers and streams. In these 9 documents, EPA has published national nutrient criteria for fourteen ecoregions.

These documents present EPA's current recommended criteria for both causative (phosphorus and nitrogen) and response (chlorophyll-a and turbidity) variables associated with eutrophic conditions. EPA wanted to base the criteria on "reference conditions," conditions of surface waters that are minimally impacted by humans and protective of beneficial uses. Because EPA was unable to identify any reference conditions, their criteria are based on statistical derivations of non-reference data, resulting in criteria that is intended to represent reference conditions. The criteria are not laws or regulations; rather they are guidance for states to use as a starting point to develop their own nutrient criteria. Based on the nutrient criteria, the RWQCB could begin to include nutrient limits in Bay Area NPDES permits.

The three principal ecoregions in California are as follows:

1. Central Valley.
2. Western Forested Mountains.
3. Xeric West.

The criteria for the Xeric West Region, which would apply to the City and WCA if a state-based nutrient criteria is not developed, are as shown in Table 4.6.

Table 4.6 Nutrient Criteria for Xeric West Ecoregion
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Parameter	Units	Criterion
Total Phosphorus	μg/L(1)	17
Total Nitrogen	mg/L	0.40
Chlorophyll-a	μg/L	3.4
Secchi	m	2.7

Note:
(1) μg/L= microgram per liter.

The development of nutrient criteria by the state is expected to be less stringent than those presented in Table 4.6. As such, the importance of a state-based nutrient criteria limit is critical. The City and WCA should follow developments related to state implementation of nutrient criteria closely.

4.3.7.3 Ammonia Limits

The SWQCB has become increasingly stringent on nutrient removal requirements in the Central Valley. Because the ammonia limit for the City and WCA is defined by a Water Quality-Based Effluent limit, it is not anticipated that the RWQCB will reduce the ammonia limit in the near future. However, because the ammonia effluent limit is based on a dilution factor and regulations are becoming increasingly stringent with time, the Master Plan will present an alternative to address nitrification.

4.4 ASSESSMENT OF WASTEWATER SOLIDS REGULATIONS

Several federal, state, and local regulations are in place that influences whether biosolids from municipal wastewater treatment plants can be reused or disposed of. Increased concerns and debate over biosolids disposal and its associated environmental impacts have led to more stringent revisions and amendments for many of these regulations. Continuing changes in regulations affecting biosolids management make a flexible management program essential. 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 reuse/disposal are discussed.

It is important to note that because biosolids agreement between the City of Richmond and WCWD has been terminated, the City will become responsible for complying with these regulations. In the past, WCWD has been responsible for the compliance tasks relating to biosolids disposal.

4.4.1 Federal Regulations

Federal, state, and local agencies are responsible for regulating biosolids beneficial reuse/disposal. The authority of each agency varies based on the beneficial reuse/disposal methods employed. However, overall 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.

Since the conception of the CWA of 1972, Congress has gained increasing awareness of problems associated with biosolids use and disposal. In response, regulations governing biosolids management practices were promulgated in 40 CFR Part 257. Part 257 established criteria for groundwater and standards for cadmium, PCBs, and pathogen levels allowable in biosolids applied to land. In addition to the CWA, several federal laws regulate a number of biosolids disposal concerns. These laws include the Clean Air Act; Subtitles C and D of Resource Conservation and Recovery Act (RCRA); the Marine Protection, Research, and Sanctuaries Act (MPRSA); and the Toxic Substances Control Act. Table 4.7 lists current federal regulations that directly apply to biosolids use/disposal methods.

4.4.1.1 Definition of Hazardous Material

Published in revisions of 40 CFR Part 261 on March 29, 1990, the EPA defined the toxicity characteristic leaching procedure (TCLP) as the method of determining whether a waste, such as wastewater sludges, is hazardous. The revised rule added 25 organic constituents to the list of toxic constituents of concern and made changes in calculations or regulatory levels of organic chemicals.

4.4.1.2 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 includes 40 CFR Parts 122, 123, and 124 (promulgated in 1983); and 40 CFR Part 501 (promulgated in 1989). Part 122, 123, and 123 established requirements and procedures for including biosolids affairs in NPDES permits. Part 501 requires procedures for granting state biosolids management programs primacy over federal programs, or for federal programs to implement biosolids permits if a state so chooses.

Table 4.7 Federal Regulations Governing Biosolids
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Federal Regulation		Land Application	Distribution and Marketing	Monofills and Surface Disposal	Incineration	Codisposal Landfill and Landfill Cover
40 CFR 50.12	Regulates sludge incinerator emissions				X	
40 CFR 51.18	Regulates sludge incinerator emissions				X	
40 CFR 52.21	Regulates sludge incinerator emissions				X	
40 CFR 60	Regulates incineration of sludge at rates above 1,000 kg/day				X	
40 CFR 61	Regulates sludge incinerator emissions				X	
40 CFR 122-124	Requires municipal disposal to be included in NPDES	X	X	X	X	X
40 CFR 257	Regulates use and disposal of biosolids not regulated by 40 CFR 503	X	X	X	X	X
40 CFR 258	Regulates co-disposal landfilling and use as alternative daily cover material for landfills					X
40 CFR 261-268, 271, and 301	Defines whether biosolids are hazardous	X	X	X	X	X
40 CFR 501	Requires states to implement federal regulations for biosolids	X	X	X	X	X
40 CFR 503	Regulates land application, surface disposal, and incineration	X	X	X	X	X
40 CFR 761	Defines biosolids containing more than 50 mg/kg of PCBs as toxic	X	X	X	X	X

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. After many revisions,

Part 503 was promulgated February 19, 1993. This rule addresses three general categories of beneficial reuse/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.

The federal regulation 40 CFR 503 requires biosolids that are land applied to be treated to meet metal concentration limits as shown in Table 4.8, reduce pathogens as shown in Table 4.9, and reduce vector attraction as shown in Table 4.10 (State Water Resources Control Board, 2000). Biosolids that meet the high quality pollutant concentrations per Table 4.8, one of the Class A pathogen reduction requirements per Table 4.9, and one of the vector attraction reduction alternatives per Table 4.10, options 1 through 8, may be identified as 'exceptional quality 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.

4.4.1.3 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 (such as Richmond's sludge that is dry and disposed of by WCWD). 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 the Richmond sludge once dried by WCWD, typically passes this test as it does not contain any free liquid.

4.4.1.4 Treatment of Landfill Leachate

Currently, the Richmond WPCP accepts and treats landfill leachate from the West Contra Costa Sanitary Landfill (WCCSL). Previously, it was determined that the leachate was "non-hazardous." However, the landfill used to be a Class II landfill, and hazardous materials were accepted. The 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 the leachate tests are non-hazardous. However,

Table 4.8 40 CFR 503 Biosolids Regulations – Pollutant Concentration and Loading Rates for Land Application of Biosolids
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Constituent	Monthly Average Pollutant Concentration Limits (mg/kg) on a Dry Weight Basis[1]
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Molybdenum	_[2]
Nickel	420
Selenium	100
Zinc	2800

Notes:
(1) From Table 3 of 40 CFR 503.13.
(2) Limit is under reconsideration by EPA. Biosolids may not exceed 75 mg/kg molybdenum until a new pollutant concentration limit is established.

Table 4.9 40 CFR 503 Biosolids Regulations – Pathogen Reduction Requirements for Class A and Class B Biosolids
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Class A Biosolids Requirements	Class B Biosolids Requirements
• Either fecal coliform density is less than 1000 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).

Notes:
CFU = Colony Forming Unit.
PFU = Plaque Forming Unit.

Table 4.10	40 CFR 503 Biosolids Regulations – Vector Attraction Reduction Requirements Richmond Wastewater Treatment Master 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.

under the federal Domestic Sewage Exemption (DSE) as long as the leachate is commingled with domestic wastewater prior to the headworks, a treatment facility is exempt from having to meet Treatment, Storage, and Disposal (TSD) requirements under RCRA.

4.4.2 State Regulations

State biosolids beneficial reuse/disposal is primarily regulated by California's SWRCB, the California DPH, and the nine RWQCBs. The City is regulated under the San Francisco Region. As required under the Porter-Cologne Act, the SWRCB, along with its nine RWQCBs, is principally concerned with protecting existing and future beneficial uses of water.

Created in the early 1990s, the California Integrated Waste Management Board (CIWMB) 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 biosolids 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.

In August 2000, the SWRCB adopted Water Quality Order No. 2000-10-DWQ. This order is titled 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. GWDRs cover 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 Code 40 of Federal Regulations (CFR) Part 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.

Table 4.11 lists existing California state regulations that directly apply to biosolids use and disposal methods. Table 4.12 summarizes their relevance to the City. Additional details are provided below.

Title 22 under the CCR states that the waste discharger is responsible to determine its waste is hazardous (according to CCR, Title 22, Division 4.5, Chapter 11, Article 3). The DPH has regulatory authority over such wastes. In addition, the DPH regulates the utilization and land application disposal of biosolids.

Due to the lack of state standards governing land application of biosolids, the DPH's Sanitary Engineering Branch has published a guidance manual "Manual of Good Practice for Land Spreading of Sewage Sludge". The most recent guidance manual was published as a replacement by the California Water Environment Association in 1998. The "Manual of

Table 4.11 California Regulations Governing Biosolids
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	Federal Regulation	Land Application	Distribution and Marketing	Monofills and Surface Disposal	Incineration	Co-Disposal Landfill and Landfill Cover
CCR Title 23 §2908	Regulates discharge of municipal solid waste to land including biosolids.	X	X	X		X
CCR Title 23 §2510 et. Seq.	Regulates discharge of waste to land including biosolids.	X	X	X		X
CCR Title 23 §3680 et. Seq.	Regulates operator certification for wastewater treatment operators.			X		
CCR Title 22 §66261.24	Defines whether biosolids are hazardous.	X	X	X	X	X
PRC §40191	Includes sewage sludge in the definition of solid waste.	X	X	X	X	X
PRC §42246	Requires procuring agencies to document use of fertilizing material, including biosolids, as not harmful to public health and safety.	X	X			
PRC §50002(b)	Establishes requirements for exemption of land application of sewage sludge that poses no threat to public health or the environment.	X	X	X		X
CCR Title 17 §94126	Includes Method 101A - Mercury emissions for sewage sludge incinerators.				X	
FAC §14505	Regulates municipal biosolids as a fertilizer.	X	X			
FAC §14560	Defines biosolids with respect to its use as a fertilizer.	X	X			
FAC §14682	Prohibits distribution of adulterated fertilizing materials including biosolids.	X	X			

Notes:

CCR = California Code of Regulations
PRC = Public Resource Code
FAC = Food and Agriculture Code
IN = Incineration
LA = Land Application
LC = Landfill Cover
SD = Surface Disposal

Table 4.12 Relevance of State Regulations Governing Biosolids and City Facilities
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Law or Regulation	Application	Relevance to City
CCR Title 23, Chapter 15, discharges of waste to land (commonly known as Chapter 15 regulations)	Regulates biosolids and incinerator ash disposal to landfills (waste management units) and dedicated land disposal (land treatment units).	Permit required to dispose of biosolids in a landfill. (WCWD is responsible for obtaining this permit)
CCR Title 22, Division 4.5, Chapter 11	Defines hazardous wastes.	Historically, WCWD biosolids have been shown to meet Title 22.
CCR Title 17, Division 3	Defines tests for emissions monitoring.	
California Department of Public Health Manual of Good Practice for Land Spreading of Sewage Sludge (1983)(1)	Provides guidance for land application of liquid and dewatered biosolids.	Consistent with federal regulations in 40 CFR 257 and provides additional guidance (not updated to recent 40 CFR 258 and 503 regulations).
Porter-Cologne Water Quality Act	Established State Water Resources Control Board and Regional Water Quality Control Boards.	NPDES permit for City is issued by San Francisco Bay Basin-Regional Water Quality Control Board.
California Environmental Quality Act (CEQA)	Establishes procedures for implementing a project following identification of environmental impacts.	None required at this time. Possible future requirement depending on future biosolids handling processes and method of beneficial use/disposal.
Toxic Pit Clean Up Act of 1984 (Katz Bill AB 3566/3121)	Applies to hazardous materials disposal.	Not applicable since City biosolids have been shown to be nonhazardous.
Public Resource Code (PRC)	Defines sewage sludge as solid waste and requires documentation for land application exemptions.	Solid waste designation puts biosolids under CCR Title 23 Chapter 15.
Food and Agriculture Code (FAC)	Limits use of biosolids as fertilizer.	Impacts distribution and marketing of biosolids as fertilizer.

Note:
(1) Not a regulation but anticipated to be used as a reference by RWQCB in writing permits.

Good Practice for Agricultural Land Application of Biosolids" includes sections on management practices for biosolids generators, transporters, appliers, and growers.

Air emissions from the combustion of biosolids are regulated by the California Air Resources Board (CARB) and Regional Air Quality Management Districts (AQMD) to meet the objectives of the Regional Air Quality Maintenance Plan. The Regional Plan is designed to maintain federal and state ambient air quality standards. The AQMDs also have the authority to regulate nuisance odors generated during biosolids processing, handling, and beneficial use/disposal facilities.

The CEQA requires documentation of the environmental impacts of proposed biosolids management projects. In order to obtain CEQA approval, an environmental impact report or negative declaration may be required.

4.4.3 Local Agency Regulations

Nineteen counties in California have developed, or are developing, ordinances for biosolids land application. The counties are:

- Glenn County
- Yuba County
- Sutter County
- Yolo County
- Solano County
- Marin County
- San Joaquin County
- Stanislaus County
- Merced County
- Monterey County
- San Benito County
- Fresno County
- Kings County
- Tulare County
- San Luis Obispo County
- Kern County
- San Bernardino County
- Riverside County
- Imperial County

The stringency of these county regulations ranges from requirements for relatively high minimum insurance to the banning of sludge land application. Some counties have gone as far as banning all biosolids land application. These include San Joaquin, Yolo, Sutter, Yuba, Stanislaus, San Benito, and Monterey Counties. Table 4.13 summarizes County Biosolids Ordinances.

For the WCA, 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.

Table 4.13 Summary of County Biosolids Ordinances
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

County	Ordinance Adoption Date	Acceptable Biosolids	Specific Prohibited Area/Time Period	Primary Responsible Agent
Riverside	2001	Class A only	Not within 500 feet of public area	County Department of Public Health
Fresno	2001	Class A & B	Conditional use permit required	County Department of Public Health
Kings	2001	Class A & B	Class A only after January 1, 2003	County Department of Public Health
Imperial	2000	Class A	Conditional use permit required	County Department of Public Health
Sutter	2000	Ban Completely	Unincorporated area	County Department of Public Health
Yuba	2000	Ban Completely	Everywhere	County Department of Public Health
Glenn	2000	Class A Only	Everywhere	County Department of Public Health
Kern	1999	Class A & B	• Ban on land application of biosolids not meeting Exceptional Quality Standards starting January 1, 2003. • Limited to existing permitted sites and subject to significant County oversight.	County Environmental Health Services Department
Merced	1994	Class A & B	None specified	County Department of Public Health, Division of Environmental Health
San Joaquin	1997	Ban Completely	Everywhere	County Department of Public Health, Division of Environmental Health
Solano	1997	Class A & B	Primary area of Suisun Marsh. By 2012 agencies who land apply will have to divert a portion of their biosolids to Class A or biosolids-to-energy process	County Department of Environmental Management, Environmental Health Division
Stanislaus	1998	Ban Completely	Unincorporated Stanislaus County	County Department of Public Health, Environmental Health Division
Yolo	1996	Ban Completely	Everywhere	County Agricultural Commissioner/Sealer
Tulare	1996	Class A only	• Urban improvement area • Urban development boundary • Urban area within 660 ft of the boundary • East of easterly boundary of rural valley lands plan policy area	County Department of Public Health

- **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 that has recently been closed. The landfill sends its leachate to the WPCP for treatment. Richmond's and WCWD's dried sludge used to be disposed of at this site but is now trucked to the Potrero Hills Landfill in Solano County.
- **City of Richmond.** The City manages the Richmond WPCP and is therefore responsible for regulation and supervision of all activities including sampling, reporting, and maintenance of the Pretreatment Program.

4.5 ASSESSMENT OF AIR QUALITY REGULATIONS

At the WPCP, sources of air contaminants are predominantly derived from diesel engines, digester gas flares, and boilers. In addition to the diesel engine driven standby generator, diesel fuel is used by portable pumps. Digester gas is flared. Other sources of air contaminants are derived from wastewater processes and associated fugitive emissions, a fuel dispensing island.

Agencies at the federal, state, and local levels have jurisdiction pertaining to air pollution and odor control at wastewater treatment plants. At the federal level, the major agencies are the EPA and the Occupational Safety and Health Administration (OSHA). At the state level, the applicable agencies are the CARB and Cal-OSHA. At the local level, it is the Bay Area Air Quality Management District (BAAQMD). These agencies establish ambient air quality criteria and levels of treatment necessary to protect the public health and environment both off-site and on-site of a potential source. The RWQCB also includes general nuisance (odor) provisions in their NPDES permits. These agencies also have the responsibility to permit new facilities for construction and operation and to establish new source pollutants levels and treatment requirements.

4.5.1 Overview of Air Quality Regulations

The federal Clean Air Act (CAA) creates a comprehensive national framework designed to protect ambient air quality by limiting air emissions for both stationary and mobile sources. While the CAA deals primarily with “conventional“ air pollutants, it also addresses emissions of 188 toxic materials defined as “hazardous air pollutants.” The most recent amendments

to the CAA were passed by Congress in November 1990. A few changes have been made to the CAA since that time; these changes are discussed below.

In addition to the national air quality programs, California has a comprehensive state air quality control program under the California Clean Air Act (CCAA). These regulations and policies have been modified and amended several times since their origination in the 1950s. The most recent changes were adopted in 1992 and are discussed later in the following sections. Many provisions of the CCAA parallel those found in the national program. However, California's regulations generally continue to be stricter than the CAA's national requirements and therefore supersede them. The CAA and the State Act are generally implemented as a program by the CARB and local Air Pollution Control Districts (APCD), and regional AQMDs. Although the stricter state provisions generally predominate, California must still submit implementation plans for state and regional compliance with the federal program.

4.5.2 Federal Regulations

The CAA was last amended in 1990. Requirements under this law include the state implementation plan, prevention of significant deterioration for new sources, national ambient air quality standards, hazardous air pollutant standards, and offset requirements.

For listed categories of "major" sources (those that have the potential to emit 10+ tons/year of a listed pollutant or 25+ tons/year of a combination of pollutants), the CAA requires the EPA to develop standards that are based on stringent air pollution controls, known as maximum achievable control technology (MACT). POTWs are a source category listed by EPA for regulation. Although these MACT requirements are not imposed on existing POTWs, the Final Toxics Rule for POTW facilities (October, 1999) requires that new or reconstructed POTWs, which are "major facilities" 1) include covers and controls on the primary treatment processes, except cover only on the primary clarifiers; or 2) demonstrate an overall fraction emitted of 0.014 or less from those primary treatment processes.

On October 26, 1999, under the CAA, the EPA promulgated National Emission Standards for Hazardous Air Pollutants (NESHAP) for new and existing POTWs. The primary HAPs emitted from POTWs include: xylenes, methylene chloride, toluene, ethyl benzene, chloroform, tetrachloroethylene, benzene, and naphthalene.

4.5.3 State Regulations

Many of the guidelines and requirements established in California's air pollution control program parallel federal requirements. These include permits for new stationary sources, including emissions controls and establishment of emissions measurement and monitoring requirements.

CARB is the primary agency for implementation of California's air pollution control program and also oversees AQMD and APCD activities. Each APCD may establish distinct

requirements regarding limitations, permits, and other programs. Therefore, when determining compliance issues in a particular APCD, applicable local district regulations must be consulted.

4.5.3.1 California Air Resources Board

In general, CARB coordinates efforts to attain ambient air quality standard, conducts health and technological research, and controls motor vehicle emissions. CARB is also the designated agency for assuring compliance with CAA, and prepares the state's implementation plan as required.

CARB is responsible for the development of ambient air quality standards for each air basin in California. CARB promulgates ambient air quality standards based, in part, on recommendations from the DPH concerning health effects related to air emissions. These standards are generally more stringent that the National Ambient Air Quality Standards (NAAQS) developed by EPA under the CAA. CARB is the agency which designates air basin attainment and nonattainment of state ambient air quality standards.

4.5.3.2 California Clean Air Act (CCAA)

The CCAA (AB 2595) was adopted in 1988 and requires APCDs (such as the BAAQMD) to reduce criteria pollutant emissions. The no net emissions permit program developed for this purpose is designed to achieve a no net air emissions increase of non-attainment pollutants and precursors such as nitrogen oxides (NO_X), sulfur oxides (SO_X), carbon monoxide (CO), particulates, and reactive organics.

4.5.3.3 Toxic Air Contaminants Identification and Control Program

California's original Air Toxics Program was established in Assembly Bill (AB) 1807 in 1983. The bill set forth policy to reduce public exposure to toxic air contaminants (TACs). In 1987, the California legislature passed the Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, Connelly/Stirling), which provided additional requirements on hazardous air pollutant sources and required implementation of control strategies for "hot spot" areas.

In 1992, AB 2728 amended the AB 1807 Air Toxics Program by requiring that CARB identify as TACs, the 189 federal HAPs listed in the CAA amendments of 1990. CARB officially adopted the list of HAPs as TACs on April 8, 1993. The state recognized that Congress and EPA had already conducted an extensive process to evaluate and identify these substances. Therefore, the intent of AB 2728 was to save the state time and expenses associated with individually identifying each of the 189 HAPs as TACs. However, not all of the 189 HAPs have peer reviewed health values to use in risk assessment and later in risk management.

In 1992, SB 1731 was promulgated to modify AB 2588. SB 1731 in part, requires the Office of Environmental Health Hazard Assessment (OEHHA) to develop and adopt risk assessment guidelines for implementing the AB 2588 Air Toxics "Hot Spots" Act. As part of

the guidelines, OEHHA has included health values that can be used for cancer and noncancer risk assessment.

4.5.3.4 BAAQMD Regulations

Air quality management district activities include rule development and enforcement, monitoring of air quality, a permit system for stationary air pollution sources, air quality planning, protection of the public from the adverse affects 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 Air Basin. New construction or rehabilitation of treatment plant facilities that result in an increase, decrease, control, or elimination of air contaminants must undergo preconstruction review by the BAAQMD under their New Source Review (NSR) requirements.

The goal of NSR (BAAQMD Regulation 2, Rule 2) is to prevent interference with the attainment or maintenance of ambient air quality standards and to prevent degradation of clean air basins. Affected pollutants include, but are not limited to, precursor organic compounds (POC), NO_X, SO_X, particulate matter, and CO.

Important aspects of Regulation 2, Rule 2 are requirements for the application of Best Available Control Technology (BACT), BACT for toxics (TBACT), and the requirement for pollutant offsets. These regulations have recently been modified (May 17, 2000). Regulation 2, Rule 2 requires that an applicant apply BACT to any new or modified source that 1) results in emissions from a new source or increased emissions from a modified source and 2) has the potential to emit 10.0 pounds or more per highest day of POCs, non-POCs, NO_x, SO_x, particulate matter, and CO. These triggers are applied on a source-by-source basis and a pollutant specific basis.

Regulation 2 requires that the applicant offset POC or NO_x emissions at a ratio of 1.15:1.0 when emissions are great than 50 tons per year or more, on a pollutant specific basis. If emissions are greater than 15 tons per year yet less than 50 tons per year, POC or NO_x emissions may be offset at a ratio of 1.0:1.0. Emissions offsets need to be provided when PM10 (particulate matter <10 micrometers in diameter) or SO_x emissions result in a cumulative increase for that pollutant in excess of 1.0 ton per year since April 5, 1991 at a ratio of 1.0:1.0. Emission reduction credits of NO_x and /or SO_x may be used to offset increased emissions of PM10.

Similar to the requirement for pollutant offsets is the Prevention of Significant Deterioration (PSD). In accordance with the PSD provisions of 40 CFR 51.166 of the Code of Federal Regulations, increases in pollutant concentrations over the baseline concentration shall be limited to designated maximum allowable increases. Emission increases for Class II areas, such as the City, are limited to the values shown in Table 4.14.

Table 4.14 Allowable Pollutant Baseline Increases for Class II Areas Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water			
	Annual Arithmetic Mean ($\mu g/m^3$)(1)	**24-hour Maximum ($\mu g/m^3$)**	**3-hour Maximum ($\mu g/m^3$)**
PM_{10}	17	30	-
SO_X	20	91	512
NO_X	25	-	-
Note: (1) $\mu g/m^3$= microgram per cubic meter.			

4.5.3.5 Permitting

There is a two-step permitting process for the WPCP that requires an Authority to Construct (ATC) followed by a Permit to Operate (PTO). To obtain these permits, the requirements outlined in the BAAQMD Regulation 2, Rules 1 and 2 must be met. Based on this information, the BAAQMD staff engineer evaluates the impact of the new or modified source on air quality.

The application for the ATC includes an emission inventory for the new or modified source, proposed BACT and sources of offsets. Since BACT has not been determined for many treatment processes, close interaction with BAAQMD is required during development of BACT. Additionally, any new or modified source is affected by BAAQMD's Regulation 7 which sets limitations on odorous substances. Prior to ATC issuance, the permit application is subject to public review. The City will have to comply with this process if the WPCP constructs a Vactor truck waste facility or street sweeper tipping location at the site.

New nitrogen oxides (NO_x) and carbon monoxide (CO) limits for stationary internal combustion engines with greater than 50 brake horsepower have been adopted by the BAAQMD (Regulation 9, Rule 8). They will come into effect on January 1, 2012. There are also NO_x and carbon monoxide limits for boilers. The current and future limits for these stationary sources are summarized in Table 4.15.

At present, the BAAQMD requires the City to permit 11 emissions sources at the WPCP. The WPCP permit is renewed on an annual basis in April. The permit fee for each source is based upon the amount of predicted annual emissions. BAAQMD makes these predictions based upon annually submitted emissions information. A copy of the current permit is included in Appendix H.

4.5.4 Odor Control

The BAAQMD adopted Regulation 7 and Regulation 9 (Rule 1 and Rule 2) to regulate certain odorous substances emission limits. Odor emissions or ambient odor levels are listed in Table 22. However, the limits presented in Table 4.16 are not applicable until a sufficient number of complaints are received by the BAAQMD Air Pollution Control Officer.

Table 4.15 Nitrogen Oxides and Carbon Monoxides Concentrations Emission Limits for Stationary Sources
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Equipment	NO_x Limit (ppmv)[1][2]		CO Limit (ppmv)[1][2]	
	Current to 2012	2012	Current to 2012	2012
Spark-Ignited Engines Powered by Fossil Fuels - rich-burn engines	56[2]	25	2,000	2,000
Spark-Ignited Engines Powered by Fossil Fuels - lean-burn engines	140	65	2,000	2,000
Spark-Ignited Engines Powered by Waste-Derived Fuels - rich-burn engines	140	70	2,000	2,000
Spark-Ignited Engines Powered by Waste-Derived Fuels - lean-burn engines	210	70	2,000	2,000
Compression-Ignited Engines - 51 to 175 bhp[3]	-	180	-	440
Compression-Ignited Engines - greater than 175 bhp[3]	-	110	-	310
Boiler, Steam Generator, or Process Heater Powered by Gaseous Fuel[4]	30[5]	-	400[5]	-

Notes:
(1) ppmv = part per million, volumetric.
(2) Corrected to 15% oxygen, dry basis.
(3) bhp = brake horsepower.
(4) Emission limits effective 1996 onward.
(5) Dry at 3 percent oxygen.

BAAQMD also regulated the limits on hydrogen sulfide and sulfur dioxide level ground level emissions. The limits for these sulfur-containing compounds are presented in Table 4.17.

An Odor Evaluation Report for the WPCP was prepared for the City in September 2007 by Webster Environmental Associates, Inc. The report shows that the WPCP exceeds the BAAQMD emission limits for hydrogen sulfide. The report is included in Appendix N.

4.5.5 Greenhouse Gas Emissions

Publicly owned treatment works (POTWs) are not currently required to monitor, inventory, or report greenhouse gas (GHG) emissions. However, that is expected to change due to passage of California Assembly Bill No. 32 (AB 32), the Global Warming Solutions Act of 2006. Although no rules have been promulgated for POTWs as of yet, this section examines potential impacts of AB 32 on the Richmond WPCP.

Table 4.16 BAAQMD Odor Substances Limits Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water	
Elevation of Emission Above Grade in Meters (Feet)	**Dilution Rate Volumes of Air - Free Air per Volume of Source Sample**
Less than 9 (30)	1,000
9 to 18 (30 to 60)	3,000
18 to 30 (60 to 100)	9,000
30 to 55 (100 to 180)	30,000
Greater than 55 (180)	50,000

Table 4.17 Hydrogen Sulfide and Sulfur Dioxide Ground Level Concentrations Emission Limits Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water		
Substance	**Limit Ground Level Concentration (ppm)**	**Duration**
Hydrogen Sulfide	0.06 or	Averaged over 3 consecutive minutes in a day
	0.03	Averaged over 60 consecutive minutes in a day
Sulfur Dioxide	0.5 or	Averaged over 3 consecutive minutes in a day
	0.25 or	Averaged over 60 consecutive minutes in a day
	0.05 or	Averaged over 24 hour period

4.5.5.1 Greenhouse Gas Emissions Legislation

AB 32, passed in September 2006, is the first regulatory program in the U.S. that mandates GHG reductions by public and private entities. Regulations will be developed to reduce statewide GHG emissions to 2000 levels by 2010 and 1990 levels by 2020. The GHGs that will be regulated are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

The California Air Resources Board (CARB) has been delegated responsibility to monitor and regulate sources of GHGs in order to reduce emissions. The CARB has delegated the task of identifying major GHG emissions from POTWs to the State Water Resources Board (SWRB). In 2011, the CARB will adopt GHG emission limits and reduction measures that will become active on January 1, 2012.

AB 32 requires CARB to identify and implement reporting and reduction regulations for the largest emitters first. The facilities that will be required to report their GHG emissions first are:

- Power plants and utilities.
- Oil refineries.
- Cement plants.
- Cogeneration facilities (≥1 MW).
- Large stationary combustion sources (e.g., boilers).

These facilities represent 94 percent of point source carbon dioxide emissions.

4.5.5.2 Impacts to the Richmond WPCP

The CARB is developing the list of facilities that will be required to report GHG emissions. The CARB stated that some POTWs will likely be included on the list. These POTWs are likely to be the larger POTWs that produce in excess of 1 MW of cogenerated energy or directly emit in excess of 25,000 metric tons of CO_2 equivalents.. Direct emissions constitute carbon dioxide, methane and nitrous oxide emitted through use of natural gas, or methane and nitrous oxide emitted through the use of biogas. Typically, the various plant processes that emit these gases do not emit sufficient volumes to bring POTWs to the reporting threshold.

4.5.5.3 GHG Emissions Reporting Requirements

If the CARB list includes the Richmond WPCP, the CARB will notify the WPCP that it is required to report GHG emissions. GHG emission limits and reduction measures will become operative on January 1, 2012. POTWs are encouraged to develop facilities level GHG inventories to identify significant sources of emissions and areas of reductions. Quantifying emission reductions is important to eventually receive and market carbon credits. AB 32 requires CARB to ensure entities that have voluntarily reduced their GHG emissions receive appropriate credit for early voluntary reductions. CARB is developing the process for translating voluntary emissions reductions into creditable reductions consistent with AB 32 implementation strategy.

4.5.5.4

The CARB has stated GHGs selected for regulation will be based on the sector - not all GHGs identified in AB 32 will be regulated for every type of facility. If the WPCP is required to inventory, report on, and perhaps ultimately reduce GHG emissions, the gases would include carbon dioxide, methane, and nitrous oxide emissions.

The CARB will regulate direct and indirect GHG emissions, and AB 32 directs the CARB to "recommend the minimum threshold of greenhouse gas emissions below which emission

reduction requirements will not apply." The following sources of GHG emissions are expected to be applicable at the WPCP:

- Direct emissions from stationary combustion sources.
- Direct emissions from wastewater treatment unit processes.
- Indirect emissions from purchased electricity and natural gas.

The POTW Steering Committee has identified some potential early action GHG reduction measures for POTWs:

- Energy efficiency projects.
- Improve pump efficiencies.
- Renewable energy projects (e.g., solar, wind, in-conduit hydropower).
- Engine retrofits.
- Biogas and alternative fuel utilization.
- Water reuse to reduce water import.

Future opportunities for POTWs include receiving credit for voluntary early reductions:

- Credit for reduction in electricity use.
- Credit for production of carbon-neutral fuel (e.g., digester gas).
- Credit for use of carbon-neutral fuel (e.g., digester gas, landfill gas, biodiesel, etc.).

If the CARB does not require the Richmond WPCP to report and reduce its GHG emissions, the WPCP has an opportunity to identify any potential emission reductions and implement voluntary reductions that can then be used as source of revenue through participation in a future regional carbon credit market.

4.5.5.5 Summary

In summary, some POTWs in California can expect to be notified by CARB as to when they will be required by law to monitor and report GHG emissions. Attending public workshops and stakeholder meetings organized by CARB/SWRCB provides an opportunity to voice concerns and stay on top of new regulations as they are being drafted. It is recommended that the City and Veolia stay active in the AB 32 process by signing up for email notifications of these workshops and meetings at their websites. Additionally, the City and Veolia should consider performing a preliminary audit of the WPCP GHG emissions and identify potential GHG emissions reduction strategies.

Since it is not likely that the Richmond WPCP will be required to report or reduce its GHG emissions both the City and Veolia are in position to voluntarily reduce emissions that can then be marketed and sold. It is recommended that the City and Veolia evaluate the potential for voluntary offsets and participation in the future cap and trade carbon market as part of a GHG emission analysis and strategy study.

CONDITION ASSESSMENT AND CRITICALITY EVALUATION

5.1 INTRODUCTION

This chapter details the condition of the Water Pollution Control Plant (WPCP) as determined by an assessment performed May 6, 2008. In addition, the criticality of each unit process component, as determined by a collaborative process with Veolia, is presented. The condition assessment and criticality evaluation led to the development of a rehabilitation and replacement (R&R) schedule for the existing process equipment and components.

5.2 CONDITION ASSESSMENT

The following sections summarize the condition of the major WPCP components. A team consisting of three process/mechanical engineers, a structural engineer, an electrical engineer, and an instrumentation & control engineer conducted the condition assessment. 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
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

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

Selected photos taken during the condition assessment are included in Appendix E. A full equipment list is included in Appendix F. Note that the condition assessment did not include an evaluation of the anaerobic digesters, sludge mixing facilities, boiler building, or sludge transfer pumps. A condition assessment of these facilities was performed as part of a separate project.

5.2.1 Preliminary Treatment

5.2.1.1 Mechanical Bar Screen

The mechanical bar screen was installed in 2002. In general, the bar screen, the rake, auger, and screenings bin are in excellent condition. However, the handrails, kickplates, and HVAC in the bar screen stairwell/channel are severely corroded. Both the handrails and inoperable HVAC system are potential safety hazards that should be fixed in the near future. Because there is only one bar screen, the bar screen channel cannot be shut down for maintenance. Consequently, the condition of the concrete in the bar screen channel is unknown. Because the bar screen and influent pump station structure is 55 years old, it is probable that the concrete is in poor condition due to hydrogen sulfide corrosion.

5.2.1.2 Influent Pump Station

The mechanical bar screen and influent pump structure is in fair condition with the exception of the areas of the pump station that have been exposed to hydrogen sulfide. The exposed plumbing and pipe hangers in the wet well are heavily corroded. The motor control center (MCC) for the influent pumps is corroded. The influent piping and valves appeared to be in fair condition but there are no flexible joints between the structure and the exterior piping.[1] The scum skimming pumps are not functional because the skimming inlets are too low. The HVAC in the pump station is heavily corroded and needs to be replaced. The pumps, isolation gates, and variable frequency drives (VFDs) are scheduled to be replaced in 2009 (Project 1.3); therefore, they are noted as new in the equipment list.

5.2.1.3 Grit Removal

Overall, the grit removal system is in fair to poor condition. The influent well has extensive damage due to hydrogen sulfide attack. The kickplates on the handrails are wood planks and should be replaced with metal kickplates. 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 were corroded. Portions of the grit collectors appeared to be broken and out of alignment. The Parshall flow meters lack level sensors and the grit basin effluent gates are heavily corroded.

5.2.2 Primary Treatment

5.2.2.1 Primary Clarifiers

The primary clarifier structure was originally constructed in 1953 and was rehabilitated in 2003. The rehabilitation included a resurfacing of the concrete on the top of the structure, installation of new handrails, and installation of new sludge collector mechanisms.

[1] Flexible joints between structures and exterior piping allow the structure and pipes to move independently during seismic events. Rigid connections are more likely to fail during seismic events.

Consequently, the handrails, kickplates, and concrete on the top of the structure are in excellent condition. The condition of the concrete below the water surface is unknown. The structure is at the end of its projected useful life by useful life guidelines but it is not in urgent need of replacement. Because of the renovation, the useful life was extended from 50 years to 65 years (see Appendix F for an equipment list which includes useful life information). In general, the mechanical equipment as in good to fair condition with the exception of the chain guards on the sludge collector mechanisms that should be replaced.

5.2.2.2 Primary Scum Pumping

The primary scum pumps and associated electrical equipment are in good condition. Some hydrogen sulfide corrosion was observed in the scum collection boxes. A pinhole leak in the scum piping has been clamped off, which is an indication of internal corrosion in the piping.

5.2.3 Secondary Treatment

5.2.3.1 Aeration Basins

In general, the aeration basins are in fair condition. The mechanical aerators in Basin No. 1 and 2 have been replaced in the last five years. The aerators in Basin Nos. 3 and 4 are not operable and should be rehabilitated if these basins are placed back into service and mechanical aeration is continued. The gates throughout the basins are in poor condition due to corrosion. The channel aeration system is not operable. The return activated sludge (RAS) piping and valves on the deck of the aeration basins are in poor condition. 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 stability of the aerator platforms during seismic events is also questionable.

5.2.3.2 Secondary Clarifiers

The secondary clarifiers are in fair condition. Localized portions of the collector mechanism structures (e.g., steel on bridges for Clarifiers Nos.1 and 2) are heavily corroded and should be replaced. The corner sweeps in Clarifier Nos. 1 and 2 need to be replaced or the corners should be grouted in (Project 1.10A). The effluent launders are out of alignment in spots and should be rehabilitated. The collector drives were replaced recently and are in good condition. In addition, some rehabilitation of the collector mechanism support steel has occurred. This type of preventative maintenance extends the useful life of the collector mechanisms.

The concrete structures of Clarifier Nos. 1 and 2 are nearing the end of their useful life but their replacement is not needed in the immediate future. There is also 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. Clarifier No. 3 is also missing several ducking skimmers that should be replaced.

5.2.3.3 Secondary Treatment Control Building

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 is 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.

5.2.3.4 Secondary Treatment Gallery

The secondary treatment gallery houses electrical equipment, waste activated sludge (WAS) pumps, RAS/WAS piping and valves, as well as 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. 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.

5.2.4 Disinfection

5.2.4.1 Chlorine Contact Basin

The chlorine contact basin is in fair to good condition. A large portion of the mechanical equipment (e.g., mixers, backup 3W pump, etc.) exhibits some corrosion. The basin structure is in good condition.

5.2.4.2 Disinfection Building

The disinfection building is in fair to good condition. The electrical equipment is very corroded but the chemical pumps and piping are in good working condition. There is a potential for a seismic hazard in this building due to the precast roof diaphragm. The connections between the roof diaphragm and the walls should be evaluated by a structural engineer. The disinfection system HMI needs to be replaced and programmed to improve control of the disinfection and dechlorination processes.

5.2.4.3 Chemical Storage Area

The chemical storage area is in fair condition. The chemical storage tanks have reached the end of their useful life due to ultraviolet (UV) light attack. The tanks should be replaced in the near future before a spill occurs. Currently, three out of the nine tanks are out of service due to weak tank walls and broken connections. 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.

5.2.5 Outfall

The confluence structure is in fair condition. The gates are heavily corroded. The handrails and stairs do not meet Occupational Safety and Health Administration (OSHA) requirements. The reverse flow piping (used during construction of the outfall) is not used but is in fair condition. Consideration should be given to installing a level sensor in the confluence structure.

The condition of the tunnel and outfall is unknown. A tunnel inspection in 1978 showed that the tunnel was in good condition. The outfall diffusers were replaced in 1993.

5.2.6 Solids Handling

5.2.6.1 Dissolved Air Flotation Thickeners (DAFTs)

DAFT No. 1 was constructed in 1967 and is inoperable. All electric and mechanical equipment is obsolete. This DAFT should be replaced with a gravity belt thickener (Project 1.14) as soon as possible. DAFT No. 2 is in fair condition. The steel deck and canopy are in poor condition. The foundations for the pumps and mechanical equipment are also cracked. The grating and handrails should be replaced soon.

5.2.6.2 Primary Sludge Pumping

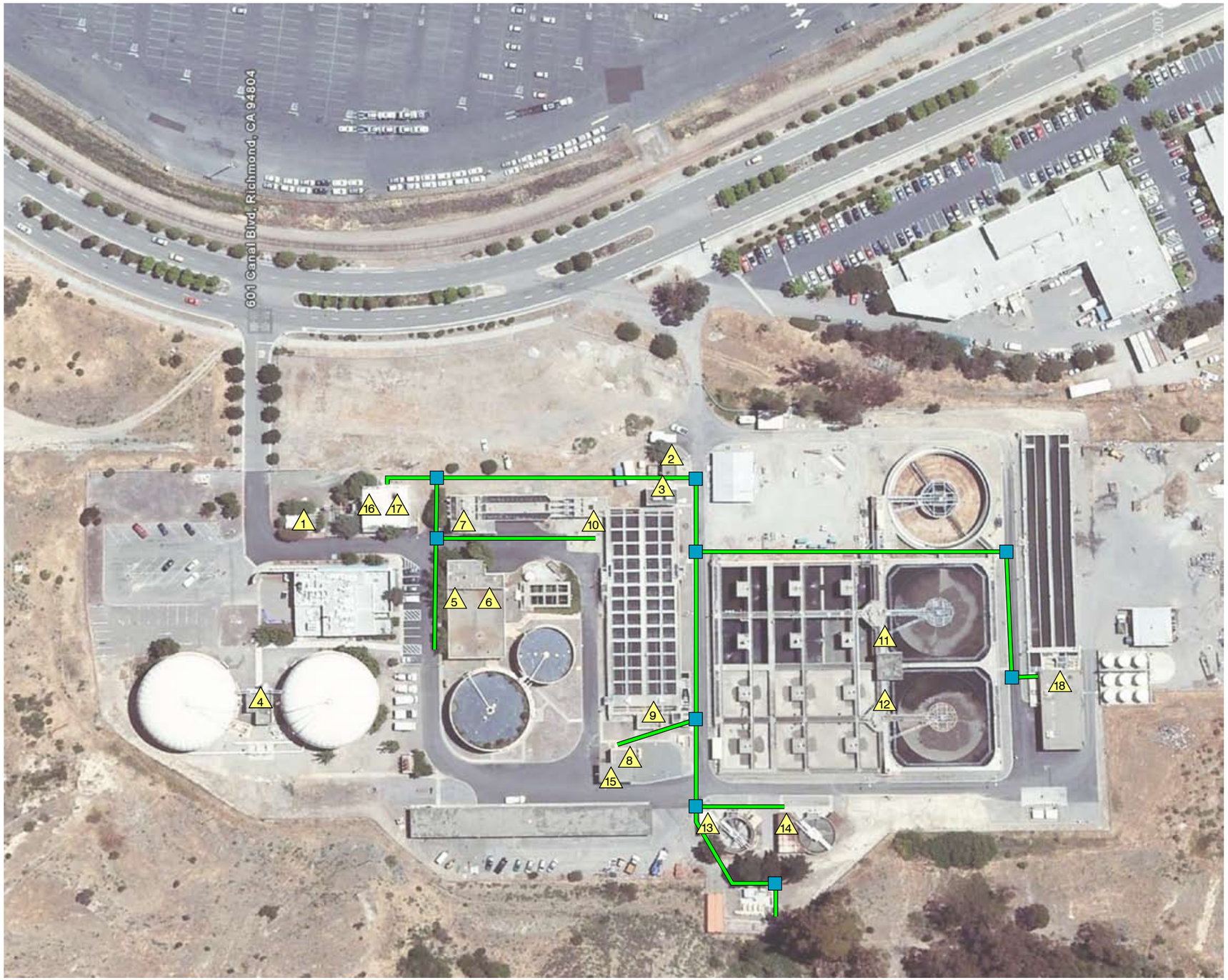
The primary sludge pumping facilities are in poor to fair condition. The concrete structure is 55 years old and is cracked and spalled at penetrations and in localized areas. The sludge piping and valves are in poor condition. The MCC is 50 years old and is in poor condition due to corrosion.

5.2.7 Electrical System

The WPCP's electrical system is at the end of its useful life. Figure 5.1 depicts the locations of major electrical system components. The majority of ductbanks were installed in 1953 and 1967. Based on conversations with plant personnel, the condition of the ductbanks, conduits, and cables is poor. The poor condition has resulted in shorts and electrical fires. When any wire or cable is submerged in water, whether in a vaults, pullbox, or ductbanks, any metallic component is subject to corrosion that can damage the component itself and/or cause termination failures.

Many 1950 and 1960 era MCCs and transformers remain in service throughout the plant. Many of these MCCs are excessively corroded and missing key components such as panel covers, grounds, and lights. Corroded MCCs are a safety hazard because protective components may be adversely affected by the corrosion.

The plant switchboard was installed in 1967 and is in fair condition. The switchgear has some minor corrosion and is missing a cover. The switchboard building is in fair condition. The bus between the Pacific Gas & Electric (PG&E) transformer and the switchboard is exposed to the elements. This is a hazard that should be fixed immediately.



LEGEND
Ductbank
Pullbox
MCC

EQUIPMENT	
1	Old Switchgear
2	Main Service Switchboard
3	Standby Generator
4	Digestion Control Building MCC
5	Sludge Control Building MCC
6	Incinerator MCC
7	Pretreatment Structure MCC
8	3W MCC
9	Primary Sludge Pump Building MCC
10	Primary Sedimentation MCC
11	Aeration and Secondary Sedimentation Tanks MCC No. 1
12	Aeration and Secondary Sedimentation Tanks MCC No. 2
13	Sludge Thickener WAS #1 MCC
14	Sludge Thickener WAS #2 MCC
15	Bioassay Laboratory MCC
16	Influent Pump Station MCC
17	Influent Pump Station MCC-IP
18	Disinfection Building MCC

Figure 5.1
EXISTING ELECTRICAL SYSTEM PLAN
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

vw808f16-8009.ai

A load study was performed to evaluate the capacity of the switchboard. The study showed that the existing switchboard is currently servicing a load of 3,500 amps (including the new influent pumps). The switchboard has a rated capacity of 4,000 amps. The load study should be updated once information on the power requirements for the sludge dewatering facility is received.

The standby generator and the generator building were constructed in 1988 and are in good condition. A load study was performed to determine if the generator was capable of starting and running critical loads at the WPCP. The study showed that the generator could run the four new influent pumps, the six mechanical aerators, the RAS pumps, and other minor loads if there is a utility power failure.

Overall, the WPCP electrical system is in poor condition and much of the electrical distribution system should be replaced in the near future to reduce the potential for power failures and to alleviate safety hazards. Most of the equipment is over 40 years old; it will be increasingly difficult and costly to locate replacement parts. In addition, electrical failures will become more common. These failures may result in process unit failures and permit violations.

5.2.8 Instrumentation and Controls

The instrumentation and controls (I&C) system was renovated by Veolia in 2003. The communication network was converted to wireless communication because of failures in the hardwired data highway plus cable. Only the influent pump station PLC is hardwired to the main PLC in the Administration Building. According to WPCP personnel, the data highway cables were damaged by flooding in the pullboxes. All of the programmable logic controllers (PLCs) have been replaced recently and are in good condition except for the HMI in the disinfection building. This HMI needs to be replaced as well. There is also limited communication between the generator, the 1W system, and the remainder of the WPCP network. Improved communication between the standby generator and SCADA network is necessary. The network room in the administration building has recently been remodeled.

Overall, the control equipment is in good condition because of the upgrades that have occurred over the last five years. It is recommended, when the ductbanks are replaced, that fiber optic cable be included in the ductbanks. While more expensive, converting the SCADA communication network from wireless to fiber optic would result in a faster and more reliable control system.

The instrumentation throughout the plant is in relatively good condition with the exception of several WAS and RAS flowmeters that should be replaced. These are included in the rehabilitation and replacement schedule at the end of this chapter.

5.2.9 Miscellaneous Facilities

5.2.9.1 Plant Water System

The plant water system is composed of 1W, 2W, and 3W systems.

- The 1W system provides potable water for drinking and hygiene to plant personnel, via an air gap, booster pumps, and a hydropneumatic tank. The 1W system is in fair condition.
- The 2W system is no longer in service because 3W (disinfected secondary effluent) is used to provide seal water to pumps and for other plant water needs.
- The 3W system is composed of two vertical turbines located near the north end of the aeration basins. A backup vertical turbine is located in the chlorine contact basin. The discharge from all three pumps is filtered by inline, dual body, hand operated strainers. WPCP personnel state that the 3W is unclean, causing pump seal problems, and that there are both flow and pressure problems.

The City and Veolia should consider installing automatic inline flow strainers (Project 1.16). These strainers employ two, motor driven, rotating screens and scraper bars to remove solids from the surface of the screens. The cleaning is initiated when the motor and flush valve operator are actuated (e.g., can be controlled by pressure drop across screen). The automatic strainers would clean themselves automatically, without operator assistance, 24 hours, seven days a week. Switching from manual to automatic strainers could be accomplished without major modifications to the 3W piping. Alternatively, the 3W piping could be reconfigured to allow the installation of horizontally mounted self-cleaning strainers. This alternative would require more intensive piping and structural changes to the 3W system. A separate mechanical screening system is not recommended because the addition of a second bar screen (with smaller bar spacing) should remove bags and trash upstream of the secondary process (before they can clog the 3W pumps).

The 3W pumps should be replaced with higher capacity pumps when they are at the end of their useful life.

5.2.9.2 Fencing

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 for security.

5.3 CRITICALITY OF UNIT PROCESSES

On May 20, 2008, Veolia and Carollo Engineers conducted a workshop to rank the treatment processes by their relative criticality and to develop a rationale for selecting the highest priority upgrades or replacement projects for the WPCP.

The relative criticality was determined by ranking each process area against each other, based on some assessment criteria, in a collaborative review process. The following assessment criteria were selected at the criticality workshop:

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

The criticality analysis was conducted as a pairwise comparison, in which each unit process is compared to every other unit process to determine their relative importance. The group agreed to several assumptions prior to commencing the analysis.

- The outfall was assumed to be in good condition (it has not been inspected recently).
- The analysis was conducted assuming that the process had failed. The consequences of a process failure were evaluated for each process unit.
- It was assumed that digested sludge would continue to be pumped to West County Wastewater District (WCWD).

The results of the comparison are included in Tables 5.2 to 5.6.

After the pairwise comparison process, the group decided on weighting criteria to value the review criteria according to which is the most important or critical to the WPCP.

- Health and Safety = 2.5.
- Permit Compliance = 2.5.
- Operational Costs = 1.0.
- Condition = 4.0.

Applying the weighting criteria showed that the most critical processes, in order of importance, are: the Influent Pump Station, chlorination/dechlorination, and wet weather bypass/equalization. A weighted ranking of the components is shown in Table 5.7.

Table 5.2 Criteria 1: Health and Safety (after failure, which process will cause the most health and safety concerns?)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	Bar Screen	Influent Pump Station	Grit Removal	Primary Clarifiers w/Sludge Pumping	Storm Weather Bypass/ Equalization Basins	Aeration Basins and Aeration Equipment	Secondary Clarifiers	RAS/WAS Pumping	Chlorination/ Dechlorination	Outfall Conveyance	Sludge Thickening	Sludge Stabilization (Anaerobic Digesters)	Sludge Dewatering	Sum	Ranking
Bar Screen	--	1	4	3	2	3	3	3	1	1	3	3	3	30	**5**
Influent Pump Station	5	--	5	5	5	5	5	5	3	3	5	5	5	56	**1**
Grit Removal	2	1	--	3	2	2	2	2	1	1	2	2	2	22	**13**
Primary Clarifiers w/ Sludge Pumping	3	1	3	--	2	3	3	3	1	1	3	3	3	29	**8**
Stormweather Bypass/Equalization Basins	4	1	4	4	--	5	5	5	3	3	5	5	5	49	**4**
Aeration Basins and Aeration Equipment	3	1	4	3	1	--	3	3	2	1	3	3	3	30	**5**
Secondary Clarifiers	3	1	4	3	1	3	--	2	2	1	3	3	3	29	**8**
RAS/WAS Pumping	3	1	4	3	1	3	4	--	1	1	3	3	3	30	**5**
Chlorination/Dechlorination	5	3	5	5	3	4	4	5	--	3	5	5	5	52	**3**
Outfall Conveyance	5	3	5	5	3	5	5	5	3	--	5	5	5	54	**2**
Sludge Thickening	3	1	4	3	1	3	3	3	1	1	--	3	3	29	**8**
Sludge Stabilization (anaerobic digesters)	3	1	4	3	1	3	3	3	1	1	3	--	3	29	**8**
Sludge Dewatering	3	1	4	3	1	3	3	3	1	1	3	3	--	29	**8**

Table 5.3 Criteria 2: Permit Requirements (after failure, which process will impact permit compliance the most?)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	Bar Screen	Influent Pump Station	Grit Removal	Primary Clarifiers w/Sludge Pumping	Storm Weather Bypass/ Equalization Basins	Aeration Basins and Aeration Equipment	Secondary Clarifiers	RAS/WAS Pumping	Chlorination/ Dechlorination	Outfall Conveyance	Sludge Thickening	Sludge Stabilization (Anaerobic Digesters)	Sludge Dewatering	Sum	Ranking
Bar Screen	--	1	3	1	1	1	1	1	1	1	2	1	1	15	**12**
Influent Pump Station	5	--	5	5	5	5	5	5	5	3	5	5	5	55	**1**
Grit Removal	3	1	--	1	1	1	1	1	1	1	1	1	1	14	**13**
Primary Clarifiers w/ Sludge Pumping	5	1	5	--	4	2	2	2	2	1	4	4	5	37	**6**
Stormweather Bypass/Equalization Basins	5	1	5	2	--	3	3	3	1	2	4	4	5	35	**7**
Aeration Basins and Aeration Equipment	5	1	5	4	3	--	3	3	2	3	4	4	5	42	**4**
Secondary Clarifiers	5	1	5	4	3	3	--	3	2	3	4	4	5	42	**4**
RAS/WAS Pumping	5	1	5	4	3	3	3	--	1	1	4	4	5	33	**8**
Chlorination/Dechlorination	5	1	5	4	5	4	4	5	--	3	5	5	5	51	**2**
Outfall Conveyance	5	3	5	5	4	3	3	5	3	--	5	5	5	51	**2**
Sludge Thickening	2	2	2	2	5	2	3	3	3	4	--	2	3	27	**10**
Sludge Stabilization (anaerobic digesters)	2	2	2	2	5	2	3	3	3	4	3	--	3	30	**9**
Sludge Dewatering	5	1	5	1	1	1	1	1	1	1	3	3	--	24	**11**

Table 5.4 Criteria 3: Operational Costs (highest number = highest relative cost to operations)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	Bar Screen	Influent Pump Station	Grit Removal	Primary Clarifiers w/Sludge Pumping	Storm Weather Bypass/ Equalization Basins	Aeration Basins and Aeration Equipment	Secondary Clarifiers	RAS/WAS Pumping	Chlorination/ Dechlorination	Outfall Conveyance	Sludge Thickening	Sludge Stabilization (Anaerobic Digesters)	Sludge Dewatering	Sum	Ranking
Bar Screen	--	4	3	2	5	4	4	4	4	4	4	4	4	46	**2**
Influent Pump Station	2	--	3	3	5	4	3	3	3	4	4	4	4	42	**4**
Grit Removal	3	3	--	5	5	5	5	5	5	5	4	4	4	53	**1**
Primary Clarifiers w/ Sludge Pumping	4	3	1	--	5	4	3	3	4	5	4	4	4	44	**3**
Stormweather Bypass/Equalization Basins	1	1	1	1	--	1	1	1	1	3	1	1	1	14	**11**
Aeration Basins and Aeration Equipment	2	2	1	2	5	--	3	3	3	4	4	4	4	37	**5**
Secondary Clarifiers	2	3	1	3	5	3	--	3	3	4	3	3	3	36	**6**
RAS/WAS Pumping	2	3	1	3	5	3	3	--	3	4	3	3	3	36	**6**
Chlorination/Dechlorination	2	3	1	2	5	3	3	3	--	4	3	3	3	35	**8**
Outfall Conveyance	2	2	1	1	3	2	2	3	2	--	2	2	2	23	**12**
Sludge Thickening	2	2	2	2	5	2	3	2	3	4	--	3	3	34	**9**
Sludge Stabilization (anaerobic digesters)	2	2	2	2	5	2	3	3	3	4	3	--	3	34	**9**
Sludge Dewatering	2	2	2	2	5	2	3	3	3	4	3	3	--	34	**9**

Table 5.5 Criteria 4: Condition (what needs to be replaced first?)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia

	Bar Screen	Influent Pump Station	Grit Removal	Primary Clarifiers w/Sludge Pumping	Storm Weather Bypass/ Equalization Basins	Aeration Basins and Aeration Equipment	Secondary Clarifiers	RAS/WAS Pumping	Chlorination/ Dechlorination	Outfall Conveyance	Sludge Thickening	Sludge Stabilization (Anaerobic Digesters)	Sludge Dewatering	Sum	Ranking
Bar Screen	--	1	1	2	1	1	1	2	1	1	1	1	1	14	**13**
Influent Pump Station	5	--	4	5	5	5	5	5	5	5	5	5	5	59	**1**
Grit Removal	5	2	--	5	3	4	4	5	4	4	4	4	5	49	**2**
Primary Clarifiers w/ Sludge Pumping	4	1	1	--	2	2	1	2	1	3	1	1	1	20	**12**
Stormweather Bypass/Equalization Basins	5	1	3	4	--	4	4	4	4	5	4	4	4	46	**3**
Aeration Basins and Aeration Equipment	5	1	2	4	2	--	4	4	4	5	4	5	5	45	**4**
Secondary Clarifiers	5	1	2	5	2	2	--	4	4	5	3	5	5	43	**5**
RAS/WAS Pumping	4	1	1	4	2	2	2	--	2	4	1	2	2	27	**10**
Chlorination/Dechlorination	5	1	2	5	2	2	2	4	--	4	2	2	2	33	**8**
Outfall Conveyance	5	1	2	3	1	1	1	2	2	--	1	1	1	21	**11**
Sludge Thickening	5	1	2	5	2	2	3	5	4	5	--	3	4	41	**6**
Sludge Stabilization (anaerobic digesters)	5	1	2	5	2	1	1	4	4	5	3	--	4	37	**7**
Sludge Dewatering	5	1	1	5	2	1	1	4	4	5	2	2	--	33	**8**

Table 5.6 Raw Criticality Results (unweighted and unsorted)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	Criteria No. 1	Criteria No. 2	Criteria No. 3	Criteria No. 4	
	Health Safety/ Hazards	Permit (Environmental Compliance	Operational Costs	Condition	Total
Bar Screen	30	15	46	14	105
Influent Pump Station	56	58	42	59	215
Grit Removal	22	14	53	49	138
Primary Clarifiers w/ Sludge Pumping	29	37	44	20	130
Stormweather Bypass/Equalization Basins	49	38	14	46	147
Aeration Basins and Aeration Equipment	30	42	37	45	154
Secondary Clarifiers	29	42	36	43	150
RAS/WAS Pumping	30	39	36	27	132
Chlorination/Dechlorination	52	51	35	33	171
Outfall Conveyance	54	51	23	21	149
Sludge Thickening	29	27	34	41	131
Sludge Stabilization (anaerobic digesters)	29	30	34	37	130
Sludge Dewatering	29	24	34	33	120

Table 5.7 Weighted Results (sorted high to low)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	Criteria No. 1	Criteria No. 2	Criteria No. 3	Criteria No. 4	
	Health Safety/ Hazards	Permit (Environmental Compliance	Operational Costs	Condition	Weighted Total
Influent Pump Station	140	145	42	236	563
Chlorination/Dechlorination	130	128	35	132	425
Stormweather Bypass/Equalization Basins	123	95	14	184	416
Aeration Basins and Aeration Equipment	75	105	37	180	397
Secondary Clarifiers	73	105	36	172	386
Outfall Conveyance	135	128	23	84	370
Grit Removal	55	35	53	196	339
Sludge Thickening	73	68	34	164	338
Sludge Stabilization (anaerobic digesters)	73	75	34	148	330
RAS/WAS Pumping	75	98	36	108	317
Sludge Dewatering	73	60	34	132	299
Primary Clarifiers w/ Sludge Pumping	73	93	44	80	289
Bar Screen	75	38	46	56	215

The criticality rank was used to help determine the priorities in the rehabilitation and replacement program (discussed in the following section) as well as the Master Plan Program Implementation Plan (discussed in Chapter 8).

After the criticality workshop, Veolia indicated that the sludge disposal agreement with WCWD would be terminated in the near future. In addition, after discussion between Veolia and Carollo about the electrical system, it was determined that, because the electrical system is critical to the WPCP, this system should be added to the criticality analysis. Based on these revised assumptions, the rehabilitation and replacement program and the capital improvement plan were revised to reflect that the electrical system, the solids handling process, and the influent pumps station had the highest criticality rank.

5.4 EQUIPMENT REHABILITATION AND REPLACEMENT (R&R)

Equipment rehabilitation and replacement requirements were established based on the condition assessment, criticality, and the useful life of each WPCP component. As discussed previously, meetings were held with Veolia operations and maintenance staff to develop an assessment of the condition and criticality of the major process equipment. A priority ranking for major equipment replacement was developed based on the condition of the equipment, criticality ranking, the importance of the equipment to personnel safety, and discharge permit compliance.

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 must be done 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.

Useful lives were calculated based on California State Revolving Fund (CSRF) and Environmental Protection Agency (EPA) guidelines. They are summarized in Table 5.9. In some cases, such as with the generator and the primary clarifier, the useful life of the equipment or structure was extended to reflect a longer useful life if the component was in better than expected condition (e.g., good or excellent condition). In other cases, as with the chemical storage tanks, the useful life was reduced to reflect their current condition. It is important to note that the useful life criteria are guidelines; replacement of equipment and

structures should be considered on a case-by-case basis. The useful life of equipment and structures can be extended by a continued focus on preventative maintenance.

The priority categories are explained below and summarized in Table 5.8. Table 5.9 lists useful length of life for WPCP components. Major equipment groupings and the associated priority rankings for replacement are summarized in Table 5.10. The table lists the major equipment, the approximate date the equipment was originally installed or replaced, the existing condition of the equipment, the short term R&R cost, and the priority ranking for replacement. Tables presenting recommendations for individual R&R projects by priority class are included in Appendix G. The full equipment list is included in Appendix F. If the useful life was changed from the guidelines, the useful life for that particular component is highlighted in yellow.

Table 5.8 Priority of Equipment Rehabilitation and Replacement
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Priority Class	Project Status	Project Timing
Level 1 - Mandatory Projects	Replace Now	Next 2 Years
Level 2 - Necessary Projects	Replace Soon	Next 5 Years
Level 3 - Discretionary Projects	Replace Later	As Budget Allows

Table 5.9 Useful Life of WPCP Components
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Type of Component	Useful Life
Mechanical Equipment	25
Electrical Equipment	20
Structural Concrete	40
Piping and Valves	40
Motors and Drives	20
Field Instruments and PLCs	15

Table 5.10 R&R Summary for Major Equipment - Priority Ranking for Repair and Replacement
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Process/Equipment	Installation Year	Remaining Useful Life	Condition Summary	Priority Class	Short Term R&R Cost (next 5 years)	Recommended Action
Preliminary Treatment						
Electrical	Varies	Varies	Excellent	1	$600,000	Existing MCC and ductbanks should be replaced. New equipment that is undergoing replacement as part of the IPS upgrade project is considered to be in excellent condition (therefore, the average condition for the electrical equipment is 'excellent')
HVAC	1967	0	Inoperable	1	$250,000	Replace immediately
Influent Pumps	2009	25	Excellent	1	$0	Will be replaced as part of pump station upgrade in 2009. This project is included as a separate line item in the CIP.
Influent Gates	2009	25	Excellent	1	$0	Will be replaced as part of pump station upgrade in 2009. This project is included as a separate line item in the CIP.
Influent Pump Piping and Valves	1953	0	Fair	1	$270,000	Replace piping and valves (including plumbing) during the planning period. Raise height of scum skimmers to remove scum at average flows.
Skimmer Pumps	1953	0	Fair	3	$40,000	Replace at End of Useful Life
Bar Screen	2002	21	Good	3	$0	Replace at End of Useful Life
Instrumentation	Varies	Varies	Good	3	$0	Replace at End of Useful Life
Structure	1953	10	Fair	3	$3,050,000	Replace at End of Useful Life. Structure is 55 years old. Facility could be rehabilitated for less cost. Installation of redundant bar screen is necessary for full rehabilitation.
Grit Basins						
Structure	2010	40	Poor	3	$0	Rehabilitation of grit basin is included in Master Plan. This project is included as a separate line item in the CIP. Grit basin rehabilitation is planned for 2010.
Gates	2010	25	Poor	3	$0	
Collectors and Screws	Varies	25	Fair	3	$0	
Electrical	1953	0	Fair	3	$50,000	
Primary Treatment						
Primary Clarifier Structure	1953	10	Good	3	$0	Replace at End of Useful Life. Top of clarifier structure was rehabilitated in 2002. The rest of the structure is original to 1953.
Primary Scum Pumps and Collectors	2002	19	Good	3	$0	Replace at End of Useful Life
Sludge Equipment	2002	19	Fair	3	$0	Replace at End of Useful Life
Electrical	2002	14	Fair	3	$0	Replace at End of Useful Life
Instrumentation	2002	7	Good	3	$0	Replace at End of Useful Life
Valves and Piping	1967	0	Fair	3	$60,000	Replace at End of Useful Life. Some piping is corroded and susceptible to pinhole leaks.

Table 5.10 R&R Summary for Major Equipment - Priority Ranking for Repair and Replacement
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Process/Equipment	Installation Year	Remaining Useful Life	Condition Summary	Priority Class	Short Term R&R Cost (next 5 years)	Recommended Action
Aeration Basins						
Electrical	1967	0	Fair	1	$50,000	Includes local conduits only. Most of the electrical system is associated with the secondary control building.
Aeration Basin Structure	1967	7	Good	3	$100,000	Aeration Basin structures are 41 years old.
Influent and Effluent Gates	1967	0	Poor	2	$190,000	Replace/Rehabilitate soon. Most gates are not functional
RAS Piping and Valves	1967	0	Poor	2	$400,000	Replace/Rehabilitate soon due to extensive corrosion
Aerators	Varies	13	Fair	3	$0	Aerators in Basins 1 and 2 are new. Aerators in basins 3 and 4 are not functional.
Instrumentation	2002	11	Excellent	3	$0	Replace at End of Useful Life
Secondary Clarifiers						
Collector Mechanism	Varies	4	Poor	1	$200,000	Replace bridges in Secondary Clarifiers 1 and 2. Possible safety hazard due to corroded bridges.
Secondary Clarifiers Structures	Varies	14	Good	3	$0	Structures of secondary clarifiers 1 and 2 are at the end of their useful life.
Weirs and Launders	Varies	3	Fair	2	$150,000	Launders should be replaced soon.
Secondary Process Control Building						
Electrical	1967	2	Poor	1	$250,000	Ductbanks need to be replaced.
Structure	1967	0	Fair	2	$500,000	Structure is a seismic hazard (heavy concrete roof and parapet do not appear to be supported by structural elements with adequate shear strength
Instrumentation	2002	9	Good	3	$0	Replace at End of Useful Life
Secondary Treatment Gallery						
Electrical	Varies	1	Fair	1	$900,000	MCCs, transformers, and ductbanks should be replaced.
WAS Pumps	Varies	4	Poor	2	$60,000	WAS pumps are heavily corroded.
RAS/WAS Instrumentation	Varies	5	Fair	2	$10,000	Replace at End of Useful Life
RAS Piping and Valves	Varies	8	Poor	2	$100,000	RAS piping is heavily corroded and should be replaced.
WAS Piping and Valves	1967	0	Poor	2	$100,000	WAS piping is heavily corroded and should be replaced.
RAS Pumps	Varies	10	Fair	3	$0	RAS pumps were replaced recently.

Table 5.10 R&R Summary for Major Equipment - Priority Ranking for Repair and Replacement
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Process/Equipment	Installation Year	Remaining Useful Life	Condition Summary	Priority Class	Short Term R&R Cost (next 5 years)	Recommended Action
Disinfection Facilities						
Electrical	1978	0	Fair	1	$625,000	Replace at end of useful life.
Instrumentation	1978	5	Good	1	$2,000	Reprogram chemical pump PLC soon to avoid permit violations. HMI is also at end of useful life.
Chemical Pumps and Mixers	1992	4	Fair	1	$107,000	Mixers, chemical pumps, piping, and valves nearing end of useful life and should be replaced.
Chemical Storage Tanks	1992	2	Fair	2	$180,000	Replace tanks soon as they have reached the end of their useful life.
Chlorination Facilities (CCB, Gates, etc.)	Varies	1	Fair	3	$425,000	CCB gates are nearing end of useful life and should be rehabilitated.
Disinfection Building	1978	10	Fair	3	$0	Replace at end of useful life.
Confluence Structure	1978	7	Fair	3	$0	Replace at end of useful life.
Solids Handling						
Primary Sludge Electrical	Varies	3	Fair	1	$350,000	Electrical system is at end of useful life.
Primary Sludge Structure	1953	0	Fair	2	$500,000	Primary sludge pumping structure is 55 years old and should be replaced.
Primary Sludge Pumping	Varies	12	Fair	2	$75,000	Primary sludge piping and pumps are in fair to poor condition.
DAFT No. 1	1967	0	Inoperable	1	$0	DAFT No. 1 is not functional. Replacement of DAFT 1 with a GBT is included as a separate line item in the master plan CIP.
DAFT No. 2	1978	3	Fair	1	$0	DAFT No.2 has no backup because DAFT 1 is out of sercie. DAFT 2 is also near end of useful life. Replacement of DAFT 2 with a GBT is included as a separate line item in the master plan CIP.
Sludge Stabilization/Digesters	---Pending Assessment by Herwit Engineering---					
Electrical System						
Substation Electrical Equipment	1967	0	Poor	1	$1,440,000	Bus from transformer to switchgear is exposed and should be fixed as soon as possible. Switchgear is near end of useful life.
Standby Generator	1988	10	Good	3	$0	Generator is at end of useful life but in good condition.
Electrical Substation Structure	1970.5	0	Good	3	$350,000	Structure is nearing end of useful life.
Standby Generator Building	1988	20	Good	3	$0	Replace at end of useful life.

Table 5.10 R&R Summary for Major Equipment - Priority Ranking for Repair and Replacement
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Process/Equipment	Installation Year	Remaining Useful Life	Condition Summary	Priority Class	Short Term R&R Cost (next 5 years)	Recommended Action
Plant Water System						
3W Electrical	1978	4	Good	1	$350,000	Electrical system is at end of useful life.
3W Structure	1967	0	Poor	2	$50,000	Structure should be replaced.
3W Pumps and Valves	Varies	7	Fair	1	$80,000	Piping and valves are at end of useful life.
1W Mechanical System	1995	10	Fair	3	$5,000	Replace at end of useful life. Date of installation is unknown.
1W Structure	1995	27	Fair	3	$0	Replace at end of useful life. Date of installation is unknown.
Miscellaneous Facilities						
Administration Bldg Ductbanks	Varies	0	Fair	1	$50,000	Electrical system is at end of useful life.
Fence	Varies	0	Poor	2	$100,000	Fence is in poor condition in areas and should be replaced.
Bioassay Building	1991	5	Fair	3	$750,000	Building is used to house electrical equipment. Building is at end of useful life.
Administration Building	Varies	14	Fair	3	$0	Building is at end of useful life. HVAC system in portions of the building is not functional.
Maintenance Building	1967	0	Fair	3	$1,150,000	Building is at end of useful life. Integrity during seismic events is questionable.
				Total Estimated Short Term (< 5 years) R&R Expenditures =	**$14,169,000**	

Note:

(1) Year installed, rehabilitated or replaced. In some cases, groups of assets were installed, rehabilitated or replaced in various years.

TREATMENT ALTERNATIVE ANALYSIS

6.1 INTRODUCTION

This chapter presents an evaluation of treatment alternatives to accommodate existing conditions, future conditions, and potential discharge requirements.

6.2 APPROACH TO ANALYSIS

Alternatives were developed to meet three objectives:

- Provide reliable capacity to treat existing flows and loads.
- Provide additional capacity to accommodate growth within the service area.
- Provide the level of treatment required to meet future regulations.

Other important process concerns, independent of the above objectives, are addressed within this chapter. These include the impact of on-site mechanical dewatering facilities on the existing treatment process, solids disposal options, recycled water, a review of facilities required for odor control, and gas utilization.

The projected wastewater flows and characteristics developed in Chapter 3 are summarized in Table 6.1. As shown in Table 6.1, the projected average day dry weather flow (ADWF) at buildout is 10.8 million gallons per day (mgd) and the projected average day maximum month flow is 20.1 mgd. The existing ADWF treatment plant capacity (with one unit out of service), as established in Chapter 2, is 6.5 mgd. The existing average day maximum month flow (ADMMF) capacity is 12.3 mgd. Since the projected dry weather and existing maximum month flows are greater than the existing treatment plant capacity, the Water Pollution Control Plant (WPCP) requires additional capacity.

Table 6.1 Summary of Design Wastewater Flows and Characteristics
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

		Existing Conditions			Projected 2040 Values		
Parameter	**Units**	**ADWF**	**ADAF**	**ADMMF**	**ADWF**	**ADAF**	**ADMMF**
Flow	mgd	6.5	8.1	12.1	10.8	13.6	20.1
BOD_5	mg/L	292	250	250	285	250	243
	lb/d	15,855	17,235	25,329	25,700	28,356	40,800
TSS	mg/L	468	400	434	455	400	421
	lb/d	25,394	27,345	43,836	41,000	45,370	70,700

Note:
(1) Flows represent Average Dry Weather Flow (ADWF), Average Day Maximum Month Flow (ADMMF), Average Daily Annual Flow (ADAF) and loads in lb/d represent Average Dry Weather Load (ADWL), Average Day Maximum Month Load (ADMML), and Average Day Annual Load (ADAL).

6.3 REQUIRED TREATMENT IMPROVEMENTS

6.3.1 Introduction

Recommended capacities for the major wastewater treatment processes were presented in Chapter 2. For convenience, the recommended capacities are shown again in Table 6.2. The table presents design criteria corresponding to the plant capacity under three conditions: 1) all units operational and in service under ADMMF; 2) the largest unit is out of service under ADWF; and 3) all units are operational and in service under peak wet weather flow (PWWF) conditions.

As discussed in Chapter 2, the major treatment processes have reliable capacity to treat the existing ADWF of 6.5 mgd (with the largest unit out of service) and ADMMF of 12.3 mgd with the exception the dissolved air flotation thickener (DAFT), and the digester. Because the ADMMF varies from year to year (in 2006 the AMMF was 14.2), the addition of a third aeration basin and a fine bubble aeration system are recommended to meet existing flows. The DAFT and the digester do not meet reliability requirements because there are no backup units for either of these processes. DAFT No. 1 needs to be replaced with a new DAFT or gravity belt thickener (GBT) and Digester No. 1 needs to be rehabilitated and put online.

At a buildout ADWF of 10.8 mgd and ADMMF of 20.1 mgd, only the primary clarifiers have the reliable capacity to treat the flows and loads from future growth. Additional aeration basin capacity is required and the solids process must be upgrades as described above.

At peak weather flows, all processes are capable of meeting the 40 mgd primary and 20 mgd secondary capacity requirements with the exception of the influent pump station, the bar screen, the primary clarifiers, and the outfall. No unit processes are capable of treating the evaluated peak wet weather flow of 55 mgd. As stated in Chapter 2, the primary clarifiers are rated at 39 mgd but will function, albeit with lower efficiency, at 40 mgd. Note that this rating assumes that improvements will be made to improve the settlability of the sludge and the performance of the clarifiers.

Additional information concerning historical unit process performance, as well as the development and detailed results from the capacity analysis, can be found in Chapter 2 of this Master Plan.

6.4 MASTER PLAN PHASES AND LEVEL OF TREATMENT REQUIRED

Four facility phases, or scenarios, were developed to address treatment requirements and effluent disposal options at the WPCP through the planning period. Each scenario considers different flow and load conditions as well as possible regulations that may be imposed upon the City. The phases are:

Table 6.2 Treatment Capacity Rating
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Unit Process	All Units In Service[1] (mgd ADMMF)	One Unit Out of Service[1] (mgd ADWF)	All Units In Service[2] (mgd PWWF)	Design Criteria
Bar Screen[3]	--	--	33	Approach velocity of 1.5 ft/sec
Influent Pump Station[3]	--	--	30	With largest pump out of service
Grit Basin[3]	--	--	40	
Primary Clarifiers	20	8.75	39	SOR of 1000 gal/sf-d at ADWF (2500 at PWWF)
Aeration Basins[4]	12.3	6.5	20	SRT = 3 days and MLSS = 3500 mg/L
Secondary Clarifiers	12.3	10	20	SOR of 400 gal/sf-d (600 at PWWF)
Chlorine Contact Basin	24	--	72	HRT of 1 hr at ADMMF and 20 min at PWWF
Outfall[3]	--	--	35	At a water level of +20.0 in the confluence box
Dissolved Air Flotation Thickeners	11.0[5]	0[5]	N/A	Loading of 18 lb/sf-d
Digesters	9.0[5]	0[5]	N/A	Loading of 0.12 lb VSS/cf-d and HRT of 15 d

Notes:
(1) Based on ADAF BOD_5 and TSS concentrations of 250 mg/L and 400 mg/L.
(2) Based on wet weather conditions (ADAF loadings under higher hydraulic loads).
(3) For simplicity, processes that are designed based on hydraulic capacity were excluded from the ADMMF/ADWF analysis because these unit processes are not designed based on BOD_5 or solids loading.
(4) Existing mechanical aeration system is undersized at ADMMF and at ADWF if one aeration basin is out of service.
(5) Only one DAFT and digester are functional. DAFT and digester capacities determined by ADWF.

- Phase I. Meet the existing discharge permit limits at current flows and loads.
- Phase II. Meet the existing discharge permit limits at buildout flows and loads.
- Phase III. Comply with a hypothetical prohibition of wet weather blending at buildout flows and loads.
- Phase IV. Comply with a hypothetical prohibition of wet weather blending and a hypothetical reduction in the allowable ammonia effluent limit at buildout flows and loads.

For each phase, Carollo recommended which processes should be modified or expanded as a result of the treatment objective and planning flows.

6.4.1 Phase I: WPCP Improvements Necessary to Reliability Treat Existing Flows and Loads.

The necessary major capital improvements for reliability treating an ADWF of 6.5 mgd, ADMMF of 12.1 mgd, and a PWWF of 55 mgd are described below:

6.4.1.1 Mechanical Bar Screen

As discussed previously, the bar screen capacity is limited to 33 mgd, there is no backup bar screen, and there is no bypass around the barscreen to facilitate maintenance. Two alternatives were developed to eliminate these deficiencies;

- Install a second bar screen, in a separate structure, adjacent to the location of the current influent pump station. Advantages to this alternative include the ability to screen all wet weather flows and the addition of a redundant bar screen would allow for rehabilitation of the existing bar screen channel. Disadvantages include the large capital cost required because the existing influent channel and structure cannot accommodate a second barscreen. The project cost for this alternative is estimated to be $4,500,000.
- Do nothing. The bar screen meets capacity requirements for ADWF but not for peak flows. The bar screen will still function at peak wet weather flows but the trash and rags that will escape the bar screen will impact the primary sedimentation basins scum collecting equipment, primary sludge pumps, the anaerobic digesters, and the secondary clarifiers.

It is recommended that a second bar screen be installed in the near future (Project 1.2). The second bar screen should have bar screen spacing of 1/4 inch to 1/2 inch to allow for more removal of trash and floatable materials than the existing bar screen.

6.4.1.2 Influent Pump Station

The total capacity of the influent pump station is 40 mgd with all four pumps in operation. The City of Richmond (City) and Veolia are currently in the process of upgrading the pump station to a firm capacity of 40 mgd. Since peak flows are estimated to be greater than

40 mgd, the pump station is not capable of conveying all wet weather flows. Three alternatives were developed to address this issue:

- Replace the existing pumps with larger pumps to increase the firm capacity of the pump station to 40 mgd. Add a 2 to 3-million gallon (MG) equalization tank upstream of the pump station.
- Replace the pumps with larger pumps to increase the firm capacity of the pump station to 55 mgd
- Do nothing.

Because none of the downstream processes are rated at 55 mgd, it is not recommended that the influent pump capacity be increased in size to 55 mgd. The third option is not acceptable, because without a pump station upgrade, overflows in the collection system may occur. Therefore, the first option, increasing the pump station capacity (Project 1.3) is preferred; this project is consistent with the influent pump station upgrade project that is currently in design. The upstream equalization storage (Project 1.1) will be discussed in more detail later in this chapter.

In addition to the capacity issue, the pump motors are in a dry well. Consequently, a broken valve or pipe could flood and shut down the entire pump station. There are two options to resolve this issue:

- Mount the pump motors above the maximum wet well level and add long drive shafts.
- Do nothing.

Mounting the pump motors above the water level in the wet well would require extensive structural upgrades. The total cost of this project is estimated to be approximately $1 million. The alternative, leaving the pump drivers at the bottom of the dry well, is recommended because each pump intake as an isolation gate that can be closed if there is a leak in the pipe or valve. It is recommended that the sump pump be maintained and tested regularly to ensure that, if there is a leak, the sump pump will be able to remove the wastewater from the dry well. In addition, it is recommended that the City and Veolia should consider installing immersible motors that are capable of operating in both dry and submerged conditions.

6.4.1.3 Grit Removal

As discussed previously, the grit removal performance is poor. Four alternatives to improve the grit removal system were evaluated:

- Rehabilitate the existing grit chambers. Most of the components of the existing grit chambers would be rebuilt. This rehabilitation would include extensive concrete work to repair the influent well, replacing all of the gates, replacing the grit collectors and installing a new grit conveyor. This alternative is estimated to have a total project cost of $750,000.

- Replace the existing grit basins with a new 40 mgd vortex type grit removal system (e.g., vortex grit removal). The principle advantage to this alternative is the improved grit removal which would reduce wear and tear on downstream equipment and decrease the amount of inert material in the digester (freeing up capacity). A new grit removal system is estimated to cost $7.5 million.
- Rehabilitate the Influent well of the existing grit chambers and construct a 16 mgd vortex-type grit removal system. This alternative is a hybrid between the first two alternatives. This alternative includes the rehabilitation of the influent well concrete as well as the replacement of the isolation gates in the influent well. A vortex grit basin with a capacity of 16 mgd would be constructed next to the western most grit chamber. This grit chamber would be modified to direct flow through the new vortex grit basin. The vortex grit basin would have the capacity to treat peak hour dry weather flows. Wet weather flows would be sent through the center and eastern most grit chambers. Grit that settles in the channels would be removed by Veolia's vactor truck after the wet weather event. The project cost for this alternative is estimated to be $1.7 million.
- Do nothing. This is not considered a viable alternative because without improvements, the impacts to the downstream processes would be too severe. Without grit removal, grit would continue to pass through the grit chambers without being removed to a significant degree. Grit would continue to pass through primary treatment and accumulate in the anaerobic digesters. The grit would also cause excessive wear on plant equipment (pumps, valves, and pipe). Additionally, the structural concrete for the grit chamber influent well would continue to degrade and possibly fail in the future.

A cost-benefit evaluation, based on total life-cycle costs, was performed to compare the merits of all four alternatives. The results of the evaluation are presented in Table 6.3.

In evaluating all four alternatives on the basis of total life-cycle costs, the most economical approach is the third alternative - vortex grit removal for dry weather flows and continued use of the gravity chambers for peak wet weather flow. Given the expected improvement in grit removal from a vortex grit removal system, Alternative 3 is recommended. (Project 1.4)

Table 6.3 Cost Benefit Evaluation - Grit Removal Alternatives
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Alternative	Advantages	Disadvantages	Project Cost[(1)] (Million)	Lifecycle Cost[(2)] (Million)
1. Rehabilitate Existing Grit Basins	• Second lowest project cost. • Bypass of grit chambers only required while influent well is being rebuilt.	• May not significantly improve grit removal performance. • Will have a useful life of approximately 10 to 15 years before rehabilitation is required again. • Maintenance intensive. Does not solve access problem to center grit basin.	$0.75	$2.7
2. Construct 40 mgd Vortex Grit Removal System	• Maximizes grit removal under all flow conditions. • Protects primary sludge pumps, pipes valves, and sludge mixing equipment. • Reduces the amount of inert solids in the digesters which will increase performance of digestion process (resulting in higher quality digested sludge, lower sludge volumes, and increased digester gas production). • Will have a useful life of approximately 50 years.	• Largest project cost. • Will require lengthy bypass during demolition and construction of new vortex grit basins.	$7.5	$8.1
3. Rehabilitate the Existing Grit Basin Influent Well and Construct 16 mgd Vortex Grit Removal System	• Maximizes grit removal under most flow conditions. • Protects primary sludge pumps, pipes valves, and sludge mixing equipment. • Reduces the amount of inert solids in the digesters which will increase performance of digestion process • New dry weather vortex basin will have a useful life of 50 years.	• Center and eastern most grit basins will have to be cleaned manually after wet weather events. • Project Cost is higher than the cost of Alternative 1.	$1.7	$2.1

Table 6.3 Cost Benefit Evaluation - Grit Removal Alternatives
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Alternative	Advantages	Disadvantages	Project Cost[(1)] (Million)	Lifecycle Cost[(2)] (Million)
4. Do Nothing	• No project cost.	• Existing grit basins have reached the end of useful life. • Minimal grit removal. • Potential for structural failure of influent well. This would result in a spill of raw wastewater and a possible discharge permit violation. • Grit would continue to accumulate in the digesters resulting in continued production of poor quality sludge, odor problems, reduced gas production. • Premature equipment wear/failures can be expected.	$0	N/A

Notes:
(1) The project costs were calculated from construction costs using the same assumptions described in Chapter 8 of the Master Plan.
(2) The following assumptions were used to generate the life cycle costs:
- 40-year period with an interest rate of 6 percent and discount rate of 3 percent.
- Mechanical equipment would be replaced every 20 years in the vortex grit chambers. For the existing grit chambers, the replacement of mechanical equipment was assumed to occur every 10 years. The chain and flight grit collectors and the grit conveyor were assumed to be replaced at a more frequent interval because they are more complex mechanical devices that are more prone to mechanical failure than the vortex impeller and grit pumps.
- 1/8 of a FTE employee was assumed for maintenance of the vortex grit chambers. One FTE at 1/4 time was assumed for maintenance of the existing grit chambers due to the higher maintenance requirements of the existing grit system.
- The increased wear and tear on plant equipment due to poor grit removal is difficult to quantify. However, the reduced gas production due to grit buildup in the digesters will have a measurable impact on digester gas production if a cogeneration project is implemented. The digester is producing approximately 115,000 scfd and should be producing 161,000 scfd. Half of difference in gas production was assumed to be due to heating and mixing problems. The remaining half was assumed to be due to poor digestion from digester overload due to reduced volume from grit buildup. At 600 Btu per scf and a natural gas cost of $1/therm, the annual cost of the reduced gas production from the digester was calculated to be $48,000.

6.4.1.4 Primary Clarifiers

At an influent flow exceeding 39 mgd (assumed design flow is 55 mgd), the performance of the primary clarifiers begins to decline. The following alternatives to improve peak flow performance were evaluated:

- Add a high rate sedimentation system with a capacity of 20 mgd. This would limit the flow to the primary clarifiers to 35 mgd and increase the primary capacity to 55 mgd. It would also increase removal efficiency during both wet and non-wet weather flows. Disadvantages include high capital costs ($12 million) and the potential for the system to become obsolete if the Regional Water Quality Control Board (RWQCB) requires that all wet weather flows be treated with secondary treatment in the future (this will be discussed in more detail in Scenario III - Prohibited Blending).
- Add a 2 to 3.5 MG equalization (EQ) tank upstream of the primary clarifiers (and influent pumps) to limit peak influent flow to 40 mgd. A pump station would be required to pump wastewater to EQ tank. This alternative would reduce wet weather peaks - allowing the treatment plant to be designed for a peak flow of 40 mgd. Disadvantages to this alternative are that the volume of the EQ tank is uncertain due to insufficient data and the large footprint of this tank. The tank would require cleaning after every wet weather event. The construction of a 2 to 3.5 MG EQ tank and pump station is estimated to be $9 million.
- Add enhanced coagulation to the existing primaries. Adding the ability to dose ferric chloride to the primary clarifiers would increase solids removal and improve the performance of the primary clarifiers at high flows. Enhanced coagulation could also increase removal of some toxic substances (e.g., dioxins) during low flow periods. The system would also reduce odors caused by hydrogen sulfide in the primary clarifiers. The total cost for this alternative is $0.75 million.
- Do nothing. If the status quo is maintained, there is potential for total suspended solids (TSS) and biochemical oxygen demand (BOD) violations during wet weather periods due to poor primary clarifier performance. This could result in mandatory penalties and exposure to third party lawsuits.

It is recommended that an upstream 2 to 3.5 MG EQ tank be constructed and an enhanced coagulation system be implemented to improve the performance of the primary clarifiers and to reduce the flows through the WPCP to 40 mgd (Projects 1.1 and Project 1.5, respectively).

If collection system improvement projects are successful at reducing inflow and infiltration (I&I) in the collection system, the equalization basin can be reduced in size or eliminated. Table 6.4 shows current and potential reductions in wet weather flow volumes due to I&I reductions. The table also shows reductions in EQ basin volume from these changes.

Table 6.4 Potential I&I Reduction and Impacts on EQ Basin Sizing Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water			
Peak Wet Weather Flow (mgd)	**Reduction in I&I (%)**	**Total Wet Weather Volume above 40 mgd[(1)] (MG)**	**Required EQ Tank Size (MG)**
60	(9%)	3.7	4.0
55[(2)]	**--**	**3.0**	**3.25**
50	9%	2.3	2.5
45	18%	1.2	1.5
40	27%	0	0

Notes:

(1) Estimated from storm event that occurred on 12/30/2003. Assumes flow meter readings above 55 mgd are not reliable.

(2) Assumed planning peak wet weather flow (based on modeling from Sewer System Master Plan) and flow data from the WPCP SCADA system.

6.4.1.5 Aeration Basins

There are three issues with the aeration basins that need to be addressed:

- A third aeration basin is required to provide treatment during ADMM flows and loads. There are two options to address this issue:
  - Convert existing EQ Basin No. 1 back to an aeration basin and construct a new EQ basin adjacent to the east of the existing EQ basins. This alternative is estimated to cost approximately $9 million ($3 million of the equalization tank conversion and $6 million of the new equalization tank).
  - Do not put third aeration basin online. The WPCP may not perform adequately at peak flow periods. In addition, a structural or mechanical problem in Aeration Basin Nos. 1 or 2 may cause the plant to violate its NPDES permit.

  It is recommended that a third aeration basin be put online (Project 1.7). The third aeration basin will also be required in the to meet future flows and loads (as will be discussed later in this chapter). Construction of a replacement EQ Basin is also recommended (Project 1.8).
- Low dissolved oxygen (DO) concentrations in bottom of aeration basins may be causing sludge bulking. Options to improve the DO profile are:
  - Provide fine bubble aeration system. Fine bubble aeration would mix the aeration basins better than surface aerators and adequate quantities and distribution of DO. It is anticipated that this would reduce the number of filamentous organisms in the mixed liquor, which would result in a more settable sludge and a better operating secondary process. Fine bubble

aeration systems are also about 15 percent more efficient than mechanical aerators. Converting to fine bubble aeration is estimated to cost $4.5 million.

- Do nothing and continue with mechanical aeration. Continuing with mechanical aerators may result in continuing problems with sludge settleability due to filamentous growth in the aeration basins. A foam control system should be installed if mechanical aeration continues. A foam control system is estimated to cost $0.25 million.

It is recommended that the aeration system be converted to fine bubble aeration system (Project 1.6). Due to the high capital costs of this alternative, a life cycle cost analysis showed that the investment would not pay off in a 20-year period in monetary terms ($0.10/kW, 5 percent discount rate, 20 year period). However, the secondary process benefits, including increased performance of the secondary clarifiers at peak flows of 20 mgd, outweigh the economic analysis.

- The channel aeration system is not functional. The channel aeration system keeps the aeration basin influent and effluent aerated to prevent the mixed liquor from turning anoxic. This system is important because mixed liquor that consistently shifts from aerobic to anoxic zones may encourage to the growth of filamentous organisms.

  The existing system has not been operational for many years. Upgrading the system would require a new blower, air piping, and diffusers. The cost of these improvements is estimated to be $0.75 million. It is recommended that the channel aeration system be rehabilitated (Project 1.9).

6.4.1.6 Secondary Clarifiers

There are four issues that need to be addressed to maximize the performance of the clarifiers.

- There are no corner sweeps in Clarifiers Nos. 1 and 2: As a result, sludge accumulates in the corners, rises to the surface, and goes over the effluent weirs. Rising sludge contributes to poor performance and increases the potential for TSS violations. Improvement options include:
  - Install new corner sweeps to remove sludge in the corners. The corner sweeps would reduce TSS in the effluent. However, regular maintenance of the sweeps is required to prevent them from getting "stuck" in the folded position. The cost of the corner sweeps is estimated to be $0.15 million (based on vendor quote).
  - The corners of the clarifiers can be grouted in, or filled in with concrete, to form a 45-degree angle that allows the sludge to settle towards the center of the clarifiers. This alternative would reduce TSS in the effluent but would cost approximately $0.9 million.

- Do nothing - solids carryover to the chlorine contact basins would continue. Regular cleaning of the chlorine contact basin would be required. Without corner sweeps, the clarifier capacity may need to be derated because all of the surface area is not utilized.

It is recommended that the corners be grouted because this is a permanent solution to the problem (Project 1.10A). However, the installation of corner sweeps is also a viable option.

- The draft tubes on the clarifier mechanisms clog frequently. Clogged draft tubes cause rising sludge blankets that can be swept into the effluent. There are two alternatives:
  - Change the sludge collection device to a plow or blade type and install a sludge hopper or sludge collector ring at center of each clarifier. The cost of this alternative is estimated to be $0.95 million.
  - Do nothing. Draft tubes will continue to clog and result in rising sludge blankets.

  It is recommended that the draft tube sludge collection system be replaced by a plow or blade type sludge collection system (Project 1.10B).
- Operating Clarifier No. 3 at high flow results in solids carryover. There are two alternatives to this problem:
  - Modify the clarifier to improve its performance by adding density current baffles to the clarifier and replace the feed well with an energy dissipater/flocculating feed well. This alternative is estimated to cost $0.375 million. A computational fluid dynamics (CFD) analysis could be performed to identify whether density currents are responsible for the solids carryover.
  - Do nothing - Solids carry over will continue to occur during peak flows.

  It is recommended that Clarifier No. 3 be modified to improve its performance. The clarifier can be upgraded in stages. Stage 1 would be to install density current baffles and observe performance during wet weather flows. Stage 2 would be the installation of a new feedwell (Project 1.11)
- There is no way to balance the flows between the three clarifiers. It is recommended that flow distribution weirs be added to the aeration basin effluent channel to allow for a more even distribution of flow to the clarifiers (Project 1.9). This option is estimated to cost about $0.5 million.

6.4.1.7 Outfall

As discussed previously, the combined outfall capacity limits the flow through the WPCP during peak flow events. In addition, in the near future West County Wastewater District (WCWD) may request an additional 8 mgd of outfall capacity (above their 21 mgd allocation). There are several options to address the hydraulic limitation of the outfall.

- The most expensive option is to replace the outfall with a larger outfall. This alternative is not feasible due to the large cost associated with a new tunnel through the hill to the west of the WPCP and a new deep water outfall. Capital costs could exceed $100 million.
- A more practical alternative is to add a low lift pump station at the confluence structure to increase outfall capacity by surcharging the system. The low lift pump station would be designed to operate only when water levels in the confluence structure rose above a certain level. The total horsepower (hp) required for this low lift pump station would be approximately 200 to 250 hp. A conceptual level design of this pump station is shown in Figures 6.1 and 6.2. This solution is estimated to cost $3.4 million.
- Do Nothing - WPCP will continue to be hydraulically limited and may experience overflows during wet weather events.

It is recommended that a low lift pump station be installed to increase the capacity of the outfall (Project 1.13). One manhole on the west side of the mountain would need to be converted to a pressurized manhole to allow the outfall to be surcharged.

6.4.1.8 Equalization Basins

The existing equalization basins are converted aeration basins. The equalization basins are not designed to drain completely. Consequently, one to two feet of dilute, primary effluent remains in the basins after wet weather events. To prevent septic conditions, 3W is sprayed continuously into the basins. During wet weather events there is potential for the remaining solids in the bottom of the basins to be carried out and into the effluent of the plant. There are three alternatives to address this problem.

- Install a bypass around the existing the EQ basins. After EQ basins are full, discontinue filling EQ basins by opening the bypass to divert flow around the EQ basins. This alternative would cost approximately $0.9 million.
- Grout bottom of the EQ basins to improve the drainage of the EQ basins between wet weather events (and the removal of solids). This alternative would cost approximately $0.375 million.
- Do nothing - continue with current system of supplying 3W to keep the basins from becoming septic.

It is recommended that the bottom of the EQ basins be grouted to improve drainage (Project 1.12). This would reduce mosquito breeding and reduce the demand on the 3W system (3W is currently used to continuously wash down the EQ basins).

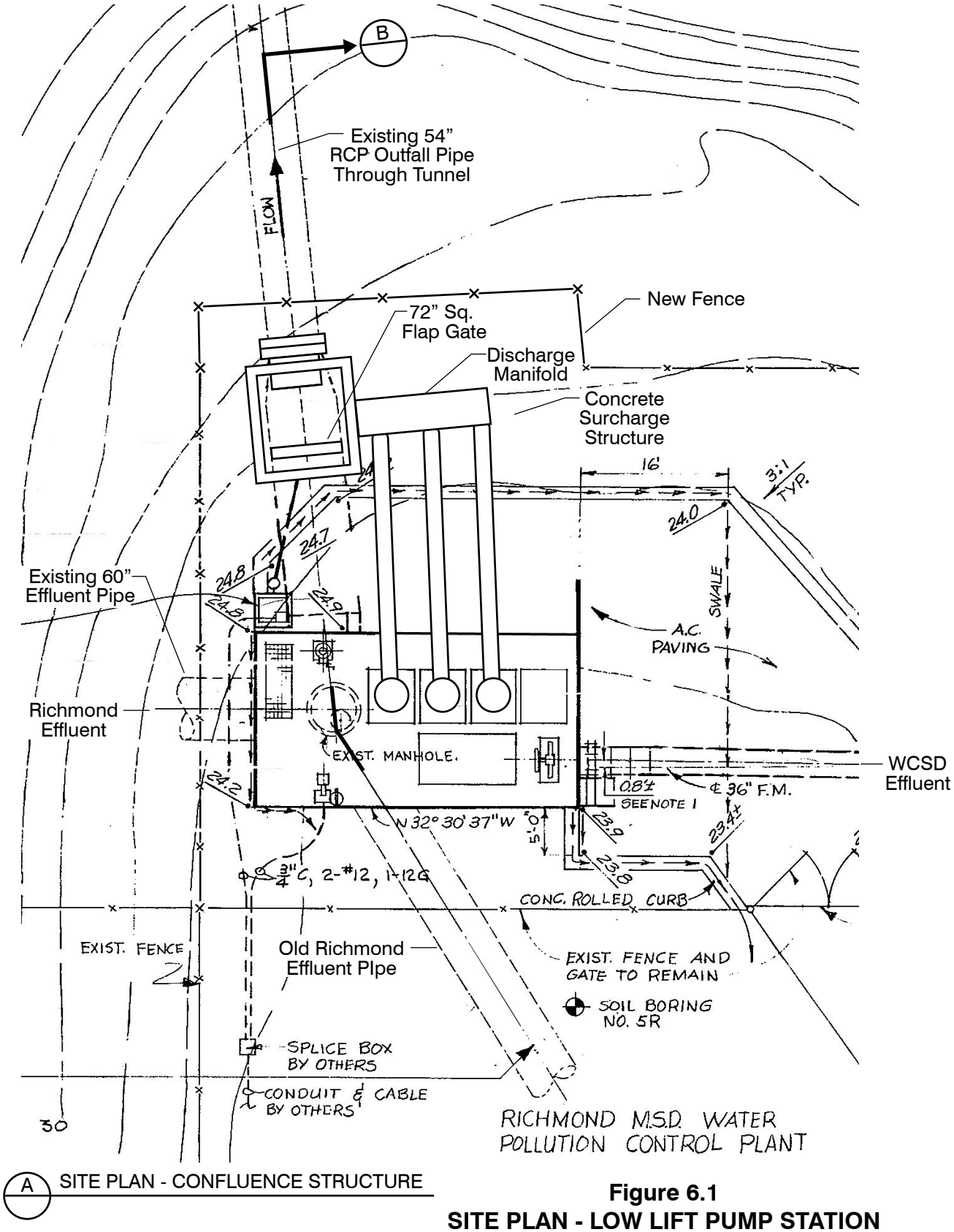


Figure 6.1
SITE PLAN - LOW LIFT PUMP STATION
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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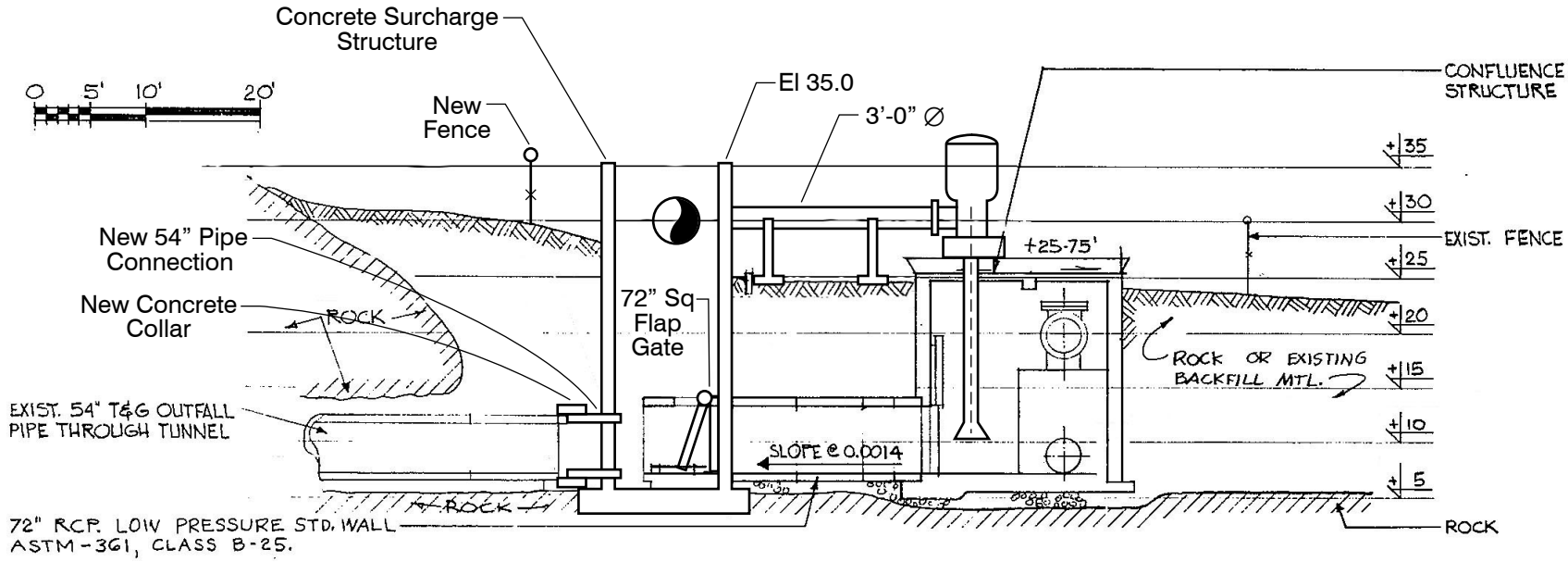

Figure 6.2
PROFILE - LOW LIFT PUMP STATION
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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6.4.1.9 Sludge Thickening

The sludge thickening system does not meet reliability standards because DAFT No. 1 is not functional. In addition, the DAFT No. 2 electrical and mechanical equipment are heavily corroded. There are four options:

- Rehabilitate DAFT Nos. 1 and 2. This will cost approximately $3.75 million.
- Replace DAFTs with two GBTs. This will cost approximately $3.75 million.
- Replace DAFT No. 1 with a GBT and use DAFT No. 2 as a backup This will cost approximately $1.88 million.
- Do nothing - WPCP solids process will not meet reliability standards.

It is recommended that DAFT No. 1 be replaced with a GBT (Project 1.14). Because DAFT No. 2 is still functional, this system could be left in service as a backup to the new GBT. When DAFT No. 2 reaches the point where it is no longer economical to run, a second GBT can be installed.

6.4.1.10 Sludge Stabilization

The sludge stabilization system does not meet reliability standards because Digester No. 1 is out of service. Digester No. 1 is currently being rehabilitated (Project 1.15). Once Digester No.1 is online, Digester No. 2 can be taken out of service for cleaning and maintenance.

6.4.1.11 Plant Water System

The 3W is sometimes high in solids, causing pump seal problems. In addition, there is insufficient pressure. It is recommended that automatic, inline, flow strainers be installed (Project 1.16). Switching from manual to automatic strainers could be accomplished without major modifications to the 3W piping. Total cost for this project should be less than $0.25 million.

6.4.1.12 Phase I Summary

Table 6.5 summarizes the capacity of the WPCP if the recommended Phase 1 improvements are implemented. The major improvements are shown in Figure 6.3.

6.4.2 Phase II: Meet the Existing Discharge Limits at Buildout Flows and Loads

There are three alternatives to expand the WPCP to meet the future flows and loads. In all cases, Aeration Basin No. 3 needs to be put into service (see discussion under Phase 1).

- Convert current equalization basin back into fourth aeration basin. Operate process with two primary clarifiers, four aeration basins, and three secondary clarifiers. Construct new EQ basin next to new EQ basin that was constructed as part of Scenario 1. This alternative is estimated to cost $7.5 million.

Table 6.5 Treatment Capacity after Implementation of Phase I Improvements
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Unit Process	All Units In Service[1] (mgd ADMMF)	One Unit Out of Service[1] (mgd ADWF)	All Units In Service[2] (mgd PWWF)	Design Criteria
Bar Screen[3]	--	--	55	Approach velocity of 1.5 ft/sec
Influent Pump Station[3]	--	--	40	With largest pump out of service
Grit Basin[3]	--	--	40	
Primary Clarifiers	20	8.75	40	SOR of 1000 gal/sf-d at ADWF (2500 at PWWF)
Aeration Basins	16.5	11.25	20	SRT = 3 days and MLSS = 3500 mg/L
Secondary Clarifiers	16.5	8.75	20	SOR of 400 gal/sf-d (600 at PWWF), SVI = 150 mg/L
Chlorine Contact Basin	24	--	72	HRT of 1 hr at ADMMF and 20 min at PWWF
Outfall	--	--	40	
Dissolved Air Flotation Thickeners	22.0	11.0	N/A	Loading of 18 lb/sf-d
Digesters	22.0	11.0	N/A	Loading of 0.12 lb VSS/cf-d and HRT of 15 d

Notes:
(1) Based on ADAF BOD_5 and TSS concentrations of 250 mg/L and 400 mg/L..
(2) Based on wet weather conditions (ADAF loadings under higher hydraulic loads).
(3) For simplicity, processes that are designed based on hydraulic capacity were excluded from the ADMMF/ADWF analysis because these unit processes are not designed based on BOD_5 or solids loading.

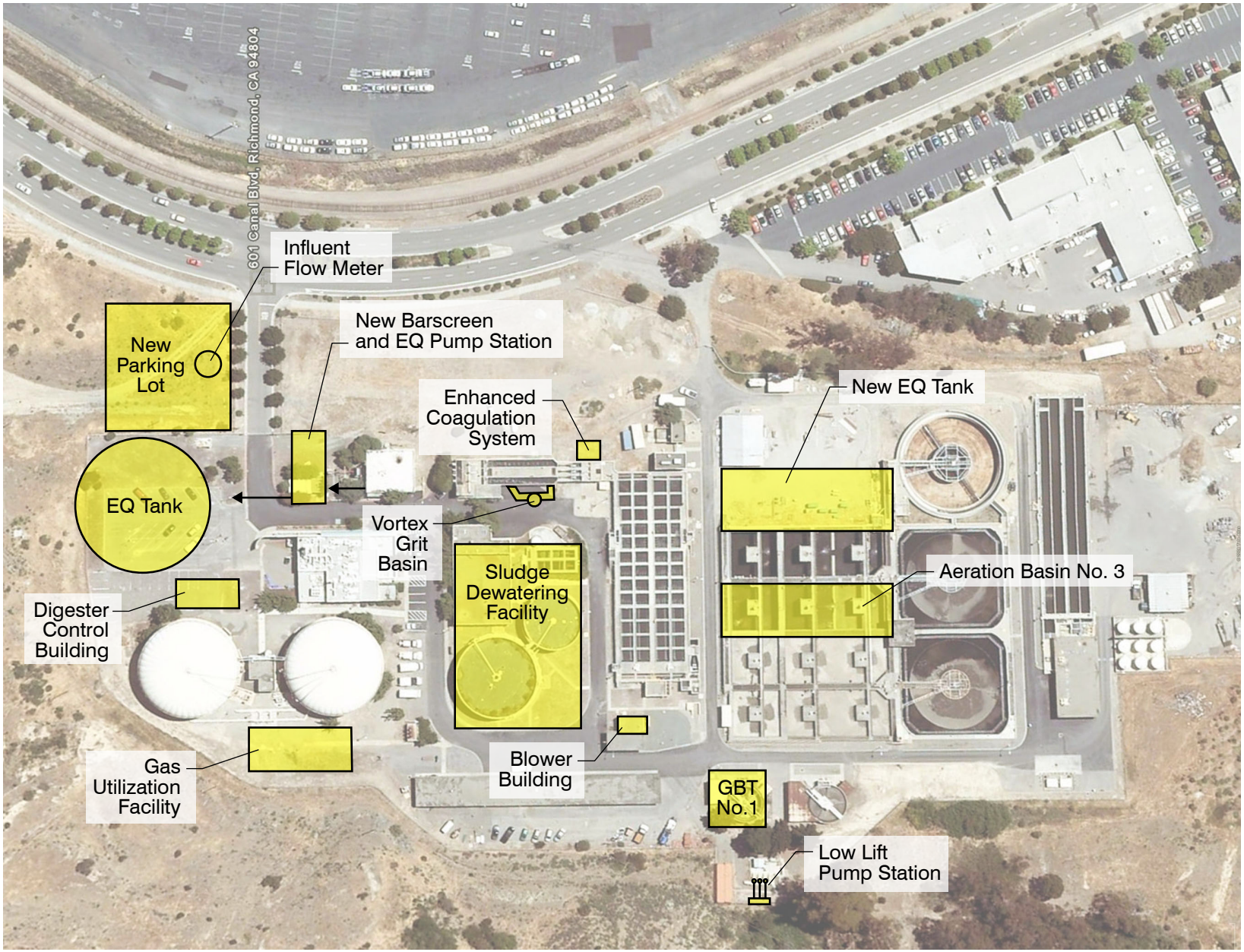

Figure 6.3
RECOMMENDED MAJOR IMPROVEMENTS FOR PHASE I
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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- Construct new high rate clarifier to improve solids removal during primary treatment to allow secondary process to operate with three aeration basins. The cost estimate for this alternative is $12 million.
- Install an MBR next to EQ Basin Nos. 1 and 2. While MBR would produce a higher quality effluent, this alternative may not be feasible because of its large capital cost ($30 to $50 million).

Based on cost, Alternative 1 (4 aeration basins) is selected as the recommended alternative to meet future flows and loads. The addition of a fourth aeration basin, and the construction new EQ basin to replace the existing EQ basin (converted to the fourth aeration basin), will be identified as projects 2.1 and 2.2, respectively.

Table 6.6 summarizes the WPCP capacity if Phase II improvements are made. The new EQ basins will have pumps to allow them to be operated as dry weather equalization basins. In addition, the new equalization basins will be designed to allow them to be converted to rectangular clarifiers in the future. As will be discussed in the next section, this will allow the plant to rerate their secondary process so that the two equalization basins located adjacent to the aeration basins are no longer required. Figure 6.4 shows the major process improvements associated with Phase II.

6.4.3 Phase III: Comply with a Prohibition of Primary/Secondary Effluent Blending During Wet Weather Flows Buildout (Blending)

Four alternatives were developed to manage peak wet weather flows. The options include:

- More Equalization Basin Storage: As described in Chapter 2, the current equalization basin capacity is approximately 2 MG. Wet weather storage requirements are on the order of 20 MG. After the storm event, or series of events, that require wet weather storage, stored volumes would be fed back to the WPCP where it would undergo full treatment prior to effluent discharge. Providing wet weather storage basins would cost approximately $25 million (not including real estate costs). However, as shown in Figures 6.5 and 6.6, there is no land available for large wet weather basins. Therefore this option is not considered feasible.
- Expand Treatment Plant Capacity to 55 mgd: The second wet weather handling alternative is to increase the secondary treatment plant capacity to 55 mgd. All treatment processes would need to be upgraded and expanded significantly. As in Alternative 1, a large footprint would be required to accommodate these treatment processes. This alternative would cost at least $22.5 million. This alternative is not feasible because land for the expansion is not available, and the plant would be difficult to operate.

Table 6.6 Treatment Capacity After Implementation of Phase II Improvements
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Unit Process	All Units In Service[1] (mgd ADMMF)	One Unit Out of Service[1] (mgd ADWF)	All Units In Service[2] (mgd PWWF)	Design Criteria
Bar Screen[3]	--	--	55	Approach velocity of 1.5 ft/sec
Influent Pump Station[3]	--	--	40	With largest pump out of service
Grit Basin[3]	--	--	40	
Primary Clarifiers	20	10.8	40	SOR of 1,350 gal/sf-d at ADWF (2,500 at PWWF)
Aeration Basins	20.1	16.5	20	SRT = 3 days and MLSS = 3,500 mg/L
Secondary Clarifiers	20.1	10.8	20	SOR of 500 gal/sf-d (600 at PWWF), SVI = 150 mg/L
Chlorine Contact Basin	24	--	72	HRT of 1 hr at ADMMF and 20 min at PWWF
Outfall	--	--	40	
Dissolved Air Flotation Thickeners	22.0	11.0	N/A	Loading of 18 lb/sf-d
Digesters	22.0	11.0	N/A	Loading of 0.12 lb VSS/cf-d and HRT of 15 d

Notes:
(1) Based on ADAF BOD_5 and TSS concentrations of 250 mg/L and 400 mg/L.
(2) Based on wet weather conditions (ADAF loadings under higher hydraulic loads).
(3) For simplicity, processes that are designed based on hydraulic capacity were excluded from the ADMMF/ADWF analysis because these unit processes are not designed on BOD_5 or solids loading.

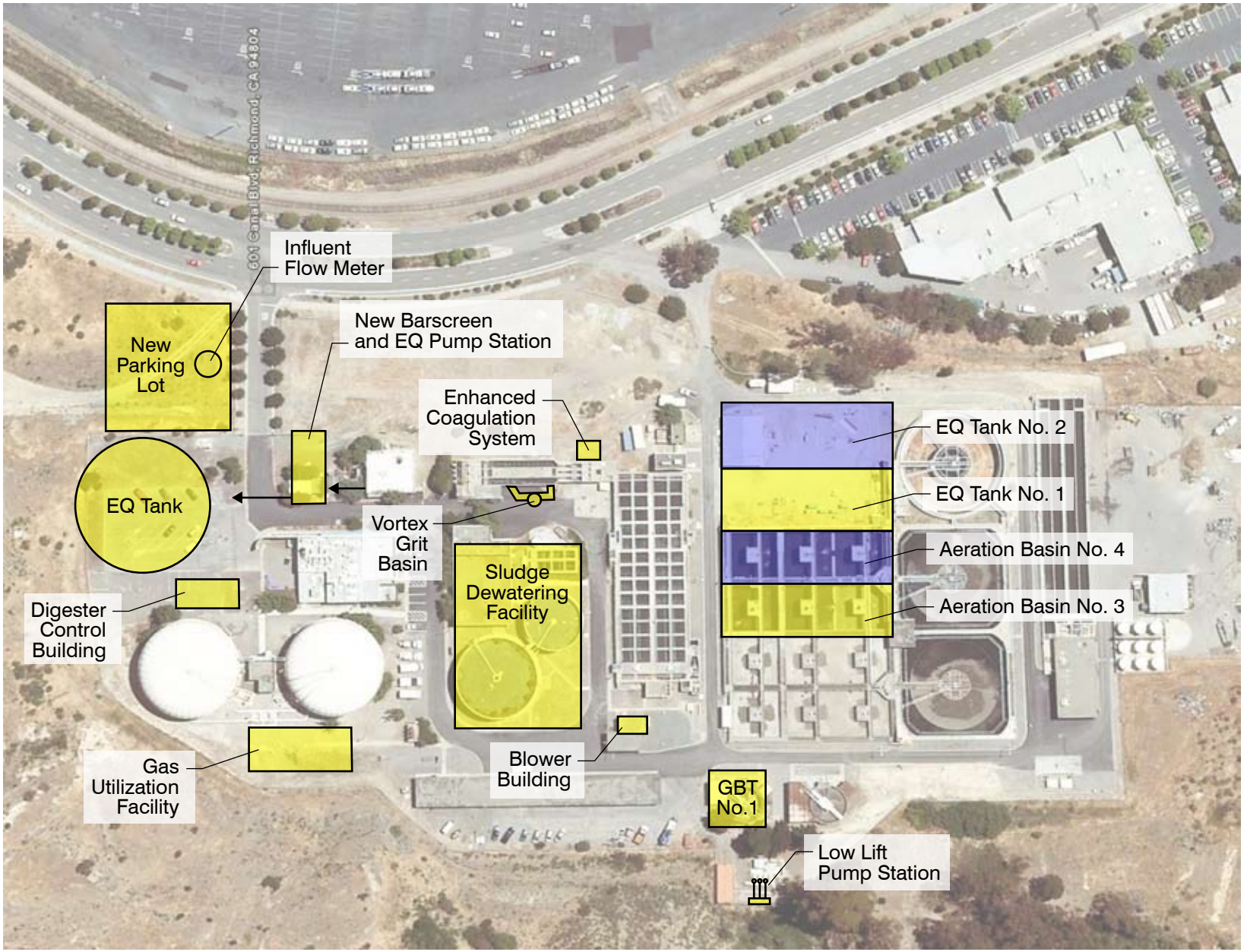

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Figure 6.4
RECOMMENDED MAJOR IMPROVEMENTS FOR PHASE II
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Figure 6.5
10 MG STORAGE BASIN
WASTEWATER TREATMENT MASTER PLAN

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Figure 6.6
TWO-10 MG STORAGE BASINS
WASTEWATER TREATMENT MASTER PLAN

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- Expand Secondary Treatment Plant Capacity to 40 MG and Provide 2 to 3.5 MG of Equalization Storage: This alternative includes an expansion of the secondary process to treat 40 mgd during a wet weather event (this requires that 2 or 3.5 MG of storage be provide upstream of the influent pump station as recommended under Phase I). The secondary process would be expanded to handle 40 mgd by converting the new equalization basins (as described in Phases I and II) into rectangular clarifiers. The equalization basins would be designed and constructed to allow the basins to be converted to clarifiers without changing the structure. Only mechanical equipment, piping, and a new RAS/WAS pump system would be required to upgrade the EQ basins to clarifiers. The cost estimate for this alternative is estimated to be $6 million.
- Expand Primary Treatment Removal to Mitigate the Impact of Blending: The final wet weather handling alternative involves the use of a wet weather treatment system, such as high-rate ballasted sedimentation, followed by blending with WPCP secondary effluent. During wet weather events, influent sewage streams are dilute with influent five-day biochemical oxygen demand (BOD_5) concentrations ranging from 100 to 150 milligrams per liter (mg/L) and TSS concentrations ranging from 125 to 175 mg/L. Recorded removal efficiencies of 85 to 90 percent for BOD and 55 to 65 percent for TSS can be achieved with high-rate systems. High-rate sedimentation requires the addition of a coagulant and polymer during wet weather periods. For wet weather treatment, the systems would be used in parallel with the primary/secondary treatment trains. Sludge generated within the high-rate system would be sent to the anaerobic digesters. This alternative would cost approximately $12 million. This alternative is risky because the RWQCB may require secondary treatment of all effluent regardless of whether the primary effluent from the high-rate system meets effluent limits.

If blending is prohibited in the future, Alternative 3, expanding the secondary process to treat 40 mgd of wet weather flow, is recommended (Project 3.1). The ADWF capacity of the secondary process would remain 11.0 mgd. Table 6.7 summarizes the capacities of the unit processes under these recommended improvements. Figure 6.7 provides a summary of the major process improvements associated with Phase III.

6.4.4 Phase IV: Comply with a Prohibition of Wet Weather Blending and Reduced Ammonia Limits at Buildout Flows and Loads

This alternative was developed to plan for a possible restriction of ammonia limits in the future. Ammonia would be removed by operating the existing activated sludge process at a longer solids retention time (SRT). This process, referred to as nitrification, utilizes nitrifying bacteria that grow under longer SRTs. Because of the higher SRTs when compared to a conventional, carbonaceous-only system, the available aeration basin capacity is diminished. Additional aeration basin volume would be required to meet the same treatment capacity as a carbonaceous-only system.

Table 6.7 Treatment Capacity After Implementation of Phase III Improvements
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Unit Process	All Units In Service[1] (mgd ADMMF)	One Unit Out of Service[1] (mgd ADWF)	All Units In Service[2] (mgd PWWF)	Design Criteria
Bar Screen[3]	--	--	55	Approach velocity of 1.5 ft/sec
Influent Pump Station[3]	--	--	40	With largest pump out of service
Grit Basin[3]	--	--	40	
Primary Clarifiers	20	10.8	40	SOR of 1350 gal/sf-d at ADWF (2500 at PWWF)
Aeration Basins	20.1	16.5	40	SRT = 3 days and MLSS = 3250 mg/L
Secondary Clarifiers	20.1	17.5	40	SOR of 400 gal/sf-d (600 at PWWF for clarifiers and 1000 at PWWF for new rectangular clarifiers), SVI = 150 mg/L
Chlorine Contact Basin	24	--	72	HRT of 1 hr at ADMMF and 20 min at PWWF
Outfall	--	--	40	
Dissolved Air Flotation Thickeners	22.0	11.0	N/A	Loading of 18 lb/sf-d
Digesters	22.0	11.0	N/A	Loading of 0.12 lb VSS/cf-d and HRT of 15 d

Notes:
(1) Based on ADAF BOD_5 and TSS concentrations of 250 mg/L and 400 mg/L.
(2) Based on wet weather conditions (ADAF loadings under higher hydraulic loads).
(3) For simplicity, processes that are designed based on hydraulic capacity were excluded from the ADMMF/ADWF analysis because these unit processes are not designed based on BOD_5 or solids loading.

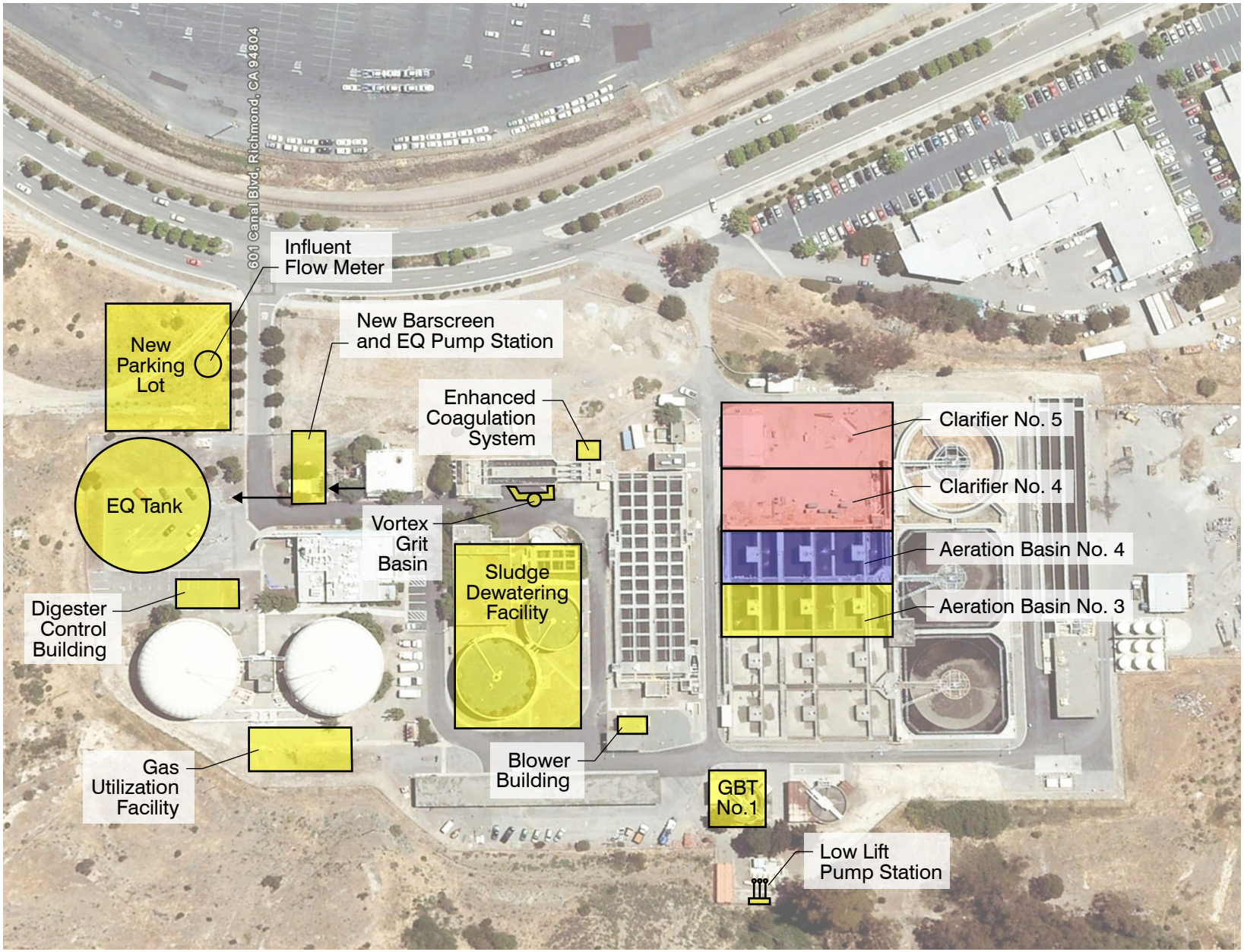

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Figure 6.7
RECOMMENDED MAJOR IMPROVEMENTS FOR PHASE III
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

If the water quality based effluent limit is reduced by removing the 25:1 dilution factor, the new effluent limit for ammonia would be 1.28 mg/L. The necessary major capital improvements for nitrifying at treatment capacities of 10.8 mgd ADWF for this alternative are discussed below:

- For the 10.8 mgd ADWF scenario (Phase II), two additional aeration basins would be required (total of 6 aeration basins).
- For the no blending scenario (Phase III), two additional aeration basins would be required (total of 8 aeration basins and 5 clarifiers).

As can be seen in Figure 6.8, there is limited space available on the site for the Phase IV improvements. If the Phase IV improvements are implemented, additional land will need to be acquired by the City (either to the east or to the south of the WPCP). The aeration basin locations shown on Figure 6.5 are conceptual. This project will be referred to as Project 4.1.

6.5 METALS REDUCTION APPROACH (IF REQUIRED)

If, after the completion of additional testing for selenium and dioxin, it is found that the WPCP effluent concentrations of selenium and dioxin in the WPCP effluent are above the limits, several steps should be taken in an attempt to minimize metals concentrations and loadings to the treatment facility.

6.5.1 Source Control/Waste Minimization

One method currently used by the Richmond Sanitary Sewer District No. 1 (RSSD) for reducing discharge constituents from industrial contributors is a source control and waste minimization program. As described in Chapter 4, pretreatment programs are required by the Environmental Protection Agency (EPA) for all publicly owned treatment works (POTWs) over 5.0 mgd. As limits on metals and other toxics are imposed on the WPCP, the development of pretreatment limits for the constituents of concern will become necessary. As such, establishing reasonable limits and subsequent enforcement will become the responsibility of POTWs. Because source control and waste minimization is not capital intensive and is relatively easy to implement, this approach is the desirable “first step.” It is recommended that the RSSD maximize its pollutant reduction strategy prior to the implementation of relatively expensive end-of-pipe technologies. The City is actively pursuing this strategy and has hired a consultant to review whether or not the City needs to implement new local limits. The City also has an approved, and actively enforced, wastewater pretreatment program.

6.5.2 End-of-Pipe Technologies

If source control and waste minimization measures fail to reduce metals to acceptable levels, “end-of-pipe” treatment technologies will be necessary. Such technologies may include chemical addition, conventional multimedia filtration and/or membrane filtration.

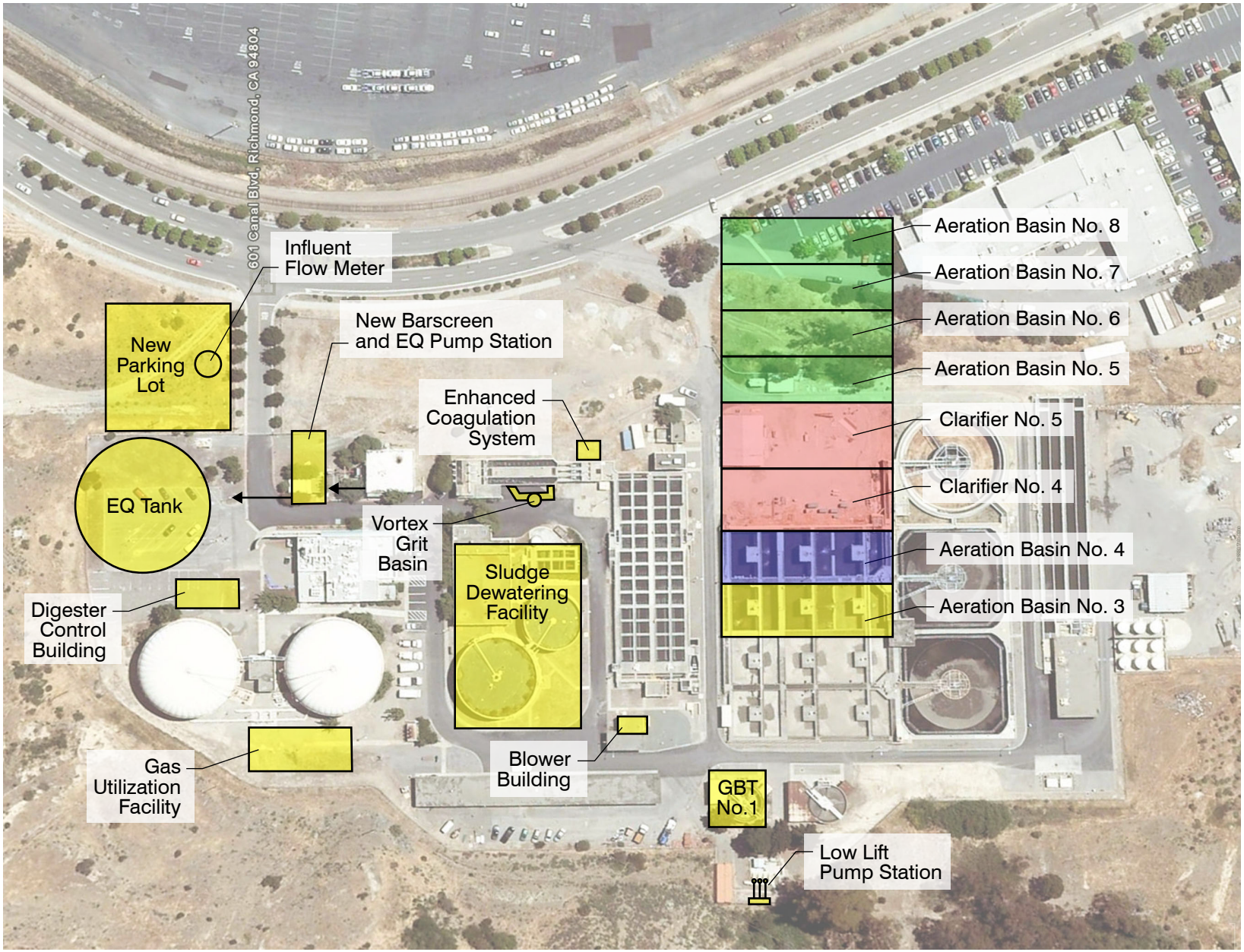

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Figure 6.8
RECOMMENDED MAJOR IMPROVEMENTS FOR PHASE IV
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

However, depending on the effluent water chemistry, some constituents may be soluble and would pass through all of the processes, including membranes. Pilot testing would be required to evaluate treatment processes to remove metals.

6.6 RECYCLED WATER

As discussed in Chapter 2, due to infiltration of seawater from San Francisco Bay into the collection system, conductivities levels are very high in the WPCP influent. These high conductivities (~5,000 microsiemens per centimeter [umhos/cm]) leave the wastewater undesirable for any recycled water use, including irrigation, even if treated to Title 22 disinfected tertiary standards. A reverse osmosis system, which has very high capital and O&M costs, would be required to remove the salts from the water before recycled water customers could utilize the water. The capital cost for a 7 mgd microfiltration, reverse osmosis, and UV disinfection facility is estimated to be $50 to $75 million (total project cost). If seawater infiltration is reduced and the sodium levels in the influent decrease to typical values, a microfiltration and UV facility could be constructed. The cost of a microfiltration plus UV facility is estimated to be $25 to $30 million (total project cost).

These costs do not include the distribution system (pump station, pipelines, storage tanks, and customer connections) that would be required to distribute the recycled water to customers. A market assessment to determine the number and location of potential recycled water customers is required before the cost for a distribution system can be estimated.

For this reason, facilities for the treatment of recycled water are not included in this master plan. It is recommended that when/if the seawater inflow and infiltration is reduced[1], the City and Veolia conduct a recycled water market assessment as part of a recycled water feasibility study. The implementation of a recycled water system should be coordinated with the East Bay Municipal Utilities District (EBMUD) as they are the water purveyor in the City of Richmond. EBMUD is currently in the process of implementing the Richmond Advanced Recycling Expansion (RARE) Water Project. In the future, RARE may treat and distribute all of WCWD's effluent during dry weather months. It is possible that EBMUD may be interested in acquiring some or all of Richmond's effluent for treatment at the RARE facilities. The effluent from the Richmond WPCP could be pumped to the RARE facilities through the WCWD's effluent pipeline. Infrastructure for this option is already in place as the WCWD effluent pipeline was used for disposal of the Richmond WPCP's effluent during construction of the combined outfall. Any pump station modifications for recycled water would have to be coordinated with the low lift effluent pump station project that is recommended to increase outfall capacity. It is recommended that the City and Veolia

[1] The City and Veolia should consider sampling manholes that were identified as being impacted by seawater infiltration in the Collection System Master Plan to determine the location of seawater inflows into the collection system.

pursue discussions with EBMUD regarding water quality requirements for the RARE project.

6.7 AIR/TOXICS ODOR CONTROL

The 2007 Odor Environmental Report (Webster Environmental Associates) provides an extensive analysis and discussion of the odor issues at the WPCP. Three options for odor control were presented:

- Odor Control Scenario 1 (OC1): Bar screen channel is covered. Air from this channel and the influent pump station wet well are treated by a new odor control system then exhausted to the atmosphere.
- Odor Control Scenario 2 (OC2): In addition to the improvements described in OC1, the grit basins are covered and the air from this process and the headworks is treated by the odor control system.
- Odor Control Scenario 3 (OC3): In addition to the improvements described in OC1 and OC2, the primary sedimentation units are covered and the air collected from the headspaces is treated by a separate odor control system.

The odor report recommends that the City and Veolia should consider implementing Odor Control Scenario 3 (Project 1.17) to mitigate off-site odors from the WPCP.

6.8 DIGESTED SLUDGE DEWATERING

Currently, digested sludge is pumped to the WCWD. At the WCWD WPCP, digested sludge is dewatered and dried using solar drying beds. At present, dried sludge (at least 50 percent solids) is removed once annually from the drying beds and is disposed of at the West Contra Costa Sanitary Landfill (WCCSL). The RSSD has been informed by WCWD that WCWD will no longer accept digested sludge from Richmond in the near future.

To accommodate this change, Veolia is proposing to develop a sludge dewatering facility to be constructed at the RSSD WPCP site. The facility would be comprised of belt filter presses, a dewatered sludge loading facility, filtrate pumps, chemical facilities, and an odor control system. The estimated cost for this facility is $14.7 Million. The annual operating and maintenance cost is estimated to be $320,000.

The City has received a competing proposal from Synagro to construct a sludge dewatering facility at the WCCSL. Under this alternative, digested sludge from the WPCP would continue to be pumped through the existing sludge transfer pipeline to the Synagro dewatering facility. The leachate from the WCCSL would continue to be pumped to the WPCP through the pipeline. The estimated cost of this facility is $5.2 Million plus $500,000 to repair the sludge/leachate transfer pipeline. The annual operating and maintenance cost is estimated to be $700,000.

An evaluation of the two dewatering proposals was performed by the City. A decision on which proposal is implemented is pending. If the Synagro proposal is implemented, an evaluation of the hydraulic capacity of the sludge transfer pipe should be performed to verify that sufficient capacity is available for sludge and leachate pumping. If the hydraulic capacity is not sufficient, larger pumps may be required. The pipe should be checked to verify that it is capable of handling the increase in pressure due to the larger pumps.

6.8.1 Projected Sludge Quantities

To verify the sludge dewatering facility design criteria, sludge production was estimated using the solids output from Carollo's process model, which was developed in conjunction with the capacity analysis described in Chapter 2. Tables 6.8 and 6.9 present a comparison of sludge mass and volume flow rates (following anaerobic digestion) between the Dewatering Facility Design Evaluation Report (Herwit Engineering 2007) and the treatment plant model. The tables show that the model estimates produced by the Carollo model are consistent with the dewatering facility design criteria.

6.8.2 Filtrate Recycle Stream Management

If the sludge dewatering facility is constructed at the WPCP, the belt filter presses will produce filtrate that will be recycled to the headworks. The filtrate, which is produced by pressing the liquid out of the digested sludge, would have high concentrations of soluble NH_3 generated from the breakdown of solids during the digestion process. Without an intermediate treatment step, mixing the filtrate with the WPCP influent would increase the NH_3 influent concentrations from an average of 23 mg/L NH_3 to approximately 30 mg/L NH_3. After secondary treatment, the ammonia concentration in the effluent is expected to be closer to 25 mg/L. Table 6.10 shows the influent concentrations of NH_3 if untreated filtrate is recycled to the headworks.

Table 6.8 Solids Projection Comparison - Existing Conditions Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water

	ADAF		ADMMF	
Condition	Dewatering Facility Design Criteria[(1)]	Master Plan Estimates and Projections	Dewatering Facility Design Criteria[(1)]	Master Plan Estimates and Projections
Influent Flow (mgd)	9.4	8.1	12.4	12.1
Dry Solids to Dewatering (lb/day)	15,607	17,885	26,763	27,304
Digested Sludge(gal/day)	89,700	80,000	154,300	132,00

Note:
(1) Data obtained from City of Richmond Dewatering Project Design Evaluation (Herwit Engineering 2007)

Table 6.9 Solids Projection Comparison - Buildout Conditions
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Condition	ADAF		ADMMF	
	Dewatering Facility Design Criteria[1]	Master Plan Estimates and Projections	Dewatering Facility Design Criteria[1]	Master Plan Estimates and Projections
Influent Flow (mgd)	12.4	13.6	16.0	20.1
Dry Solids to Dewatering (lb/day)	20,587	25,706	35,304	44,000
Digested Sludge (gal/day)	118,500	133,750	203,100	207,000

Note:
(1) Data obtained from City of Richmond Dewatering Project Design Evaluation (Herwit Engineering 2007)

Table 6.10 Filtrate Characteristics and Flowrate
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Condition	Existing Conditions - 2008			Buildout Conditions - 2040		
	ADWF	ADAF	ADMMF	ADWF	ADAF	ADMMF
Influent Flow (mgd)	6.5	8.1	12.1	10.8	13.6	20.1
Digested Sludge Flow (gpd)	78,000	80,000	132,000	126,000	133,750	207,000
Filtrate Ammonia Load (lb/d)	489	538	773	787	895	1,270
Filter Ammonia Concentration (mg/L)	764	750	730	788	780	763
Ammonia Load in Influent[1] (lb/day)	1,247	1,534	2,350	2,072	2,609	3,856
Effluent Ammonia Concentration[2], w/o Sidestream Treatment (mg/L)	25-30	25-30	25-30	25-30	25-30	25-30

Notes:
(1) Assumes 23 mg/L ammonia as N in WPCP influent.
(2) Combined flow from influent and filtrate stream after primary and secondary treatment. Assumes no treatment of sidestream.

Because the average monthly effluent limit is 32 mg/L and the expected effluent concentration is 25 to 30 mg/L, variations in plant loadings or operational problems may cause the WPCP to exceed the effluent limit for ammonia. However, the ammonia limit applies to the combined effluent for RSSD and WCWD. The WCWD treatment plant removes ammonia to comply with recycled water requirements for end users. Ammonia concentrations for WCWD effluent are less than 1 mg/L on average. Based on the WCWD average flowrate of 8.0 mgd, the combined flow from both plants will have a ammonia concentration roughly equal to half of the ammonia concentration in Richmond's effluent. Under the worst case condition of a Richmond effluent concentration of 30 mg/L NH_3 and assuming no ammonia removal from the Richmond WPCP, the ammonia concentration in the combined effluent would be 15 mg/L -- well below the effluent limit of 32 mg/L. Note that if the dewatering facility is constructed at the Richmond WPCP, and the belt filter presses are operated intermittently, an equalization tank would be required to allow the filtrate to be fed into the liquid process at a constant flow.

If WCWD were to stop nitrifying, or if all of the WCWD effluent is diverted to the EBMUD recycled water plant, the Richmond WPCP would have to consider implementing a side stream treatment process to treat the filtrate to avoid the possibility of discharge limit violations.[2] A discussion of several sidestream treatment technologies is presented below.

6.8.2.1 Filtrate Treatment Technologies

There are several technologies available to remove the ammonia to avoid potential exceedances of the NPDES permit limit for ammonia (if WCWD stops nitrifying or discharging to the bay during dry weather). These technologies are described below. All alternatives, except for air stripping, require flow equalization because the belt filter press will be used intermittently. An equalization tank would allow a continuous feed of the ammonia to the process train if the belt filter press is operated 7 hours per day. Under the buildout, ADMMF condition, a 150,000-gallon EQ tank with a 15-foot sidewater depth and a diameter of 40 feet would be sufficient. This assumes that the belt filter press will collect and discharge the washwater and filtrate separately. If the washwater is not collected separately and recycled to the headworks, then the EQ tank volume will roughly double.

- Single Reactor High-Activity Ammonia Removal Over Nitrite (SHARON): SHARON is a high-rate nitrogen removal process that operates with a minimal SRT. Due to the high temperature it is operated at (30 to 40 degrees C), the process only requires a 1 to 2 day SRT. The SHARON system requires the addition of heat, alkalinity (e.g., lime), and a carbon source (methanol). Since the HRT is equal to the SRT of the system, the SHARON process can be difficult to control. The preliminary size of the SHARON system is 300,000 gallons**.**
- MBBR: A Moving Bed Biofilm Reactor (MBBR) is a biofilm reactor that contains small media with a high specific surface area. The high specific surface area allows

[2] If a large portion of WCWD effluent is diverted, the outfall dilution study should be updated as a higher dilution ratio (and higher ammonia limit) may be warranted.

large quantities of biomass, which treat the wastewater, to attach to the media. This allows the volumetric loading on the process unit to be high and reduces the footprint of the facility. Unlike an activated sludge process, there is no return sludge in a MBBR system. The conceptual design of the MBBR system includes two reactors in series with a total volume of 550,000 gallons. Up to 59 percent of the total volume of the reactors would be filled with biofilm carriers and the reactors would be aerated with a medium bubble aeration system.

- CARRB: Activated sludge treatment can be used to reduce side stream centrate ammonia loads back to the main aeration basins. Conventional activated sludge systems treating side stream ammonia loads require clarifiers in order to concentrate biomass for return to the head of the process for seeding. Because the nitrifier growth rate is relatively slow, long SRTs are often required when treating high strength ammonia side streams. For this process to work efficiently, it requires an activated sludge process operating in nitrification mode. Therefore, this is not a viable alternative.
- Air Stripping: The ammonia can be stripped by raising the pH of the side stream to a pH of 11 with caustic soda. The liquid stream would then be sent through four 11-foot diameter air strippers. The air strippers require 150,000 standard cubic feet per minute (scfm) of air to remove the ammonia. Approximately six 75-hp blowers would be required to provide this flow rate (4 duty plus 2 standby). The gaseous ammonia then would be treated by four 11-foot diameter sulfuric acid scrubbers. This alternative is not recommended due to high operating costs of the blowers and the requirements for caustic soda and sulfuric acid systems.
- Convert WPCP to Nitrification: Under this alternative the side stream can be sent to the process untreated. To remove the ammonia, the entire liquid stream can be nitrified. This alternative is similar to Scenario IV (described above). This alternative is not preferred because the nitrification requirements conflict with the Scenario III (prohibition on wet weather blending).

6.8.2.2 Non-Economic Analysis

Advantages and disadvantages for the five alternatives discussed in this section are shown in Table 6.11. A comparison of the five treatment alternatives is shown in Table 6.12.

6.8.2.3 Recommendation

The recommendation is to not provide side-stream ammonia removal for the dewatering filtrate at this time. If WCWD stops nitrifying in the future (or they stop discharging effluent to the Bay) the City may have to add a side-stream ammonia removal process. The preliminary recommended process for side-stream ammonia removal, if required in the future, is a MBBR process. The MBBR process could be located in the open area between the WPCP and Canal Boulevard (east of the grit basins). Construction of an MBBR process

is estimated to cost approximately $8 million (based on a quote from AnoxKaldnes and quantity takeoffs).

Table 6.11 Advantages and Disadvantages of Recycled Stream Treatment Alternatives
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Advantages	Disadvantages
Alternative 1 - SHARON	
• Relatively small footprint • Allows sludge dewatering project to proceed without affecting main treatment processes	• Large equalization tank required. • Precise process control required. • No known full-scale facilities in the United States. • Recycle reheating required. • Supplemental carbon required (methanol)
Alternative 2 - MBBR	
• Relatively small footprint • Allows sludge dewatering project to proceed without affecting main treatment processes	• Large equalization tank required.
Alternative 3 - CaRRB	
• Reseeds main ABs with nitrifiers. • Increases overall SRT and/or clarifier capacity.	• Not applicable to the WPCP because the plant does not nitrify at this time • Affected by RAS rate. • Only ~50% ammonia oxidation. • Highest oxygen demand of alternatives.
Alternative 4 - Air Stripping	
• Non-biological process (easier to control). • No equalization tank is required	• Relatively high energy requirement (300 hp • Potential noise problem • Potential for carbonate scaling.
Alternative 5 - Convert WPCP to Nitrification	
• One process to operate instead of two (main treatment process plus side stream) • Reduces total ammonia load to San Francisco Bay • Established wastewater treatment process	• Capital intensive - requires large investment initially instead of phased approach. • Long SRT requires more aeration basin volume. This alternative limits the options for reducing wet weather events (e.g. upgrading the secondary process to 40 mgd) • Due to greater oxygen demand, energy requirements increase

Table 6.12 Comparison of Recycle Treatment Alternatives
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

	SHARON	MBBR	CaRRB	Air Stripping	Nitrify WPCP
Maintenance Requirements	–	0	–	0	–
Aeration/Air Energy Input	+	+	0	–	0
Heat Input	–	+	0	0	+
Operating Experience	–	–	0	0	0
Process Complexity	–	0	–	–	–
Requirement for Precise Process Control	–	0	–	0	–
Recovery From Upset	0	0	+	+	–
Reduction in Nitrogen Load	+	+	0	+	+
Reliability	0	0	0	+	0
Capital Cost	0	0	–	+	-
O&M Cost(1)	0	0	0	–	0

Note:
(1) O&M costs refer to the overall cost of treatment, not just the cost of treating the recycle stream.

Legend:
+ = Positive comparative characteristic
– = Negative comparative characteristic
0 = Neutral comparative characteristic

6.9 DIGESTER GAS UTILIZATION

Methane gas produced by the anaerobic digestion process in Digester No. 2 currently fuels boilers that are used to heat Digester No. 2. Excess digester gas is flared and released to the atmosphere. Typically, municipal wastewater treatment plants use 40 to 50 percent of their digester gas for heating and the rest is flared. This excess digester gas is a valuable resource that can be used to produce power or used for thermal drying of the dewatering sludge. Effective use of this resource can reduce costs and the carbon footprint of the plant operations. However, due to the current condition of the solids stabilization system (digesters and ancillary equipment), the digester gas production rate is low and the gas quality is poor. The gas quality and production rate should be increased before a gas utilization system is implemented. The next sections discuss gas utilization and sludge disposal options. Because digester gas can be used to dry sludge, the two topics should be considered together.

6.9.1 Existing Gas Production and Quality

From July 2007 to July 2008, digester gas production averaged 115,000 standard cubic feet per day (scfd). Gas production has varied significantly from a high of 181,000 scfd in June 2008 to a low of 46,212 scfd in January 2008. Calculations show gas production at existing flows and loads should vary between 161,000 scfd and 254,000 scfd (ADWF and ADMMF periods) based on benchmarks for performance of a typical plant of this type. By comparing the average gas production to the ADWF calculations, the digester is producing 30 percent less gas than expected.

Digester gas testing was performed for Veolia in May 2008. Two separate samples showed hydrogen sulfide (H_2S) concentrations of 6,800 and 8,600 parts per million (ppm). Typical digester gas at municipal wastewater plants has H_2S concentrations between 1,500 and 2,000 ppm. Therefore, the H_2S concentrations in the digester gas are approximately 4 times higher than normal. High H_2S concentrations have a significant impact on scrubbing costs.

The digester gas was also tested for siloxanes. The total siloxane concentration was 5,072 parts per billion (ppb). This is slightly higher than typical values.

6.9.2 Reasons for Low Gas Production and Poor Quality

The first reason for the low gas production is that the heating and mixing system for the digester is at the end of its useful life. The system requires large amounts of maintenance and operates intermittently. Heating is critical to proper digester operation because anaerobic microorganisms require relatively high temperatures to maximize their growth rates. Anaerobic digesters at municipal wastewater treatment plants are typically operated at 95 degrees Fahrenheit (degrees F). While digester temperature data are limited for the WPCP, the average temperature over the last five years is 86 degrees F. The range of temperatures varied from 44 to 113 degrees F. The less than optimal average temperature and wide range of temperature fluctuations have had a detrimental effect on digester gas operation.

To illustrate this point, Figure 6.9 shows gas production and temperature over a four-month period from May 2008 to August 2008. During the month of May, repairs were made to the digester heating and mixing system. After these changes, the digester temperature gradually increased to 95 degree F. As the graph shows, digester gas production rose after the digester temperature increased. The graph also shows that short-term temperature drops (caused by heating system failures) have a significant impact on digester gas production. During the month of August, when temperature data was not available, the gas production was highly variable and much lower than expected; this is probably due to a heating and mixing system failure.

The second reason for low gas production, and a potential reason for poor quality gas, is that the active volume of the digester has been reduced due to buildup of inert materials in the digester. As discussed previously, the grit basins allow a significant quantity of inert grit

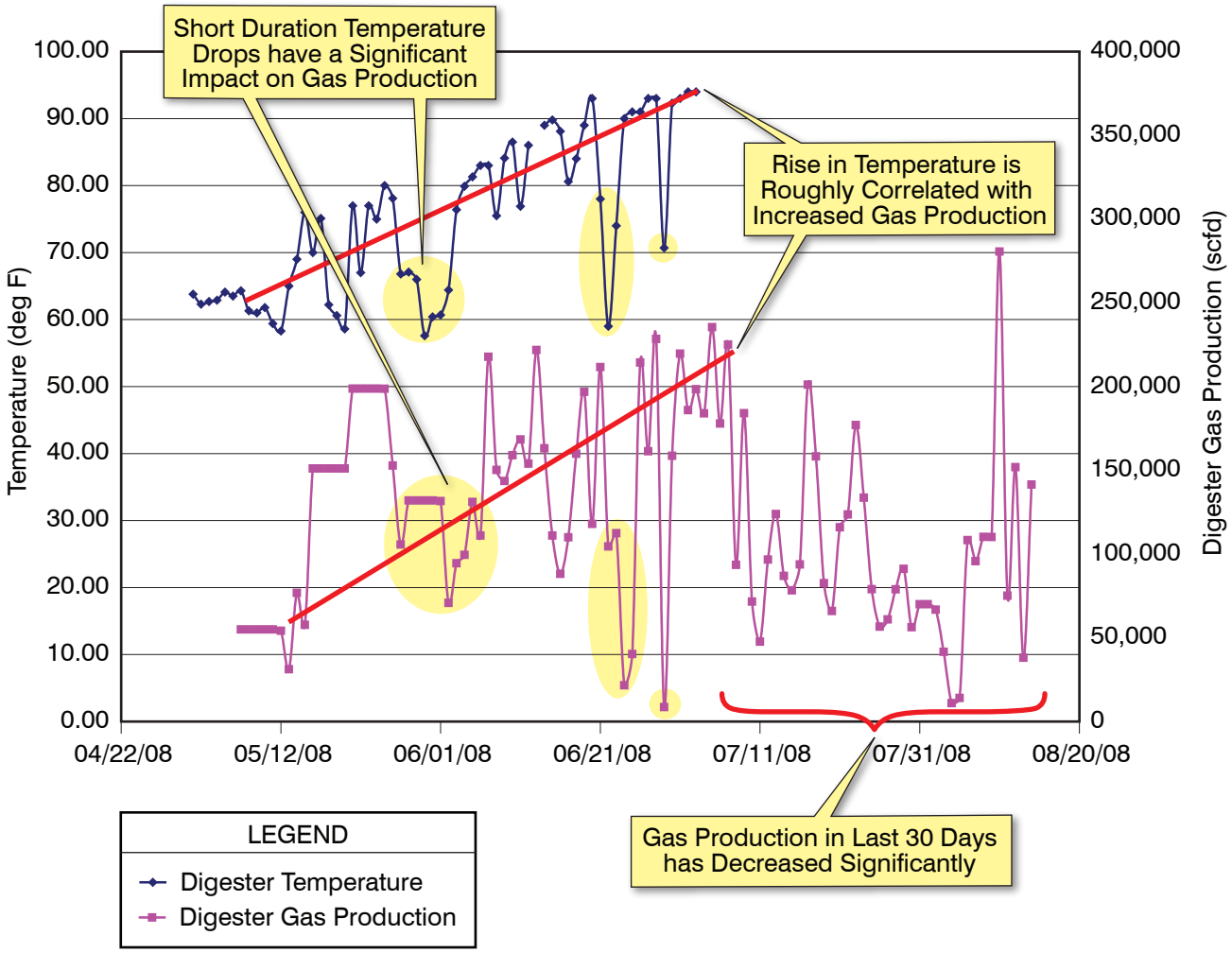

Figure 6.9
DIGESTER GAS ANALYSIS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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to pass into the primary clarifiers. In the primaries, the grit settles out into the primary sludge and is pumped to the digester. This grit, combined with fine floatable trash collected by the primary scum skimmers, results in a large quantity of inert material that collects in the digesters. This inert material reduces the total volume of the digester that can be used for the anaerobic digestion process, causing the digester to become overloaded. The digester mixing system, which does not properly mix the bottom of the digester, compounds this problem. In addition, Digester No. 2 cannot be cleaned of this inert material because the redundant digester (Digester No.1) is not in service. The odor problems at the WCWD solids drying beds, which occur when the WPCP pumps sludge to the beds, is a symptom of poorly digested sludge caused by an overloaded digester.

The average pH over the last five years (pH = 6.7) is indicative of an overloaded digester. The low pH is due to an imbalance between the acid-forming and methane-forming bacteria. In a well-balanced digester, the methane-formers can "keep up" with the acid-formers, and the equilibrium balances at a neutral pH. In an overloaded digester, the food coming in is consumed rapidly by the acid-forming bacteria (because they have a high growth rate and can quickly degrade the organic material to volatile fatty acids (VFAs). The methane-formers do not have enough time to convert all the VFAs to methane and carbon dioxide. The remaining VFAs result in a higher acid concentration that drives down the pH. Therefore, the low pH is symptomatic of an overloaded digester, resulting in lower methane production.

The low pH also has an impact on gas quality. The acid-forming bacteria use sulfate as an electron acceptor to reduce the organic material (electron donor) to VFAs. The sulfate reduction pathway is SO_4^{-2} (liquid) ---> HS^- (liquid) ---> S^{-2} (liquid) ---> H_2S (gas). Because the last reaction is pH dependent, H_2S concentration in the digester gas is pH dependent. At a neutral pH, 50 percent of S (or sulfur) will be in liquid form and 50 percent will be in gaseous form. At a lower pH, more sulfur is in gas form. At pH of 5, about 95 percent is in gaseous form. Therefore, at a pH of 6.7, more H_2S will form than at a more typical digester operating pH (e.g., 7.2 to 7.6).

A second reason for poor gas quality may be a high total sulfur concentration in the WPCP influent due to industrial loads or infiltration of salt water from San Francisco Bay. No data are available at this time to confirm this conjecture.

6.9.3 Impacts of Gas Production and Quality on Gas Utilization

Various technologies exist for the utilization of digester gas. Two of the most commonly used technologies, cogeneration and thermal drying, are both impacted by gas quality and quantity. Cogeneration involves burning digester gas to produce energy and using the waste heat to heat the digesters. Thermal drying uses digester gas to heat air used to dry, or remove water from, the dewatering sludge stream from the belt filter presses. Drying the dewatered sludge would reduce the weight of the sludge and reduce disposal costs.

Irrespective of which gas utilization technology is selected, these technologies should be sized to utilize the full supply of gas from the digesters. If the gas utilization system is sized based on current gas production rates, the system will be undersized once the digestion system is rehabilitated and gas production increases. If the system is sized based on overly optimistic future production rates, the gas utilization system may be oversized and not operate efficiently or may require large quantities of supplemental natural gas. Therefore, because the current gas production flowrate will change significantly once the current digester heating and mixing system rehabilitation project is completed, the current digester gas production rate was not used in the digester gas utilization analysis discussed below. Instead the gas production rate, calculated by the process model discussed in Chapter 2, of 161,000 scfd of digester gas was selected for the digester gas utilization analysis (based on 15 scf gas per pound of VSS destroyed)

Gas quality is equally important to the gas flowrate. Gas quality has a significant impact on the economic feasibility of gas utilization technologies. Any new emissions from the WPCP will require permits to construct and operate the facility from the Bay Area Air Quality Management District (BAAQMD). It can be assumed that the permit will require that the majority of the H_2S and siloxanes be removed, or scrubbed, before they are exhausted to the atmosphere. Because of the high H_2S concentrations, the scrubbing facilities required for a gas utilization facility utilizing poor quality gas will be larger and more expensive to build/operate than for a facility with higher quality digester gas. Since the gas quality will improve once the digester rehabilitation project is completed, in the gas utilization analysis it was assumed the H_2S concentration was 1,750 ppm in the digester gas. This H_2S concentration is typical for a facility in good operating condition.

6.9.4 Digester Gas Utilization Options

The purpose of this section is to summarize the analysis of gas utilization options for the Richmond WPCP. This analysis summarizes the current efforts to implement cogeneration at the WPCP and builds upon a previous cogeneration analysis performed by Herwit Engineering. The cogeneration analysis presented in the Herwit Analysis was updated to reflect assumed improvements in gas quality and gas production, as described in section 6.9.4. In addition, thermal drying of sludge was analyzed to determine if this is a feasible technology for the WPCP. Thermal drying of sludge is a potential alternative to cogeneration. They are discussed in tandem because both alternatives utilize digester gas. Each of these alternatives is discussed below.

6.9.4.1 Summary of Design/Build Cogeneration Proposal and 3rd Party Review of the Proposals

In 2008, the City solicited design/build proposals for a cogeneration facility at the Richmond WPCP. After a review of the proposals by Tetra Tech, it was recommended that the proposal by C. Overaa and Waterworks Engineers for the installation of a 335 kW internal

combustion (IC) engine offered the best value to the City. The proposed cost of this proposal is $2,333,500.

There are several issues that should be addressed before this project is implemented (note that these issues are raised based only on a review of the Tetra Tech Cogeneration Proposal Review letter dated January 9, 2009 and Sections 2, 3, and 4 of the Overaa Cogeneration Proposal).

The proposed cogeneration system should be design to allow for expansion to capture anticipated increases in digester gas production: It appears that the proposed cogeneration project is based on an gas flow rate of 93 scfm, or 133,000 scfd. This is the flow rate that was provided by the design/build request for proposals (RFP). After the digester rehabilitation project is completed, it is anticipated that the daily gas production will be a minimum of 161,000 scfd. The proposal anticipates that the excess gas will be used to fuel boilers to heat the digesters. If the digester gas is not required for heating, the excess gas would be flared to the atmosphere. This digester gas could be better utilized in a larger cogeneration system. A larger cogeneration system would generate enough waste heat to heat the digesters under most conditions. A larger cogeneration system would generate additional electricity and maximize use of digester gas. When additional heating capacity is required on cold winter days, heat can be generated by fueling the boilers with natural gas.

The proposal compares a 300 kW Fuel Cell to a 335 kW IC engine: Fuel cells are more efficient than IC engines because fuel cells convert more energy from the digester gas to electricity than IC engines (this is why IC engines produce more waste heat than fuel cells). Typically, higher rated fuel cell systems are compared to lower rated IC engine systems (e.g. 400 kW fuel cell system vs. 335 kW IC engine).

Electrical system modifications should be included in the Cogeneration Project: Significant modifications to the WPCP's electrical system will be required to allow for the power generated from the cogeneration system to be fed to the plant. The City should develop a plan for design, construction, and financing of these modifications.

The Cogeneration Project should be integrated with the Digester Rehabilitation Project: As recommended by Tetra Tech, the proposed cogeneration project, if implemented, should be fully integrated with the Digester Rehabilitation Project. This integration process is critical as the two projects will share common features and the two systems are inter-dependent.

The proposal states that the one of the advantages of an IC engine is that it can be operated during peak power demand periods: The proposal states that one of the main benefits of an IC engine over a fuel cell system is that it can be operated intermittently. This could be beneficial to the City because power rates vary based on peak demand hours. However, because the digesters produce gas 24 hours a day, in order to operate only during daylight hours (assume 12 hours per day) the IC engine would have be sized to handle a 24 hours of gas flow in 12 hours. This means that the engine would require twice

the capacity as the proposed engine.. For this reason, if the City desires the ability to operate the cogeneration system only during peak demand periods, a larger or expandable cogeneration system should be considered.

In summary, a cogeneration project that allows for expansion and takes into account the issues described above, will increase the benefits of this project to the City (if the cogeneration alternative is selected instead of sludge drying). A larger or expandable gas utilization project would better utilize the digester gas produced by the WPCP. However, the proposed cogeneration project will still benefit the City and City's citizens by producing power from gas that is currently wasted and by reducing air pollution.

6.9.4.2 Summary of Herwit Engineering Cogeneration Analysis

The June 2008 Cogeneration Analysis studied three cogeneration technologies: internal combustion engines, micro-turbines, and fuel cells. Preliminary sizing and costs were developed for several different configurations of each cogeneration technology. Because of the high cost of gas scrubbing and the cost of supplemental gas required due to low digester gas, the report concluded that none of the generation alternatives made sense, from an economic perspective, to implement.

6.9.4.3 Cogeneration Analysis Update

The cogeneration analysis was updated by Carollo based on the assumption that gas production and quality will increase after the digester rehabilitation project is completed. Only the 600 kW Fuel Cell and 560 kW IC Engine options were updated as these two options are most appropriately sized for the anticipated increase in gas production.

6.9.4.3.1 600 kW Fuel Cell:

By assuming a future digester gas production rate of 161,000 scfd (compared to 133,000 scfd used in the Overaa Cogeneration Proposal), the requirement for supplemental natural gas decreases by half from 14.7 to 7.61 therms per hour. In addition, the efficiency of the fuel cell was increased from 40 percent to 47 percent to reflect the efficiency shown in the FCE Fuel Cell literature. This further reduces the supplemental natural gas requirement from 7.61 to 0.5 therms per hour. These two changes correspond to a $102,000 reduction in natural gas costs. By assuming that the digester gas quality increases and the hydrogen sulfide concentration decreases to 1,750 ppm, the scrubbing costs decrease by almost $100,000. The boiler fuel cost for additional heating was increased from $20,000 to $26,000. The design, construction management, administrative, and legal fee was increased from $250,000 to $750,000 and the financing was revised to 5 percent over 20 years. All other assumptions in the analysis remained the same (including construction cost and grants).

The revisions to the fuel cell analysis had a significant impact on the economic viability of this project. The net operational costs increased from negative $20,000 to $175,000 per year. The annual savings, combined with the project cost of $2.42 Million (inclusive of

applicable rebates and credits) yield a simple payback period of 14 years instead of negative 113 years (as shown in the Herwit Analysis).

6.9.4.3.2 560 kW IC Engine

By applying similar set of assumptions (with the exception of the efficiency adjustment) the to the 560 kW IC Engine alternative was updated. The increase in digester gas production rate to 161,000 scfd reduced the required supplemental natural gas from 25.8 to 18.7 therms per hour. This change resulted in a $50,000 reduction in natural gas costs. By assuming that the digester gas quality increases and the hydrogen sulfide concentration decreases to 1750 ppm, the scrubbing costs decrease by almost $100,000. The design, construction management, administrative, and legal fee was increased from $200,000 to $500,000 and the financing was revised to 5 percent over 20 years. All other assumptions in the remained the same.

These revisions to the IC Engine analysis had a significant impact on the economic viability of this project. The net operational costs increased from negative $25,000 to approximately $124,000 per year. The annual savings, combined with the project cost of $3.2 Million, yield a simple payback period of 26 years instead of negative 107 years.

6.9.4.3.3 Cogeneration Update Conclusion

Based on the results of the review of the cogeneration proposal and the update of the Herwit Cogeneration Analysis, if the City chooses to implement a larger cogeneration project, it appears that a 600 kW Fuel Cell system is the most feasible cogeneration project. However, there are many variables and assumptions inherent to the cogeneration update and both alternatives are economically viable. While the analysis favored fuel cells, IC engines are a proven cogeneration technology that is preferred by many agencies and municipalities. Regardless of which gas utilization project is selected for implementation, the project should be fully integrated with the digester rehabilitation project to maximize use of the waste heat from the cogeneration system.

6.9.4.4 Thermal Drying Evaluation

Thermal drying of sludge reduces the moisture content of the sludge by adding heat to induce evaporation. The reduction in moisture content reduces the weight and volume of the sludge. Generally, to meet EPA Class A requirements, dewatering sludge is fed to the dryer at 18 percent solids and dried to 90 percent solids.

There are two types of dryers - indirect and direct. Indirect dryers heat mediums, such as oil or water, which are used to heat surfaces that evaporate moisture from the sludge. Based on drying efficiencies and results at other agencies, indirect dryers are not as viable as direct dryers and will not be evaluated for this study.

Direct dryers heat air that directly contacts the wet solids. Heat is transferred from the air to the solids to increase evaporation. Direct drying technologies include flash drying, spray

drying, rotary drum heat drying, fluidized bed drying, and belt drying. Fluidized bed dryers and belt dryers are most commonly used in biosolids drying applications. For the purpose of this analysis, a belt dryer was selected. However, fluidized bed dryers and belt dryers have similar costs and both should be evaluated further, in conjunction with the other drying options, if thermal drying is selected for implementation.

Belt dryers are fed dewatered sludge continuously by a feeding and mixing screw. Some previously dried material is recycled and fed to the feeding and mixing screw. Dewatered sludge and dry material are mixed to reduce the amount of energy required to dry the sludge to 90 percent solids or above. The mixed sludge is fed by screw conveyor onto a drying belt where the product is heated and dried as it passes through the dryer. The hot air absorbs the moisture from the sludge. A large portion of the air is returned to the furnace and is reheated. The remaining air is removed and treated to remove particulates prior to being exhausted to the atmosphere. The belt dryer furnace could use either digester gas, natural gas, or a combination of both for a heat source.

Two thermal drying alternatives were explored in this analysis. The first alternative increases the solids content from 18 percent to 35 percent and the second alternative increases the solids content to 90 percent. Only the second alternative would produce Class A biosolids. Preliminary design criteria for each alternative are presented in Table 6.13.

A benefit of thermal drying is that the Class A biosolids, dried to 90 percent solids, can be applied to land as a soil amendment. Most municipalities in the U.S. that operate thermal drying systems are able to sell their biosolids (WEF 2004). The value varies widely but is generally between $0 and $40 per dry ton. The value is dependent on nitrogen content, odor, potential for dust, and size/shape of the product.

6.9.5 Dewatered Sludge Disposal Alternatives

In this section of the report, a cost benefit analysis of sludge disposal options, including thermal drying and cogeneration, will be presented. If a sludge dewatering facility is not constructed at the Richmond WPCP, these options no longer apply and the City should proceed with a cogeneration project at the WPCP. If a dewatering facility is construction at the WPCP, disposal options include:

- Option 1 - Class B Sludge land application at disposal sites utilizing either truck or rail-haul.
- Option 2 - Thermal drying of the biosolids and disposal of the dried solids utilizing either truck or rail-haul.
- Option 3 -Truck or rail-haul of biosolids to an existing Class A processing facility (e.g., composting or drying facility).
- Option 4 -Biosolids-to-energy facilities.

Table 6.13 Thermal Drying Alternatives
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Description	Units	Alternative A - 35% solids	Alternative B - 90% solids
Drying Unit	--		
Drying Capacity (total)	dry tons per day	15	15
Digested Sludge Production (ADAL)(1)	dry tons per day	9	9
Digested Sludge Production (ADMMF)	dry tons per day	14	14
Days of Operation (ADAL)(2)	days	5	5
Quantity of Dewatered Sludge to be Dried (ADAL)	Wet lbs/hr	5,833	5,833
Dry Solids Content of Dewatered Sludge(3)	%	18	18
Dried Sludge Output	dry lbs per hour	3,000	1,167
Dry Solids Content of Dried Sludge	%	35	90
Quantity of Water Evaporated	lb water/hr	2,833	4,667
Required Energy(4)	MBtu/hr	3.97	6.53
Available Energy	MBtu/hr	3.03	3.03
Supplemental Energy Requirement (Natural Gas)	MBtu/hr	0.93	3.50
Supplemental Energy Requirement (Natural Gas)	therm/day	224	840
Supplemental Energy Cost(5)	$/day	224	840
Project Cost	$ (Millions)	$6.28(6)	$7.07(7)

Notes:

(1) See Table 6.9 for sludge production projections.

(2) Assumes continuous operation over 24 hour period. Evaporative capacity of the dryer is greater than evaporation requirements so actual hours of operation may be less than 16 hours per day.

(3) Based on percent solids estimate provided by Veolia for BDP Filter press.

(4) Assumes 1400 Btu/lb of water evaporated.

(5) Assumes $1/therm.

(6) Assumes Siemens Belt Dryer 2000 and that the dryer and its appurtenances is located inside the proposed dewatering facility at the WPCP. Allowances were applied for receiving, feeding, and miscellaneous equipment as well as electrical and instrumentation. Costs were increased by 50% to account for project costs (contingency, design fees, etc.).

(7) Assumes Siemens Belt Dryer 3000 and that the dryer and its appurtenances is located inside the proposed dewatering facility at the WPCP. Allowances were applied for receiving, feeding, and miscellaneous equipment as well as electrical and instrumentation. Costs were increased by 50% to account for project costs (contingency, design fees, etc.).

A comparison of these alternatives is provided after a description of the options. This evaluation assumes that disposal of biosolids at the WCCSL is prohibited. If the WCCSL management allow the City to dispose of its biosolids at this landfill without tipping fees, the City should continue to do so as this is the most economically and environmentally friendly disposal alternative (because the WPCP and WCCSL are in such close proximity to each other)

6.9.5.1 Option 1

A previous study performed by Carollo evaluated Class B disposal options for the Bay Area Regional Biosolids Group. The Bay Area Regional Biosolids Group is a consortium of public agencies interested in finding a regional solution to biosolids disposal. This section of the Master Plan summarizes the biosolids disposal report. The disposal options were updated to reflect hauling distances from the WPCP.

The evaluation identified:

- Facility description, location, size/capacity, operational history.
- Quantity of biosolids that the disposal option can accommodate.
- Ability of the facility to expand its capacity.
- Sustainability of facility based on permits and estimated length of delivery term (e.g., how long can the agencies continue to send biosolids to the facility).

6.9.5.1.1 Potential Disposal Locations

The region that was considered for disposal or Class B land application facilities extended from the 9-county Bay Area region north to the border of Humboldt, Trinity, Shasta, and Lassen counties, east to include several counties in Nevada, and south to the border of San Luis Obispo, Kern, and San Bernardino Counties. This range is shown in Figure 6.10. The northern cutoff was selected based on limited disposal options and transportation routes at the Shasta latitude and above. The southern cutoff was based upon the assumption that counties further south are heavily relied upon for biosolids disposal for Los Angeles and surrounding areas. The range extended into Nevada because it was desirable to include a state outside of California, and known candidate facilities are in the vicinity of Gerlach, Nevada.

The facilities discussed below are marked with numbers on Figure 6.10. Table 6.14 provides the corresponding facility name and summary information.

6.9.5.1.2 Land Application

Land application constitutes beneficial reuse of biosolids. This practice allows municipalities and counties to qualify for “diversion credits” (the compliance measurement of the California AB 939 mandate to divert at least 50 percent of solid waste from landfills through source reduction, recycling, and composting activities).

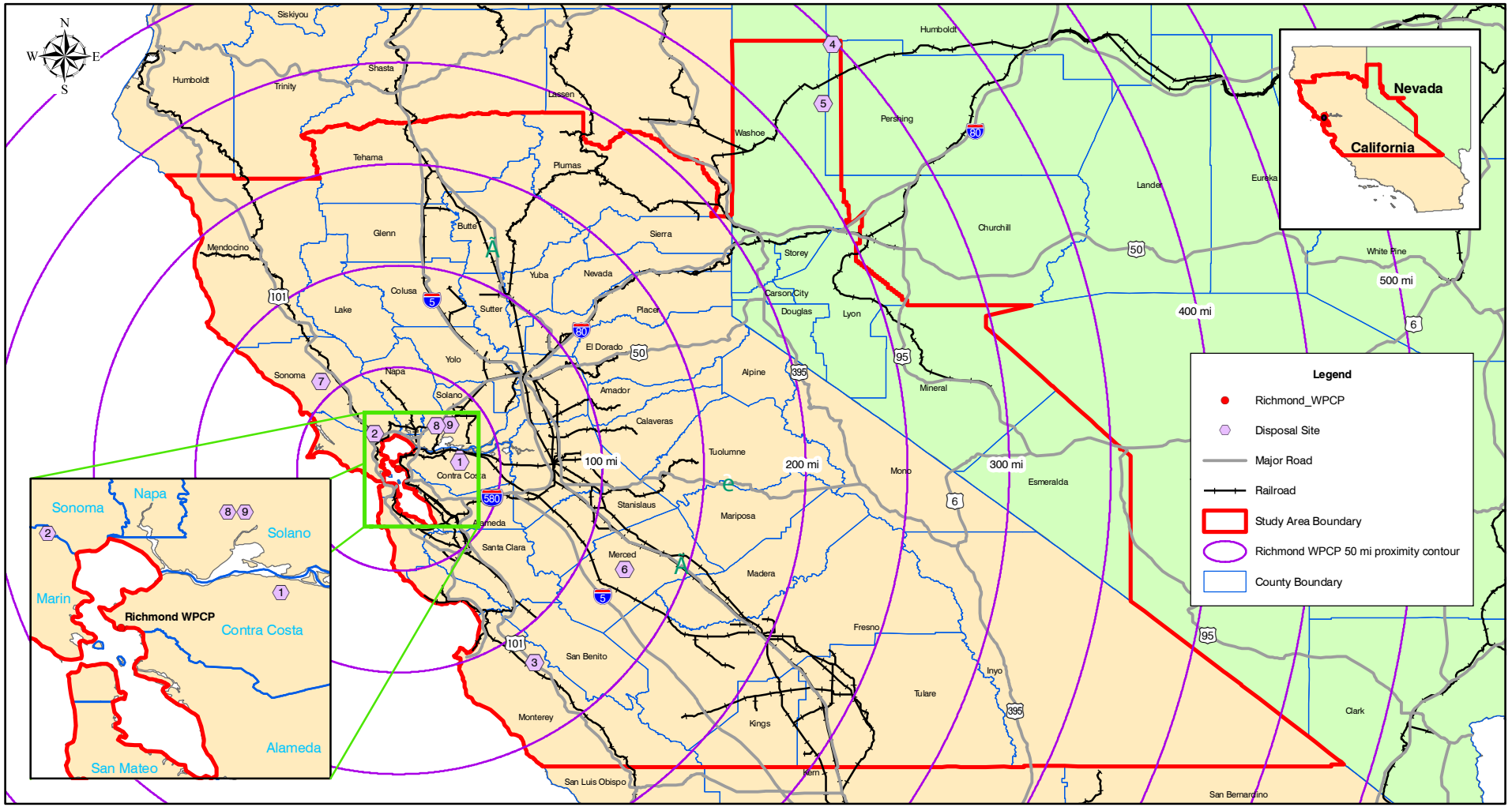

Figure 6.10
BIOSOLIDS RECEIVING FACILITIES
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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Table 6.14 Interim Biosolids Receiving Facilities
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Map. No.	Facility	Type	County	Treatment Requirements	AB 939 Credits	ADC[1]	Remaining Biosolids Capacity (wet tons/day)	Tipping Fee ($/wet ton)	Distance[2] (miles)	Total Cost[3] ($/wet ton)
1	Keller Canyon	Landfill	Contra Costa	> 15% TS	No	0%	250	$45	33	$51.6
2	Redwood Sanitary	Landfill	Marin	Class B > 20% TS	Yes	100%	100	$42	24	$46.8
3	Johnson Canyon Sanitary	Landfill	Monterey	None	That portion used as ADC only	<50%	425	$30	129	$55.8
4	Orient Farms[4]	Land App/ Compost	Washoe/ Pershing	Class B	Yes	n/a	260	$8	320	$66
5	Empire Farms[4]									
6	Synagro in Merced[5]	Land Application	Merced	Class B	Yes	n/a	Unlimited	$30-$50/ wet ton transport included	129	$30-$50
7	Synagro in Sonoma[5]	Land Application	Sonoma	Class B	Yes	n/a	<100	$30-$50/ wet ton transport included	55	$30-$50
8	Synagro in Solano	Land Application	Solano	Class B	Unknown	n/a	Unknown	$30-$50/ wet ton transport included	40	$30 - $50
9	Potrero Hills Landfill	Landfill	Solano	Class B	Yes	100%	There is unknown capacity at this time. Ownership is in transition.	$30/wet ton	40	$38

Notes:

n/a - not applicable

(1) Alternative Daily Cover. The percent of biosolids received that may be used for alternative daily cover.

(2) Approximate driving distance based on major route.

(3) Estimated costs of transport plus tipping fee. Transport costs for all locations in CA based on $0.10 per ton-mile for truck hauling ($2.00 per mile per 20 ton truck load). Transport costs for Orient and Empire Farms based on bimodal truck/rail estimate.

(4) Empire and Orient Farms are jointly owned and operated by Empire Farms, LLC. They receive and handle biosolids collectively.

(5) Synagro Disposal costs date from 2007. Synagro was not contacted to update costs because of the on-going Sludge Dewatering Bid Process.

6.9.5.1.3 Landfill

Most landfills that accept biosolids use some or all of the biosolids they receive as alternative daily cover (ADC), non-soil material applied at the end of each operating day to provide vector control and other benefits. Like land application, ADC constitutes beneficial reuse of biosolids and results in diversion credits for the source agency. According to Title 27 § 20690, only 25 percent of a landfill's daily cover can comprise biosolids. Depending on the amount of daily cover they use, some facilities cannot use all of the biosolids they receive as ADC. The fraction that can be used and therefore qualify for diversion credits shown in Table 6.14.

Tipping fees are reported for each of the facilities in Table 6.14. These fees were based on telephone quotes only and are subject to increase.

6.9.5.1.4 Transportation Options

The transportation of the biosolids to the disposal sites can all be accomplished by truck. Based on discussions with Synagro, Orient and Empire Farms, and with JL Paterson & Associates, it appears that only when there is a significant transport distance, such as to Nevada, can rail transport be viable. All those spoken with indicate that if the haul distance is less than 100 miles, rail is never less costly. Only where the haul is greater than 300 to 500 miles is it safe to assume that rail hauling will generate significant savings. Thus, the only disposal sites where rail hauling was considered were to Orient Farms and Empire Farms.

6.9.5.2 Option 2 - Thermal drying of the biosolids and disposal of the dried solids utilizing either truck or rail-haul.

Thermal drying of biosolids decreases the volume of sludge that must be disposed of in landfills or via land application. For instance, drying the biosolids from 18 percent solids to 90 percent solids decreases the number of required truck trips from 2.5 trucks per day to 0.5 trucks. This has a significant impact on transportation costs and tipping fees. For the purpose of this analysis it was assumed that the biosolids produced from drying are not marketable. Therefore, the solids would be hauled to a landfill or land application site as described in Option 1. However, if the dried biosolids can be sold to local customers, the economics of this alternative will improve markedly. Note that only biosolids dried to 90 percent can be classified as Class A biosolids. If dried to 35 percent, the biosolids will remain Class B and will have to be disposed at a landfill. When dried to 35 percent solids, the required truck trips are reduced by half.

6.9.5.3 Option 3 - Hauling of Biosolids to Existing Class A Biosolids Facility

6.9.5.3.1 Composting

No feasible Class A Biosolids facilities, such as facilities with composting operations, were identified. Synagro's Central Valley Composting Facility is already operating close to

capacity, and may have to reduce that capacity by twenty percent to 100 tons per day if the San Joaquin Valley Air Pollution Control District Proposed Rule 4565 is implemented in its current form. Forward Landfill, in Manteca, CA has a compost operation but only accepts Class A biosolids with total solids content of at least 50 percent. Therefore, thermal drying would be required for disposal at this landfill to be an option.

Empire Farms in Nevada operates a composting facility, but this has significantly less capacity than the farm's Class B land application capacity.

6.9.5.4 Waste-to-Energy

The fourth option is disposal at a waste-to-energy facility. This would require use of an existing waste-to-energy facility or waiting for the Bay Area Regional Biosolids Processing Facility (BARBPF) to be constructed. The viable waste-to-energy options for biosolids in California are cement kiln firing, thermal oxidation, and a proprietary SlurryCarb™ technology. Cement kilns use biosolids both as a fuel and as a selective non-catalytic reducing agent to reduce nitrous oxide (NO_x) emissions. Kilns require the biosolids to be already dry, however, eliminating this technology as an option for interim use/disposal.

The only thermal oxidizer that might be able to take biosolids for this area is the Central Contra Costa Sanitary District (CCCSD) facility. The CCCSD is not interested in accepting biosolids.

The Bay Area Regional Biosolids Group is starting the environmental process that is necessary to explore the environmental impacts from the construction and operation of a biosolids-to-energy facility in Solano County. The City of Richmond and Veolia may be able to use this facility for biosolids disposal after the facility is constructed. It is estimated that the tipping fee for this facility will be between $60 and $90 per wet ton. If the facility is constructed, it would not be operational for at least five years.

Veolia has expressed interest in constructing a biosolids-to-energy facility at the Richmond WPCP. Discussions with the BAAQMD have indicated that it is unlikely they will issue permits to construct and operate this facility. The air district's concern is that a biosolid incinerators at the Richmond WPCP would not have the ability to generate power from the waste heat because it is not cost effective to have this feature installed. BAAQMD is supportive of incineration for the on-going regional biosolids project because it includes power generation and the potential to reduce greenhouse gas emissions. An incinerator for Richmond would not be large enough to justify the cost for the waste heat to energy system. In addition, because the plant will only produce dried sludge with 20 percent solids, additional drying would be required to support combustion. To be autogenous (self sustaining), the incinerator needs to be fed 28 to 30 percent solids.

SlurryCarb™ is a new technology that converts biosolids into a renewable fuel with a heat value comparable to low-grade coal. This technology is being developed by a company named Enertech, that is currently operating a 675 ton per day facility in Southern California.

Regardless of whether this facility succeeds, the SlurryCarb™ technology would not be available to the Bay Area agencies within the near future.

6.9.5.5 Sludge Disposal Economic Analysis

The viable sludge disposal options, which include disposal of 18 percent solids to a landfill, thermal drying to 35 or 90 percent solids, and disposal of 18 percent solids at the BARSPF were compared to each other. Because, thermal drying and cogeneration both need digester gas to work, cogeneration and thermal drying are mutually exclusive. In some cases, the waste heat from cogeneration can be used for thermal drying. However, at the Richmond WPCP the waste heat is needed to heat the digesters. Therefore, an alternative that includes disposal of 18 percent solids to the landfill and implementation of cogeneration was included in the analysis. For all alternatives (except BARSPF), it was assumed that the biosolids would be disposed at the lowest cost disposal site, Potrero Hills Landfill. As stated previously, this analysis assumes that disposal to WCCSL is prohibited. If disposal is allowed to continue at the WCCSL, the City and Veolia should continue to disposal of solids at this location and implement cogeneration at the Richmond WPCP.

Table 6.15 presents a cost analysis of each alternative if the tipping fee remains at $30 per wet ton. Because the economics of sludge disposal are highly dependent on tipping fees, an analysis was also performed at a tipping fee of $50 per wet ton. The results of this analysis are shown in Table 6.16. Figures 6.11 and 6.12 show the results of the analysis graphically.

Key assumptions in the comparison include:

- The dewatering facility is located at the Richmond WPCP
- Projects are financed over 20 year period at 5 percent.
- O&M escalation rate is 3 percent per year.
- Discount rate is 3 percent per year.
- Disposal is at Potrero Hills Landfill (80 miles round trip at $2/mile, which is $0.1/wet ton/per mile with a 20-ton load).
- Biosolids production increases per Master Plan projections.
- Tipping fee at Bay Area Regional Biosolids Processing Facility (BARSPF) is $75/wet ton.
- Gas production and quality assumptions, as described in section 6.9.4, are valid

Table 6.15 Gas Utilization and Sludge Disposal Alternative Expenditures with an Assumed Tipping Fee of $30/wet ton
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Alternative	Capital Cost	2008 Total Annual Operating Cost[1]				Net Present Worth[3]	Simple Payback Period
	Total Project Capital Cost	Sludge Disposal Cost in 2008	Operating Cost in 2008[2]	Energy Revenue in 2008	Amortized Capital Expenses in 2008		
18% Solids Sludge Disposal at Potrero Hills Landfill	$0	$679,322	$679,322	$0	$0	$27,550,328	N/A
Cogeneration + 18% Solids Sludge Disposal at Potrero Hills	$2,424,000	$679,322	$946,133	$441,594	$194,508	$24,763,091	14 Yrs
Drying to 35% Solids and Sludge Disposal at Potrero Hills[4]	$6,300,000	$349,365	$569,995	$0	$505,528	$29,196,144	19 Yrs
Drying to 90% Solids and Sludge Disposal at Potrero Hills[4]	$7,100,000	$135,864	$587,784	$0	$569,722	$29,153,737	13 Yrs
18% Solids Sludge Disposal at BARSPF[5]	$0	$1,299,572	$1,299,572	$0	$0	$46,021,151	N/A

Notes:
(1) Total escalated cost calculated assuming 3% escalation of O&M costs, a 5% interest rate, and a 20 year amortization period for capital projects.
(2) Operating cost includes sludge disposal cost, electricity, supplemental gas, and equipment maintenance costs. Does not include capital payments.
(3) Net present worth calculated assuming a 3% discount rate.
(4) Payback period determined by calculating number of years to yield lower annual cost in comparison to the 18% sludge disposal option.
(5) 18% solids sludge disposal at BARSPF costs are presented in 2013 and from 2013 to 2040 to coincide with BARSPF project completion.

Table 6.16 Gas Utilization and Sludge Disposal Alternative Expenditures with an Assumed Tipping Fee of $50/wet ton
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Alternative	Capital Cost	2008 Total Annual Operating Cost[1]				Net Present Worth[3]	Simple Payback Period
	Total Project Capital Cost	Sludge Disposal Cost in 2008	Operating Cost in 2008[2]	Energy Revenue in 2008	Amortized Capital Expenses in 2008		
18% Solids Sludge Disposal at Potrero Hills Landfill	$0	$1,036,860	$1,036,860	$0	$0	$42,050,500	N/A
Cogeneration + 18% Solids Sludge Disposal at Potrero Hills	$2,424,000	$1,036,860	$1,323,396	$441,594	$194,508	$39,263,263	14 Yrs
Drying to 35% Solids and Sludge Disposal at Potrero Hills[4]	$6,300,000	$533,242	$753,872	$0	$505,528	$36,653,376	13 Yrs
Drying to 90% Solids and Sludge Disposal at Potrero Hills[4]	$7,100,000	$207,372	$659,292	$0	$569,722	$32,053,771	9 Yrs
18% Solids Sludge Disposal at BARSPF [5]	$0	$1,299,572	$1,299,572	$0	$0	$46,021,151	N/A

Notes:
(1) Total escalated cost calculated assuming 3% escalation of O&M costs, a 5% interest rate, and a 20-year amortization period for capital projects.
(2) Operating cost includes sludge disposal cost, electricity, supplemental gas, and equipment maintenance costs. Does not include capital payments.
(3) Net present worth calculated assuming a 3% discount rate.
(4) Payback period determined by calculating number of years to yield lower annual cost in comparison to the 18% sludge disposal option
(5) 18% solids sludge disposal at BARSPF costs are presented in 2013 and from 2013 to 2040 to coincide with BARSPF project completion.

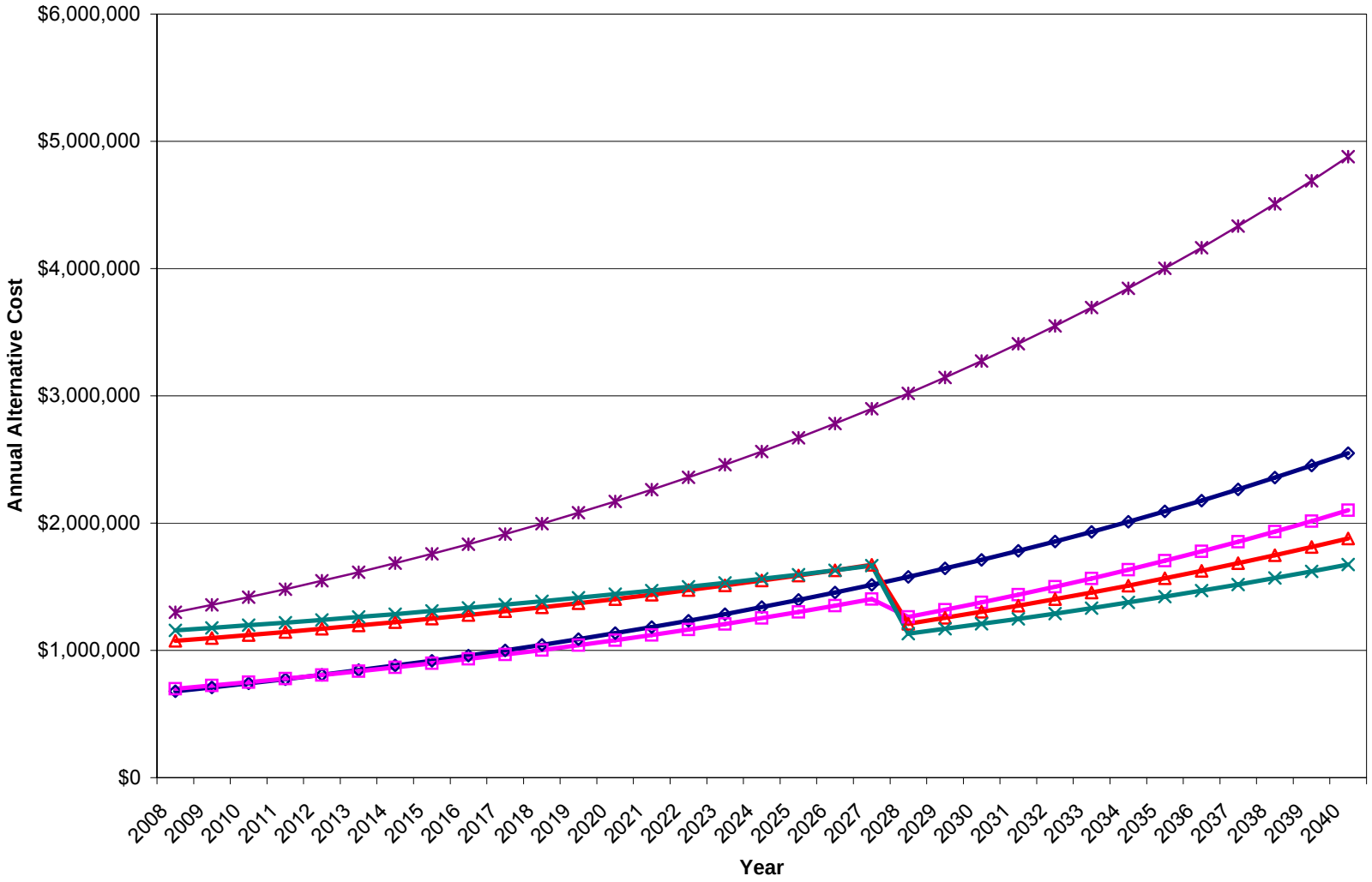

Figure 6.11
GAS UTILIZATION AND SLUDGE DISPOSAL ALTERNATIVES
($30/WET TON TIPPING FEE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

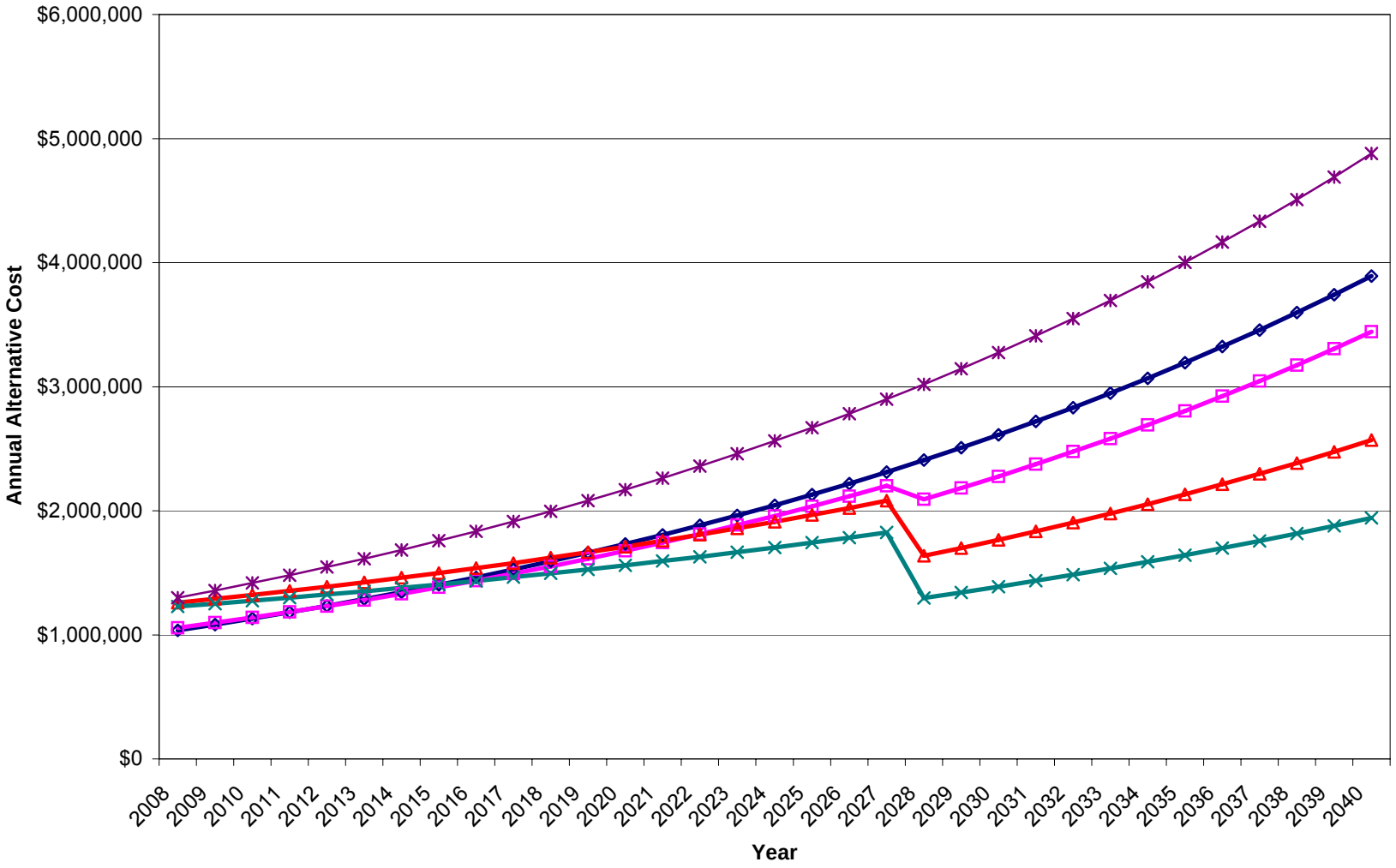

Figure 6.12
GAS UTILIZATION AND SLUDGE DISPOSAL ALTERNATIVES
($50/WET TON TIPPING FEE)
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Several conclusions can be made from the economic analysis:

- The economic analysis shows that, in both cases, disposal to BARSPF is not economically viable.
- Because of the energy revenue provided by cogeneration, the combination of disposal of 18 percent solids to the landfill and cogeneration is a better option, from an economic perspective, than disposing of sludge at 18 percent solids at the landfill without cogeneration.
- Thermal drying to 90 percent solids is more economical than drying to 35 percent (the savings in sludge disposal costs outweigh the high capital costs and the cost of supplemental natural gas).
- If tipping fees remain at $30 per wet ton, cogeneration plus disposal of sludge at 18 percent solids is a better option than thermal drying, based on Net Present Worth (difference of $4.4 Million). If tipping fees increase to $50 per wet ton, thermal drying is better than the cogeneration plus disposal of sludge at 18 percent solids alternative based on net present worth (difference of $7.2 Million). This establishes that the comparison between these two alternatives is highly dependent on tipping fees. Based on the level of assumptions involved in the cost analyses and the degree of uncertainty inherent to cost estimates, these two options can be considered essentially equal on an economic basis.
- Thermal drying provides for a significant decrease in sludge disposal costs. However, the initial capital costs for thermal drying is higher than a cogeneration project.
- The annual costs decrease significantly for the cogeneration and thermal drying alternatives in 2029, once the capital costs of the facilities are paid off

6.9.5.6 Non-Economic Evaluation

Several non-economic factors must be considered in this sludge disposal analysis. These factors include: potential changes in sludge disposal regulations, carbon footprint, and uncertainties in the analysis.

6.9.5.6.1 Potential Changes in Sludge Disposal Regulations

As described in Chapter 4, many California Counties have developed ordinances that restrict or ban the disposal or land application of biosolids. Some Counties, such as Kings, Riverside, Glenn, and Tulare only allow disposal of Class A biosolids. Solano County recently adopted an ordinance that states that agencies that land apply Class B biosolids will have to divert a portion of their biosolids to Class A or to Waste-to-Energy facilities. It is reasonable to expect that regulations will become increasing restrictive over the planning

period. Because of this, if the WPCP continues to produce Class B biosolids in the future, the number of biosolids disposal options will decrease and disposal costs may increase. There is a chance that if cogeneration is implemented at the plant, a Class A biosolids treatment facility may have to be constructed and the digester gas diverted from cogeneration to this facility.

6.9.5.6.2 Carbon Footprint

A basic carbon footprint analysis was conducted for the disposal alternatives. The results of the analysis are shown in Table 6.17. The calculation shows that cogeneration plus disposal of the biosolids at 18 percent solids has the lowest carbon footprint. Thermal drying to 90 percent solids has the highest carbon footprint because of the supplemental gas required. Note that this analysis does not incorporate other green benefits of thermal drying such as reduction in waste to landfills and reduction in traffic impacts, nor is it a complete greenhouse gas inventory.

Table 6.17 Carbon Footprint of Solids Disposal Alternatives (Tons of CO_2 per year)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Alternative	Transportation[(1)]	Supplemental Natural Gas[(2)]	Electricity[(3)]	Total
18% Solids Sludge Disposal at Potrero Hills Landfill	136	0	0	136
Cogeneration + 18% Solids Sludge Disposal at Potrero Hills	136	448	(1237)	(653)
Drying to 35% Solids and Sludge Disposal at Potrero Hills	68	550	344	962
Drying to 90% Solids and Sludge Disposal at Potrero Hills	27	2061	344	2432
18% Solids Sludge Disposal at BARSPF[(4)]	136	Unknown	Unknown	Unknown

Notes:
(1) Assumes 80 mile round trip, 6 miles per gallon of diesel, and 22.4 lb CO_2 per gallon of diesel.
(2) Assumes 13.446 lb CO_2 per therm (www.pge.com).
(3) Assumes 0.524 lb CO_2 per kWh (www.pge.com).
(4) Design criteria of BARSPF Class A processing facility is not certain; calculation of carbon footprint was not performed.

6.9.5.6.3 Uncertainties in the Analysis

The following uncertainties were considered in the analysis:

- Biosolids market: Biosolids produced from thermal drying may be marketable to the public as a soil amendment. If so, the products could be bagged and sold at the WPCP or nearby retailers. This would reduce the disposal costs of the thermal drying alternatives (to 90 percent solids) closer to zero. Consequently, this would make thermal drying to 90 percent solids the most economical option.

- Tipping fees: If changes in local regulations limit disposal sites for Class B solids, tipping fees at landfills may increase as demand for disposal at these facilities increase. The supply, or number and capacity of landfills, is unlikely to keep pace as landfills are increasingly difficult to permit and open/expand. Higher tipping fees would make the thermal drying options preferable over the cogeneration alternative.

- Diesel and natural gas prices: If diesel fuel prices increase, the transportation costs of each alternative will increase. Because more truck trips are required for the 18 percent solids alternatives, these alternatives will be affected the most. If the cost of natural gas rises, the thermal drying alternative (to 90 percent solids) will be negatively affected more than the other alternatives.

- FOG: If large enough volumes of fats, oils, and greases (FOG) are available, and the Richmond WPCP digesters have capacity for additional loading, a FOG receiving facility could be constructed at the WPCP. The addition of FOG to the digesters would produce more digester gas. This additional digester gas would improve the economics of both the cogeneration and thermal drying alternatives.

6.9.5.7 Recommendation

The City should continue to dispose of biosolids at the WCCSL until the WCCSL terminates the existing disposal agreement. Due to the proximity of the landfill, disposal of at this location is the most economical disposal alternative. In the short term, the digester gas should be used for cogeneration. The total cost for this project is estimated to be between $2.5 and 4.0 Million.

In the long term, if disposal to WCCSL is prohibited, cogeneration plus disposal of biosolids at 18 percent to landfills, has a lower capital cost but higher operating costs than a thermal drying facility. Overall, when evaluated on a net present value basis, the economic analysis hinges on tipping fees. Lower tipping fees favor cogeneration while higher tipping fees favor thermal drying. The cogeneration project has a lower carbon footprint than thermal drying but thermal drying results in a significant reduction in waste disposal in local landfills. While a thermal drying facility provides flexibility if biosolids disposal locations and/or regulations change in the future, disposal at a landfill and cogeneration appear to benefit the City more in the short term. For this reason, disposal of biosolids at 18 percent to a landfill and a

cogeneration project should be implemented. Provisions should be made to allow for the construction of a thermal drying facility in the future if regulations change and/or disposal fees increase. . If disposal sites for Class B sludge are unavailable or tipping fees increase, the economic viability and/or useful life of the cogeneration project would be reduced and a thermal drying facility should be constructed.

Chapter 7

SUSTAINABLE DESIGN ELEMENTS AND STRATEGIES

7.1 INTRODUCTION

7.1.1 Background

Upgrades to the Richmond Sanitary Sewer District's Water Pollution Control Plant (WPCP) are needed to increase the reliability of the treatment process and address potential National Pollutant Discharge Elimination System (NPDES) permit requirements. While improvements to the reliability and performance of the treatment plant will benefit the environment by reducing the amount of pollutants discharged to the San Francisco Bay, considering the sustainability of WPCP upgrades on a broader environmental scale will help ensure the upgrades are in alignment with the City's commitment to sustainability. For instance, the City is focused on reducing its greenhouse gas emissions; due to the significant energy needs of wastewater treatment, targeting the WPCP is a good place to begin this effort. The purpose of this memorandum is to identify sustainable design elements that can be included in future projects.

7.1.2 City's Sustainability Goals and Objectives

The City of Richmond has made a strong commitment to operate more sustainably. This commitment is evident through Mayor McLaughlin's collaboration with other mayors to create the "East Bay Green Corridor", the development of the City of Richmond Environmental Sustainability Team (CREST), and the actions described more fully below.

7.1.2.1 Urban Environmental Accords

In September 2008, the City Council adopted a resolution supporting the United Nations Urban Environmental Accords. The Accords contain a list of 21 proven first steps, or actions, toward environmental sustainability in the following thematic environmental impact areas:

- Energy: Includes increasing the use of renewable energy, reducing electrical demand, and reducing greenhouse gas emissions.
- Waste Reduction: Includes the goal of achieving zero waste to landfills, reducing non-renewable product use, and implementing recycling and composting programs.
- Urban Design: Includes applying a green building rating system to new City buildings; adopting urban planning principles and practices that link high density, mixed used neighborhoods with transportation and open space; and implementing programs to create environmentally beneficial jobs in low-income neighborhoods.

- Urban Nature: Includes increasing the number of public parks or open space, increasing tree canopy coverage, and protecting animal and plant habitat.
- Transportation: Includes providing affordable and widely accessible public transportation, reducing emissions, and reducing the number of single-occupancy vehicle commuter trips.
- Environmental Health: Includes reducing use of hazardous chemicals, supporting locally grown organic foods, and improving air quality.
- Water: Includes decreasing potable water use; protecting drinking water sources; and reducing untreated wastewater discharges through expanded use of recycled water and implementation of an urban watershed planning process.

Signatories to the Accords pledged to implement as many of the actions as possible by 2012; the City of Richmond committed to accomplishing 14 of the 21 by 2012.

7.1.2.2 Climate Change Policy

In September 2008, the City Council passed a resolution committing the City to the greenhouse gas (GHG) reduction targets established by the State of California in Assembly Bill 32, the Global Warming Solutions Act. The reduction targets are:

- 2000 levels by 2010.
- 1990 levels by 2020.
- 80 percent below 1990 levels by 2050.

The City is currently conducting a GHG emissions inventory and developing an "Energy and Climate Change Element" for the General Plan update.

7.1.2.3 Waste Reduction

The City of Richmond is working to achieve the following waste reduction goals:

- Reduce the use of a disposable, toxic, or non-renewable product category by at least 50 percent in seven years.
- Reduce solid waste by 20 percent per capita in seven years.
- Zero waste by 2040.

In addition, several of the Actions defined in the Accords can be directly tied to possible projects at the WPCP. Several of these projects and the initiatives that they support are shown in Table 7.1

Table 7.1 WPCP Improvements and Sustainability Initiatives Richmond Wastewater Treatment Master Plan City of Richmond and Veolia Water				
Potential Upgrade	**Project Numbers**	**Urban Environmental Accords**	**Climate Change Policy**	**Waste Reduction Goals**
Reduce discharge of primary treated effluent during wet weather events.	1.1, 1.3, 1.12, 2.1, 2.2, & 3.1	X		
Improve performance of secondary treatment process	1.6, 1.7, 1.8, &1.10	X		
Plan for recycled water projects.	--	X		
Reduce air/odor emissions.	1.17	X	X	
Use thermal drying to Reduce disposal of sludge in landfills.	1.19	X	X	X
Use digester gas as fuel for energy production.	1.15 & 1.19	X	X	
Construction and Demolition Debris Recycling Program	--	X		X
Reduce electricity usage.	1.6	X	X	

7.2 SUSTAINABLE DESIGN FRAMEWORK

Sustainability has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (World Commission on Environment and Development, 1987) Though seemingly intuitive on the surface, applying this principle to infrastructure planning and development adds complexity. Various tools help define what sustainability means in more detail, as well as frame the additional issues to consider. The Urban Environmental Accords, adopted by the City, is a tool for communities. The Leadership in Energy and Environmental Design (LEED™) Green Building Rating System, developed by the U.S. Green Building Council (USGBC) is a tool for “green” building. The sustainable design elements described below are organized based on the Urban Accords in alignment with the City’s goals. However, it should be noted that LEED guidelines were also drawn upon to identify potential sustainable project elements.

We also want to highlight the Contra Costa Green Business Program, which certifies green businesses. The WPCP could choose to get certified as a green business. Benefits of the certification process include:

- Free advice and technical assistance to improve green business practices
- Public recognition as an environmental leader.

Appendix K includes the checklist that would be used for the WPCP. For more information on the program, visit their website: http://www.greenbiz.ca.gov/AboutUsCCC.html.

7.3 POTENTIAL SUSTAINABLE ELEMENTS

Potential sustainable elements that could be included in future projects were identified and are summarized below. The elements are organized by thematic area and action as defined in the Urban Environmental Accords.

7.3.1 Energy

Action 1 - *Adopt and implement a policy to increase the use of renewable energy to meet ten per cent of the City's peak electric load within seven years.*

- **Co-generation using digester gas (Project 1.19).** As discussed in Chapter 6, excess digester gas is currently flared to the atmosphere. The digester gas could instead be utilized to generate electricity or to dry sludge to reduce the amount of material sent to local landfills. Utilizing the digester gas for power generation would help the City to meet the renewable energy goal defined by Action 1, as well as the greenhouse gas reduction goal in Action 3 (and in the City's Climate Change Policy).
- **On-site solar photovoltaic power.** Provide a portion of electricity on-site through installation of solar photovoltaic (PV) panels. A grid-tied PV system is connected to the electric grid but utilizes the sun's energy when available. Using the PV system to augment electricity use, the generation and cost of power can be reduced. If capital costs are a barrier to installing a PV system, the City could look into executing a power purchase agreement (PPA). PPAs are offered by several companies (i.e., Sun Run, MMA Renewable Ventures, Tioga Energy, Inc.), who design, install, own, and maintain PV systems for "host entities", who purchase power under fixed terms. Typically, PPAs have a 10 to 15-year term, after which the host entity has the option to enter into a new PPA or to purchase the system from the solar provider. If the City is interested in implementing solar power, the City should commission a study to evaluate these options.
- **Off-site renewable energy purchase.** The City can evaluate purchasing 'green' power to meet some or all of its demand. PG&E purchases grid power from renewable resources (i.e., wind, solar, etc.) to offer to their customers. This option was not considered a project because it is a policy decision.

Action 2 - *Adopt and implement a policy to reduce the City's peak electric load by ten per cent within seven years through energy efficiency, shifting the timing of energy demands, and conservation measures.*

Approximately 25 to 35 percent of the operations and maintenance budget for a typical wastewater facility is spent on energy. Reducing energy use offers dual benefits of saving

money and reducing environmental impacts, such as global warming, that are associated with producing the energy.

The most cost effective ways to improve resource use efficiency usually require looking at a system as a whole, and begin "upstream." In a planning effort, it's important to identify "big picture" strategies, as well as specific actions. The biggest efficiencies are gained by implementing strategies in the right order. To reduce energy use at the WPCP, the place to start is to minimize the amount of water coming into the Plant to begin with. Three ways to do this are listed below.

- Water use efficiency programs focused on indoor water use are a cost effective way to reduce wastewater flows.
- An infiltration reduction program that reduces infiltration into the collection system is another "upstream" solution that can provide significant resource savings in the whole system. The City and Veolia already have an infiltration reduction program in place.
- Implementing low impact development strategies, such as urban forests, permeable paving, biodetention basins, and green roofs throughout the City can significantly reduce stormwater runoff and associated inflows into the system.

Most energy consumption by wastewater treatment systems is used for pumping, aeration, and solids handling (NYSERDA, 1995). Table 7.2 highlights strategies that have already been implemented or could be implemented to optimize the energy efficiency of the plant. Narrative describing items in the table is included in this section as well.

Hydraulics. Hydraulics are central to wastewater treatment plant design and can greatly impact the efficiency of pumping and aeration systems if care is not taken during the hydraulic design of these areas. The inlet and outlet piping configuration of either a pump or blower system plays a critical role in how hard these pieces of equipment must work. When designing upgrades and additions to the WPCP, effort should be taken to minimize friction losses associated with the inlet and outlet piping, thereby reducing the energy needed from the pump or blower to overcome those losses and deliver the required medium flow rate. These design elements should be incorporated into projects implemented at the WPCP.

Pumping. The WPCP has one main influent pump station. The influent pump station is used to lift raw sewage from the headworks to the grit basin. From the grit basin, process water flows through the plant by gravity to the outfall.

There are three main aspects to consider when designing pump stations for optimum energy efficiency, aside from hydraulics already discussed:

- **"Right Size" Pumps and Motors.** When evaluating pumping systems, considering peak flow and hydraulic conditions are important but just as important is planning for average and low flow conditions. The design of a pump station should address how to

Table 7.2 Energy Efficiency Strategies
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Design Area	Strategies
Hydraulics	Minimize inlet and outlet piping friction losses through piping configuration (i.e., use of wyes and 45 deg bends rather than 90 deg bends)
	Provide flow equalization to avoid sizing pumps to pump over a large range.
Pumping *(These strategies have been incorporated in the IPS Upgrade Project - Project 1.3)*	
Sizing	Consider average and low flow and loading conditions in addition to peak flow and loading for sizing.
	Consider multiple, smaller pumps, jockey pumps, variable frequency drives and automated set-point control.
High Efficiency Pumps/ Motors	Choose most efficient pump for the type of use (i.e., centrifugal, progressing cavity and positive displacement pumps are most common wastewater pumps).
	Specify premium efficiency motors, which are 2 to 8 percent more efficient than standard motors.
VFDs	Allows for pump speed adjustment with fluctuating flows while consuming less energy than if a throttling or bypass valve were used.
	Provide 'soft start' capability, which ramps up the motor slowly, reducing pump and motor wear and tear and extending motor life.
Aeration Systems	
Sizing	Consider average and low flow and loading conditions in addition to peak flow and loading for sizing. *(Project 1.6)*
	Consider multiple, smaller aeration basins to provide more flexibility. *(Project 1.7)*
High Efficiency Equipment	Provide automatic DO control for aerators. *(Project 1.6)*
	Consider fine bubble diffusers. *(Project 1.6)*
	Consider single-stage blowers. *(Project 1.6)*
	Allow for adjusting airflow through blowers. *(Project 1.6)*
Solids Handling	
	Thicken sludge before digestion. (*already used at the WPCP)*
	Optimize digestion temperature. (addressed by Project 1.15)
	Solar drying of biosolids. *(Not possible at the WPCP due to land requirements)*
Plant Lighting	
Advanced Fluorescent Lighting	Use high efficiency fluorescent lamps, electronic ballasts, custom designed reflectors and appropriate lenses or louvers for indoor applications.
High-intensity Discharge Lighting	Use high-intensity discharge lamps for outdoor applications.
Lighting Controls	Use lighting controls (i.e., occupancy sensors, time switches, dimming systems and photocell controls).
Regular Maintenance	Develop a routine maintenance program to replace lamps and luminaries.
Other	
Energy Monitoring	Install energy use monitoring equipment that is integrated with the Plant's Supervisory Control and Automated Data Acquisition (SCADA) system and review the data on a regular basis.

- **Use High Efficiency Pumps /Motors.** To optimize energy use, it is imperative to specify the most efficient pump for each type of use. Centrifugal, progressing cavity and positive displacement pumps are the most commonly used pumps in wastewater treatment, but they must be used appropriately to achieve their optimum performance. In addition, premium efficiency motors (premium-efficiency motors are 2 to 8 percent more efficient than standard motors) should be specified to increase the overall energy efficiency of the pumping system. Attention should also be given to pumps with alternative impeller designs that have demonstrated improved efficiency with the same or better operation. The energy savings over the life of the project, will often justify equipment that is slightly more expensive.
- **Variable Frequency Drives (VFDs).** Flow requirements often vary within a treatment plant and the pumping system needs to accommodate those fluctuations. VFDs can adjust the speed of the pump to allow for fluctuating flows while consuming less energy than if a throttling or bypass valve were used. VFDs also provide a 'soft start' capability, which ramps up the motor slowly, thereby reducing wear and tear on the pump and motor and extending motor life.

The ongoing Influent Pump Station Upgrade Project (Project 1.3) has incorporated many of these strategies, including multiple pumps, premium efficiency motors, variable frequency drives, and automated controls, to provide for an energy efficient pump station.

Aeration Systems. Because the aeration process is typically the largest energy user in the treatment process, accounting for 45 percent to 75 percent of total electricity use (US EPA, 2008), it is important to prioritize energy efficiency during design and operations. If the City implements the Master Plan recommendation to install a new aeration system (Project 1.6), the design of the new aeration facilities can include many of the elements discussed below.

- **Aeration System Sizing.** Considerations for aeration system sizing are similar to that of pump sizing. Peak flow and loading as well as average and minimum flow and loading conditions should be considered when assessing the sizing of an aeration system. Designs that include multiple, smaller aeration basins provide more flexibility to turn down and/or shutdown whole basins during low flow/loading conditions to allow for maintenance as well as improve overall system energy efficiency. The Master Plan recommends the addition of a third aeration basin (Project 1.7), in the short term. Three aeration basins would allow the WPCP the flexibility to operate the Plant optimally under variable flow conditions.
- **Fine Bubble Diffusers.** Fine bubble diffusers create more small air bubbles, which produce a larger surface area and increase the oxygen transfer efficiency of the system as compared to mechanical aerators or coarse bubble diffusers. Increasing the oxygen transfer efficiency reduces the aeration air requirement and the size of the blower systems. Energy usage and cost savings of approximately 15 percent can be realized using fine bubble over surface aerators. Use of fine bubble diffusers have been recommended for the WPCP.

- **Dissolved Oxygen (DO) Control.** Controlling the amount of oxygen being supplied to the aeration process is crucial to maintaining performance. DO can be monitored through either operator effort and attention, or automatically using DO sensors that continuously measure the amount of DO in the aeration basins. Continuous, automated monitoring of DO allows the aeration system to be controlled based on the amount of air needed for different loading conditions and oxygen demand rather than operating at full load continuously. This control method has a potential energy savings of 25 to 40 percent. (PG&E, 2006; NYSERDA, 1995). Plants larger than 5 mgd typically use automated DO control. This strategy should be included for the WPCP.
- **High Efficiency Blowers.** Centrifugal blowers are widely used in wastewater aeration applications due to their ability to meet a wide range of airflow and pressures relatively efficiently. Multi-stage centrifugal blowers, most commonly used, have limited turndown capacity (i.e., 70 percent of maximum), which creates some inherent inefficiency. Single-stage blowers are more efficient with higher turndown capacities (i.e., 40 percent of maximum) but have higher capital costs. New high speed turbo blowers are more efficient than both multi-stage and single-stage blowers. Further analysis of blower type should be conducted if the City decides to install fine bubble aeration at the WPCP.
- **Blower Adjustability.** As with pumping systems, load requirements often vary within the aeration system and thus, if a blower system is installed, the system needs to accommodate these fluctuations. Inlet and outlet guide vane control are two relatively inexpensive methods of adjusting airflow through blowers. However, in a study performed by EPRI, VFDs were shown to be more energy efficient, especially at lower turndown speeds (PG&E, 2006). VFDs also provide a 'soft start' capability, which ramps up the motor slowly, thereby reducing wear and tear on the pump and motor and extending motor life.

Sludge Handling. The WPCP's sludge handling process uses anaerobic digestion followed by solar drying. In the future, the WPCP will have to dewater the sludge mechanically because WCWD will no longer accept the WPCP's sludge (Project 1.18). By using anaerobic digestion as opposed to aerobic, the WPCP facility is already realizing an energy savings over some wastewater facilities. Anaerobic digestion requires less energy to operate because they operate under an absence of oxygen requiring no added air. Other energy saving techniques for the solids process include:

- **Thickening Sludge Before Digestion.** Thickening solids before digestion sends less water to the digester, resulting in a longer detention time for the solids in the digesters, producing more biogas and reducing the quantity of biosolids for disposal. Currently, waste activated solids (WAS) from the secondary process at the WPCP are thickened prior to the digestion process.

- **Operating at Optimum Temperature.** The microorganisms used to digest waste anaerobically have optimum temperature conditions at which the organisms are most active. Operating the digester in the optimum temperature range helps to ensure that the most biogas possible is being produced. The City recently approved a project (Project 1.15) to rehabilitate the digesters, which will result in improved temperature control.

Using a Thickening/Dewatering Process with Low Energy Needs. Of the thickening/dewatering processes available, centrifuges and dissolved air flotation are two of the most energy intensive. Gravity belt thickening (GBT), which is recommended by the Master Plan for WAS thickening at the WPCP, is a low energy process. Belt filter presses, which are planned to dewater digested solids at the new dewatering facility, also require relatively low amounts of energy to operate.

- **Solar Drying.** Solar drying of digested solids uses the least amount of purchased energy for drying biosolids. This is a viable option only if the land area required is available. Historically, the City has dried its solids at the WCWD's drying beds. As noted elsewhere in the Master Plan, WCWD will not allow the City to use its drying beds in the future.

Disinfection. Currently, the WPCP uses sodium hypochlorite and sodium bisulfite to disinfect and dechlorinate the secondary effluent prior to discharge. Alternative disinfection technologies include ultra-violet (UV) disinfection and chlorine gas. Chlorine gas is a safety hazard is no longer commonly used in the wastewater industry.

In a PG&E energy study examining the energy issues of UV disinfection, a survey of seven UV systems, both low and medium pressure, was conducted to determine their energy usage per MG treated. Low-pressure systems ranged from 117 to 250 kWhr/MG while medium pressure systems ranged from 464 to 1,000 kWhr/MG. The study also compared the energy required to operate a UV system and the energy required to produce chlorine (both chlorine gas and sodium hypochlorite). Table 7.3 shows the results of that comparison.

This comparison shows that the energy required for low pressure UV disinfection is relatively equivalent to the energy required to produce the sodium hypochlorite, therefore, it is recommended that the WPCP continue to use sodium hypochlorite for disinfection.

Plant Lighting. Another energy load for the WPCP, though to a smaller degree, is the plant lighting. Several measures can be taken to reduce the impact of the lighting load. Energy efficient lighting ideas listed below could be used for indoor or outdoor applications unless otherwise noted. The lighting elements discussed below can be implemented on a case by case basis as existing lights and lighting fixtures are replaced.

- **Advanced Fluorescent Lighting:** For indoor applications, high efficiency fluorescent lamps, electronic ballasts, custom designed reflectors and appropriate lenses or louvers can reduce the energy load.

Table 7.3 Comparison of Energy Requirements for UV Operation and Chlorine Production
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Disinfection Method	PG&E Energy Study[1] KWhr/MG[2,3]		
Chlorine Gas	63	to	250
Sodium Hypochlorite	110	to	438
Low Pressure UV	117	to	250
Medium Pressure UV	464	to	1,000

Notes:
(1) Source: PG&E, 2002.
(2) Chlorine energy range corresponds to dosage of 5 to 20 mg/L.
(3) UV energy range based on UV system surveys conducted as part of the study.

- **High-intensity Discharge Lighting:** For outdoor use, high-intensity discharge lamps generate high lighting output, use a fraction of the energy required for incandescent or mercury vapor equivalents, and have substantially longer lamp life than incandescents.
- **Lighting Controls:** Simple controls can eliminate unnecessary lighting in many facility areas. Occupancy sensors, time switches, dimming systems, and photocell controls can make lighting systems more efficient.
- **Regular Maintenance:** Developing a program of routine maintenance, replacement of lamps and luminaires can maintain peak efficiency and save energy. As a lamp ages, its effectiveness decreases. Dust and dirt can also reduce effectiveness by nearly 30 percent.

Energy Monitoring. Energy monitoring can be used to further improve, and maintain, the Plant's energy efficiency performance. Energy monitoring devices placed at strategic locations of high power demand could be installed to monitor energy use on a regular basis, which will help operations staff identify trends and detect variances. This type of monitoring canalso alert the Plant staff of impending problems, since power consumption often starts to increase as a problem is developing

To facilitate monitoring on a regular basis, the energy monitoring equipment should be connected to the plant's Supervisory Control and Automated Data Acquisition (SCADA) system. This would allow plant staff to monitor the whole system in addition to individual

processes. For instance, instrumentation and controls (I&C) can allow the operator to continuously monitor the concentration of dissolved oxygen in the aeration basins, and adjust power throughput to reflect actual process demand for oxygen, providing potential for significant savings (Project 1.6). I&C can also be programmed to allow the operator to use alternative operating paradigms so that the most efficient, reliable, or newest equipment can be used.

Action 3 - *Adopt a citywide greenhouse gas reduction plan that reduces the jurisdiction's emissions by twenty-five per cent by 2030, and which includes a system for accounting and auditing greenhouse gas emissions.*

The WPCP already uses digester gas to heat its digesters, thereby reducing greenhouse gas emissions that would result from purchasing fuel for the Plant's thermal needs. Installing a cogeneration system that uses digester gas to produce electricity and waste heat to heat the digesters would further reduce the WPCP's greenhouse gas emissions by using a renewable fuel instead of purchasing fuel or electricity. This project is identified as Project 1.19. In addition, Project 1.15, digester upgrades, helps increase the amount of digester gas that is produced, which will increase the amount of electricity that can be generated on-site.

Implementing energy efficiency and conservation measures will also reduce the City's greenhouse gas emissions by reducing the amount of purchased power and its associated emissions. Although beyond the scope of this study, it should be noted that there are a variety of measures that can be undertaken on the operations side to reduce GHG emissions, including incorporating low emission and/or alternative fuel vehicles into the fleet, and using biodiesel in backup generators.

7.3.2 Waste Reduction

Action 4 - *Establish a policy to achieve zero waste going to landfills and incinerators by 2040.*

Sludge Drying. As described elsewhere, the current process of sending dried sludge from the solar beds to the landfill for disposal will soon be discontinued. Instead of using the digester gas for co-generation, it could be supplemented with natural gas and used to dry dewatered sludge into Class A biosolids, which could be sold if certain requirements are met. However, because a cogeneration project (which will utilize the digester gas) is recommended, this alternative is not feasible at this time. In the future, the City and Veolia may wish to consider installing thermal drying if the economics of hauling sludge change.

Construction and Demolition Debris Recycling. Specifications that require contractors to reuse or recycle a high percentage (at least 75 percent) of construction and demolition debris should be included in all bid documents for upgrade projects. In California, construction and demolition (C&D) debris constitutes 22 percent of the waste stream, so there is a real opportunity to reduce waste during construction.

A useful resource for developing C&D specifications, along with other tools is the California Integrated Waste Management Board's Construction and Demolition Debris Recycling website: http://www.ciwmb.ca.gov/ConDemo/. In addition, the Whole Building Design Guide offers some best management practices for construction waste management including guidance in facility design, construction contract requirements, and jobsite waste reduction: http://www.wbdg.org/resources/cwmgmt.php.

Making C&D recycling/reuse a reality on a project requires the collaboration of the Owner, Engineer and Contractor(s). Initially, the Owner and Engineer must establish waste reduction goals and define the diversion levels achievable based on project-specific conditions. The Contractor is then responsible for implementing techniques, methods and procedures for achieving those goals. The City should consider requiring a C&D recycling program to be a part of future WPCP projects.

Action 5 - *Adopt a citywide program that reduces the use of a disposable, toxic, or non-renewable product category by at least fifty per cent in seven years.*

Polyvinyl chloride (PVC), is used in many applications in wastewater treatment plants as well as distribution and collection systems. Despite its prevalence and many advantages, many water and sanitary agencies (e.g., Indianapolis Water Company, United Affiliates of New Jersey and New York, Western Lake Superior Sanitary District, and Los Angeles Dept. of Water and Power) and city governments (e.g., Seattle, San Francisco, Oakland, Boston, and Berkeley) are phasing out use of PVC due to environmental and health concerns.

Dioxin, ethylene dichloride, and vinyl chloride are produced in both the manufacture and disposal of PVC. All these byproducts can cause severe health problems, including cancer, (dioxin is the most potent carcinogen known), birth defects, impaired child development, neurological damage, and reproductive and immune system damage. Manufacturing PVC is also highly energy intensive.

In wastewater treatment plant piping schedules, PVC is specified for small diameter piping (i.e., less than 8 inch) in chemical, sample, and drain applications. PVC is also specified for electrical conduits in concealed, underground applications and ductbanks, as well as for coating galvanized steel conduits in corrosive indoor environments. Alternative pipe materials are available for most piping and conduit applications. Appendix L includes a detailed comparison of varying pipe materials and their environmental and health impacts as well as various design and installation considerations. Table 7.4 offers potential piping material alternatives to PVC for some common wastewater treatment applications. Please note that our research has not identified a complete analysis of the environmental impacts of various piping materials; therefore, the following suggested alternative materials are not necessarily more 'sustainable' on all counts, but they are reported to be less toxic than PVC. As always, how well a material meets project specific design parameters must be evaluated as well.

In general, the material cost for PVC pipe is roughly equal to HDPE and ductile iron, 2 to 3 times less expensive than PP, and 8 to 9 times less expensive than copper. It should be noted that pipe material costs are a small component of the entire cost to install the pipe

Table 7.4 Potential Alternatives to PVC Piping[(1)]
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Application	Alternative Material	Design Considerations
Chemical Transport	HDPE, PP	• Resistance of material to chemical being used (i.e., should be equal to or better than PVC). • Thermal expansion and UV degradation impacts, especially in exposed applications. • Increased flexibility of pipe will likely require more restraint than with PVC.
Drain	Cast iron	• Corrosivity of soils and transported liquid (i.e., chemical drains).
Potable and Non-Potable Water	HDPE, Copper	• Operating pressures determine wall thickness needed. • Thermal expansion and UV degradation impacts, especially in exposed applications. • Increased flexibility of pipe may require more restraint than with PVC.
Electrical Conduit	HDPE, PEX	• Electrical and fire code requirements must be met.

Notes:
HDPE = High density polyethylene
PP = Polypropylene
PEX = Cross-linked polyethylene
(1) Potential alternative materials should be evaluated for each individual application.

and the installation labor should be factored in to the life cycle cost analysis when selecting materials.

Action 6 - *Implement "user-friendly" recycling and composting programs, with the goal of reducing, by twenty percent per capita, solid waste disposal to landfill and incineration in seven years.*

See elements identified under Action 4. Also, to “close the loop” on recycling, the City can specify the use of recycled content materials in WPCP projects. A few possibilities were identified which can be incorporated into projects on case by case basis:

- Fly ash or slag in cement mix for concrete.
- Recycled concrete materials for aggregate base, riprap or other acceptable areas.
- Recycled steel siding.

- Recycled content in cellulose building insulation, ceiling tiles, acoustic tiles.
- Fiber gypsum wallboard with recycled content for interior walls.
- Carpeting with recycled content for office space.

7.3.3 Urban Design

Action 7 - *Adopt a policy that mandates a green building rating system standard that applies to all new municipal buildings.*

If the City and Veolia decide to renovate the Administrative Building in the future, LEED certification of the project could be pursued. Additionally, green building strategies related to site conditions, energy and water use efficiency, recycling, and use of green materials can be incorporated into all WPCP improvement projects, as appropriate. One strategy to ensure this happens would be to write green building language into RFPS for projects.

Action 8 - *Adopt urban planning principles and practices that advance higher density, mixed use, walkable, bikeable, and disabled-accessible neighborhoods which coordinate land use and transportation with open space systems for recreation and ecological restoration.*

Bicycle racks could be installed at the WPCP to encourage the use of bicycles.

Action 9 - *Adopt a policy or implement a program that creates environmentally beneficial jobs in slums and/or low-income neighborhoods.*

An operator-training program could be implemented to create jobs for citizens of Richmond.

7.3.4 Urban Nature

Action 10 - *Ensure that there is an accessible public park or recreational open space within half-a-kilometer of every city resident by 2015.*

No strategies were identified at the WPCP to assist the City in meeting this goal.

Action 11 - *Conduct an inventory of existing canopy coverage in the city and then establish a goal based on ecological and community considerations to plant or maintain canopy coverage in not less than 50 per cent of all available sidewalk planting sites.*

Additional trees could be planted at the WPCP to expand the City's canopy coverage.

Action 12 - *Pass legislation that protects critical habitat corridors and other key habitat characteristics (e.g. water features, food-bearing plants, shelter for wildlife, use of native species, etc.) from unsustainable development.*

The upgrades recommended in the Master Plan will result in a more reliable treatment plant that will reduce the pollutant loading on the San Francisco Bay. Reducing pollutant loadings

to the Bay, a key habitat for fish and other marine organisms, is consistent with Action 12. Projects 1.2, 1.5,1.6, 1.7, 1.8, and 1.10 help the limit pollutant loadings on the Bay.

7.3.5 Transportation

Action 13 - *Develop and implement a policy which expands affordable public transportation coverage to within half-a-kilometer of all city residents in ten years.*

No strategies were identified at the WPCP to assist the City in meeting this goal.

Action 14 - *Pass a law or implement a program that eliminates leaded gasoline (where it is still used); phases down sulfur levels in diesel and gasoline fuels, concurrent with using advanced emission controls on all buses, taxis, and public fleets to reduce particulate matter and smog-forming emissions from those fleets by 50 per cent in seven years.*

Two strategies were identified to assist the City in meeting this goal:

- Staff could use bicycles and/or electric carts (i.e., golf carts) or other such vehicles for trips to do routine maintenance, inspection, and operations checks to reduce automobile use within the facility. An electric docking station would be necessary for any such vehicles.
- Designate preferred parking areas for low-emission and fuel-efficient vehicles - This could be easily accomplished for regular commuters as well as visitors to the facility.

Action 15 - *Implement a policy to reduce the percentage of commuter trips by single occupancy vehicles by ten per cent in seven years.*

The City could implement a commute reduction program that includes “Commuter Tax Benefits” and other incentives for staff to take public transportation, carpool, or bike to work. Installing bike racks to encourage staff to ride their bikes to work instead of driving cars would also help the City comply with Action 15.

Action 16 - *Every year, identify one product, chemical, or compound that is used within the City that represents the greatest risk to human health and adopt a law and provide incentives to reduce or eliminate its use by the municipal government.*

The WPCP no longer uses chlorine gas for disinfection because of the human health hazards associated with this chemical. The City and Veolia water should consider conducting a survey at the WPCP to identify other potentially hazardous products and chemicals are currently utilized and how they could be replaced. For instance, if pesticides are used to control pests, there may be an opportunity to implement an Integrated Pest Management program to reduce their use.

Action 17 - *Promote the public health and environmental benefits of supporting locally grown organic foods. Ensure that twenty per cent of all city facilities (including schools) serve locally grown and organic food within seven years.*

No strategies were identified at the WPCP to assist the City in meeting this goal.

Action 18 - *Establish an Air Quality Index (AQI) to measure the level of air pollution and set the goal of reducing by 10 per cent in seven years the number of days categorized in the AQI range as "unhealthy" or "hazardous."*

Installing the odor control facility (Project 1.17), as discussed in Chapter 6, would help to improve the City's air quality.

7.3.6 Water

Action 19 - *Develop policies to increase adequate access to safe drinking water, aiming at access for all by 2015. For cities with potable water consumption greater than 100 liters per capita per day, adopt and implement policies to reduce consumption by 10 per cent by 2015.*

The WPCP uses potable water for drinking, cooking, and showers in the Administrative Building. Other water uses, such as for washdown, use disinfected effluent. Therefore, the facility already uses minimal amounts of potable water. A couple of strategies that could further reduce potable water use include:

- Install water conservation fixtures, such as ultra low flush toilets, waterless urinals, faucet aerators, etc. WPCP Operations Staff can make these improvements on a case-by-case basis. EBMUD may provide grants for some of these improvements.
- Install xeriscape requiring little to no irrigation - Xeriscape is a landscaping technique using plants, grasses or shrubbery that require little to no irrigation. If irrigation is required, install a high efficiency irrigation system. The WPCP has minimal landscaping so this option is not particularly applicable to the City.
- Install a greywater or rainwater collection system for landscape irrigation, process water, and/or flushing toilets. This would require a separate pumping and delivery system to supply the greywater or stormwater to the end uses. Another alternative would be to use recycled non-potable water for toilets and urinals. A greywater project should be investigated further after higher priority projects are completed.

Action 20 - *Protect the ecological integrity of the city's primary drinking water sources (i.e., aquifers, rivers, lakes, wetlands and associated ecosystems).*

The City's drinking water is provided by East Bay Municipal Utility District (EBMUD) which transports water from watersheds in the Sierra Mountains. However the WPCP could evaluate the benefits of implementing low impact development (LID) strategies to protect onsite and surrounding water resources. LID is a stormwater management approach that mimics pre-development hydrologic processes by increasing retention, detention, infiltration, and treatment of runoff at its source. This can be accomplished, in part, by distributing small-scale stormwater management practices throughout the WPCP site. Examples include biodetention basins, permeable paving, vegetated filter strips, vegetated

roofs, and grass swales. The planning for the implementation of these LID strategies should be conducted in conjunction with the implementation of the recommended projects.

Action 21 - Adopt municipal wastewater management guidelines and reduce the volume of untreated wastewater discharges by ten per cent in seven years through the expanded use of recycled water and the implementation of a sustainable urban watershed planning process that includes participants of all affected communities and is based on sound economic, social, and environmental principles.

If the recommended Master Plan improvements (Projects 1.1, 1.3, 1.12, 2.1, 2.2, and 2.3) are implemented, it is anticipated that the discharge of primary treated wastewater to the environment during wet weather events will be reduced by more than ten percent. Improving the reliability of the WPCP will produce a consistent, high quality effluent with low suspended solids, biological oxygen demand (BOD) and ammonia concentrations. Recycled water, as discussed in Chapter 6, can also be implemented at the WPCP. However, recycled water production will not be feasible until after the seawater inflow and infiltration to the collection system is halted.

7.4 SUSTAINABLE DESIGN INCENTIVES

Several incentives have been identified for sustainable and energy efficient design. These incentives offer monetary assistance to offset the cost for sustainable design measures and/or design review for improved energy efficiency. A more detailed description of each sustainable design incentive is included in Appendix M.

7.5 SUMMARY AND RECOMMENDATIONS

The preceding sections have highlighted many sustainable design strategies for consideration. Incorporating sustainable design principles into future WPCP projects will assist the City in meeting the goals defined by the United Nations Urban Environmental Accords. A summary of the how the incorporate sustainable elements can be included or applied to projects recommended in the Master Plan is provided below.

- Implement the recommended WPCP projects in the Master Plan. The improvements will reduce the amount of pollutants discharged to environment by producing a consistent, high quality effluent with low suspended solids, biological oxygen demand (BOD) and ammonia concentrations through reliable secondary treatment process during dry and wet weather periods.
- Utilize digester gas to generate electricity (Project 1.19). This alternative offers sustainable benefits by offsetting purchased electricity with onsite renewable power and reducing greenhouse gases.
- Optimize energy performance by continuing to use high efficiency equipment, designing pumps (Project 1.3) and blower systems (Project 1.6) with low hydraulic

losses, optimal sizing for demands, and installing energy monitoring devices at key locations.

- Investigate the possibility of purchasing green power from the main power grid.
- Reduce potable water use and maximize water efficiency by replacing existing plumbing fixtures with low flow plumbing fixtures.
- Implement a Construction and Demolition Waste Program to conserve materials and resources.
- Replace existing lights with more efficient lighting fixtures.

CAPITAL IMPROVEMENT PROGRAM

8.1 INTRODUCTION

This chapter presents the recommended alternatives for upgrading the RSSD treatment facilities and the capital improvement plan (CIP).

8.2 MASTER PLAN PHASES

The CIP consists of four project phases, as described below.

8.2.1 Phase I - Improvements Necessary to Reliably Treat Existing Flows and Loads

Phase I consists of project elements recommended to meet discharge requirements for current flows and loads. A process schematic for this phase is shown in Figure 8.1. This scenario includes improvements that are required for all of the other scenarios. Also, the rehabilitation and replacement schedule developed in Chapter 5 is included in Phase 1.

8.2.2 Phase II - Meet the Existing Discharge Permit Limits at Buildout Flows and Loads

Facilities required to accommodate future flows for conventional secondary treatment are included. The improvements are designed to allow the WPCP to treat buildout flows and loads. Figure 8.2 presents the process schematic for Phase II.

8.2.3 Phase III - Comply With a Prohibition of Primary/Secondary Blending during Wet Weather Blending at Buildout Flows and Loads

Phase III includes modifications and expansion of the WPCP to provide secondary treatment of all wet weather flows up to 40 mgd. This would be required if the RWQCB prohibits primary/secondary blending during peak wet weather flows. A schematic of Scenario III is shown on Figure 8.3.

8.2.4 Phase IV - Comply With a Prohibition of Primary/Secondary Blending and a Reduction in the Allowable Ammonia Effluent Limit at Buildout Flows and Loads

Phase IV includes the modification and expansion of the WPCP to provide nitrification for the projected flows. It was assumed that the WPCP would be required to meet an ammonia-nitrogen concentration of less than 2 milligrams per liter (mg/L). Figure 8.4 presents the process schematic for Phase IV.

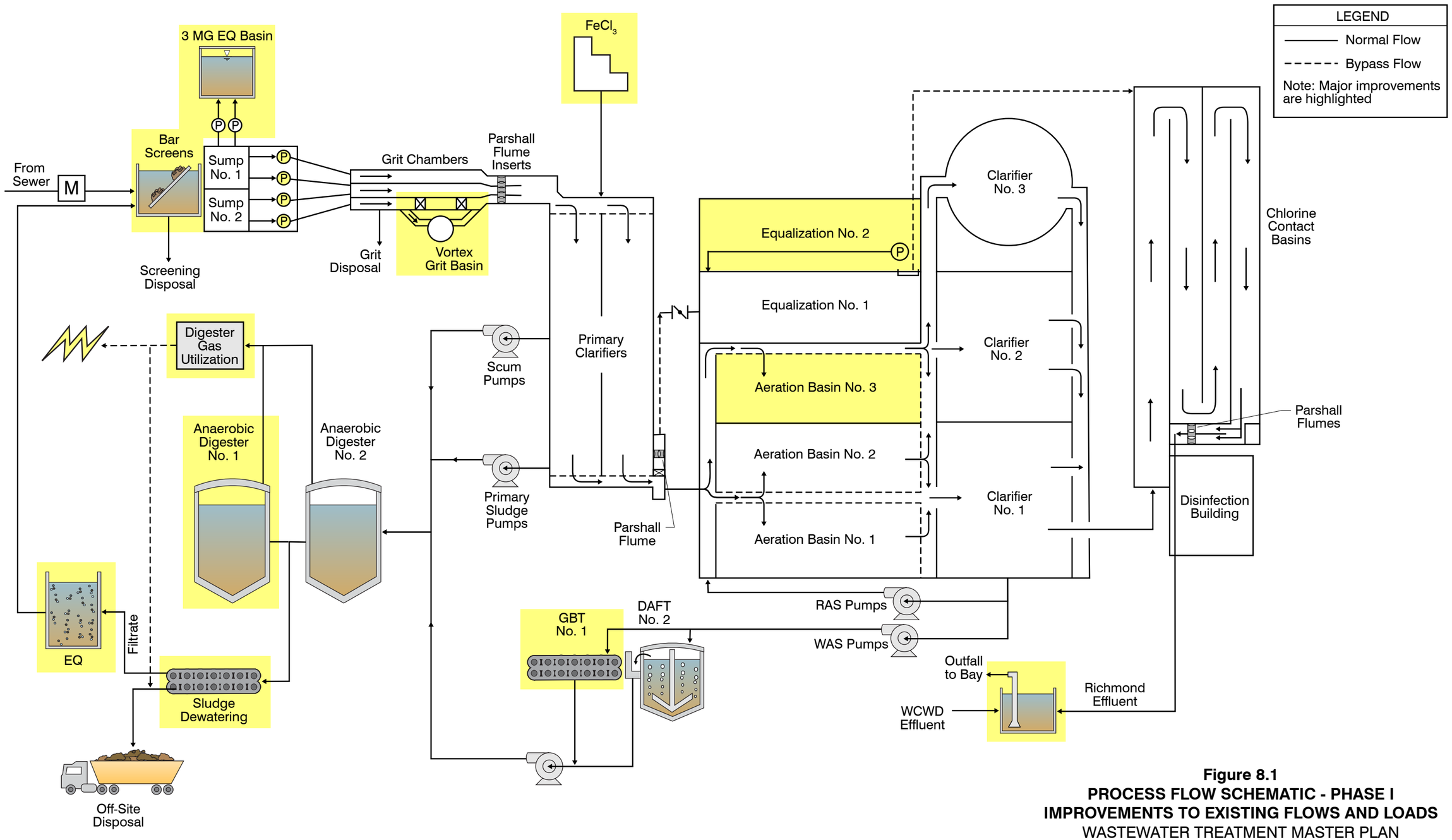

Figure 8.1
PROCESS FLOW SCHEMATIC - PHASE I
IMPROVEMENTS TO EXISTING FLOWS AND LOADS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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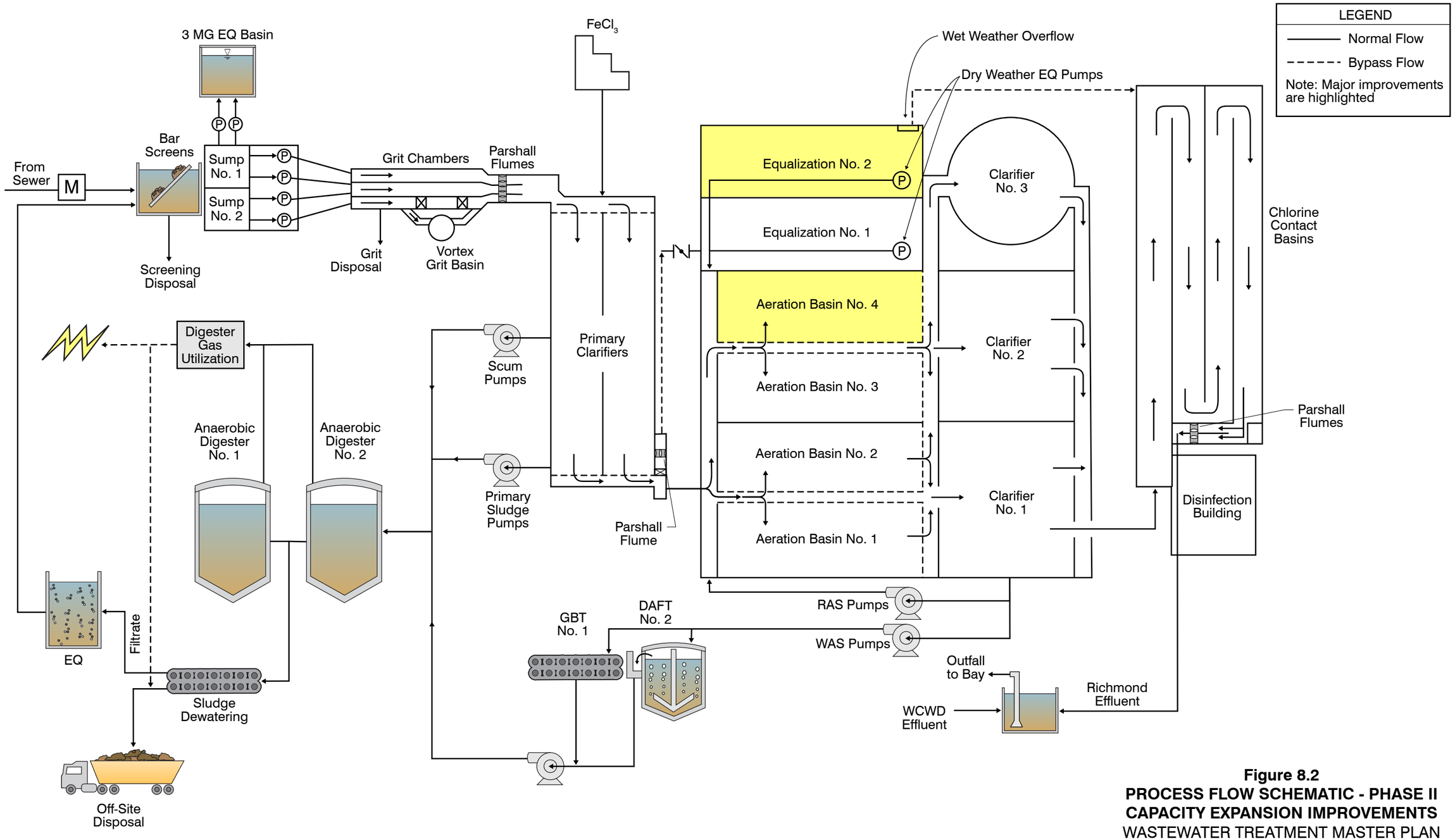

Figure 8.2
PROCESS FLOW SCHEMATIC - PHASE II
CAPACITY EXPANSION IMPROVEMENTS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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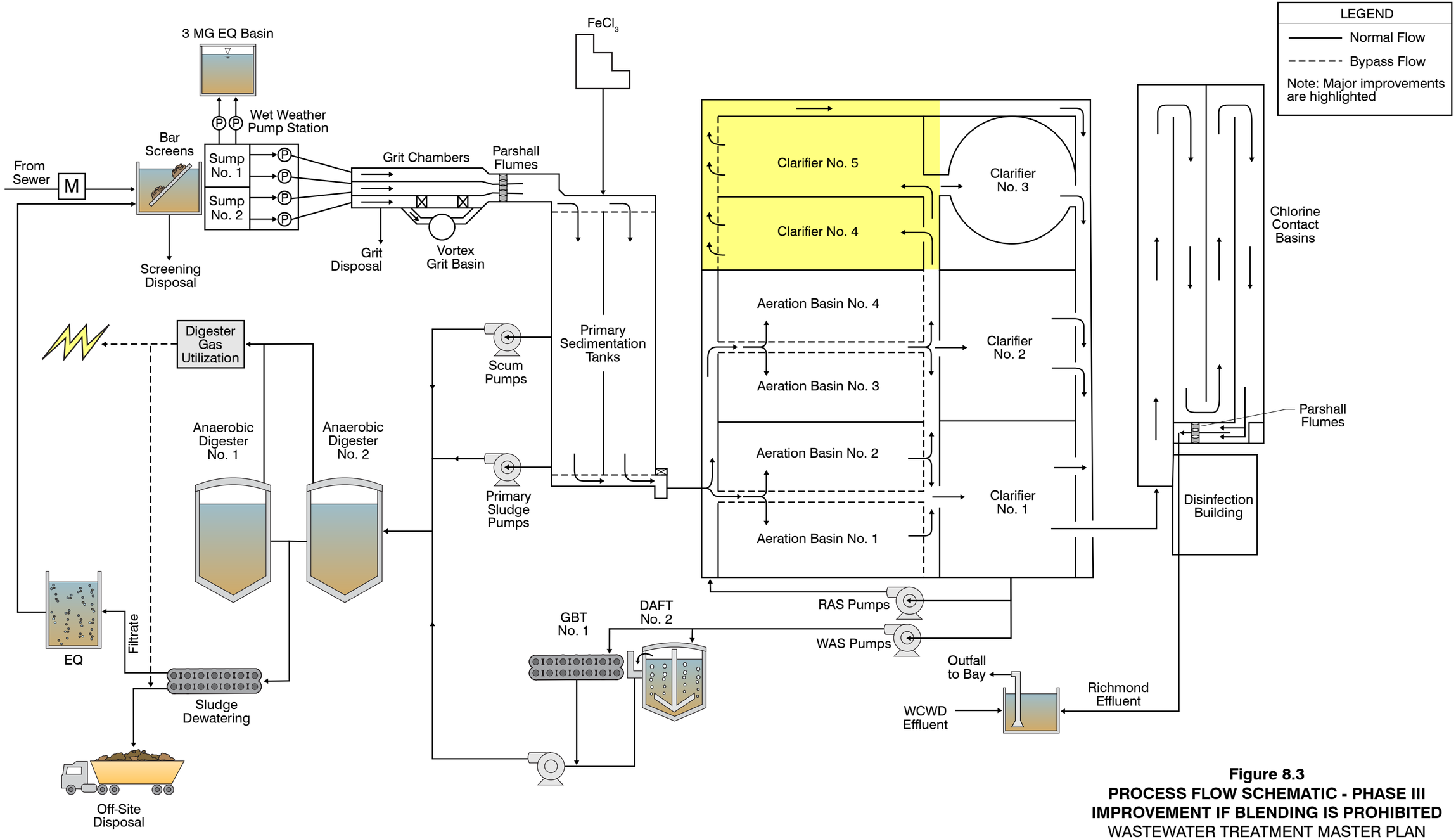

Figure 8.3
PROCESS FLOW SCHEMATIC - PHASE III
IMPROVEMENT IF BLENDING IS PROHIBITED
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

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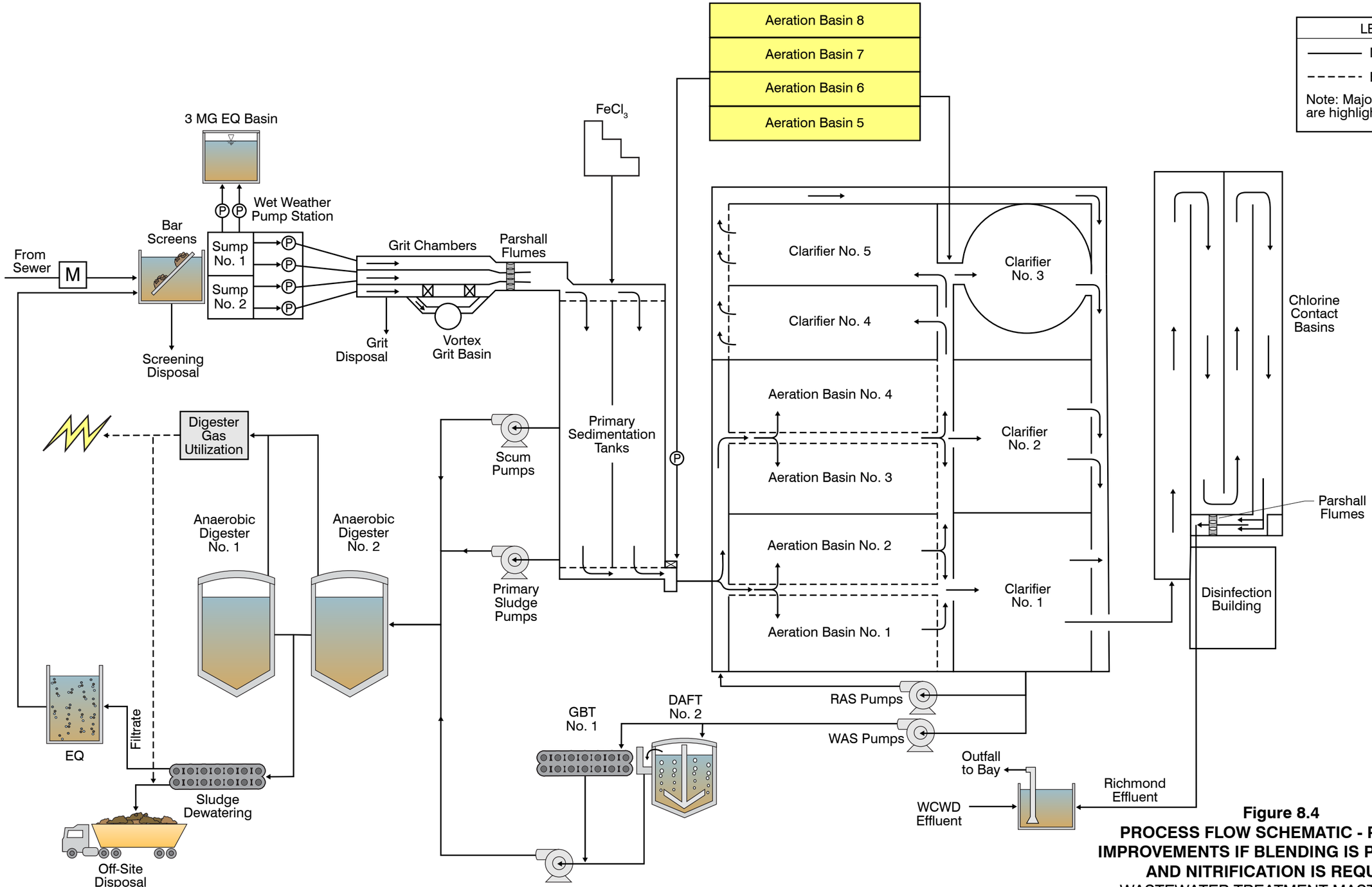

Figure 8.4
PROCESS FLOW SCHEMATIC - PHASE IV IMPROVEMENTS IF BLENDING IS PROHIBITED AND NITRIFICATION IS REQUIRED
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

vw110f4-8009.ai

8.2.5 Recommended Capital Improvement Plan

The recommended CIP encompasses Phases I through III. Due to the uncertainties about future ammonia limits, Phase IV was not included in the CIP.

8.3 COSTS

Cost estimates for the expansion and improvements to the WPCP facilities have been prepared for each alternative. Cost estimates were based on preliminary design criteria and the assumptions and findings of the previous chapters. The final project costs will depend on actual labor and material costs, when the facilities are constructed, productivity, competitive market conditions, final project scope, project schedule, and other variable factors. Consequently, the final project costs will vary from the cost estimates presented in this Master Plan. Because of these factors, funding needs must be carefully reviewed before making specific financial decisions or establishing final budgets.

The estimates for the scenarios are in August 2008 dollars (ENR Construction Cost Index = 9293). The level of accuracy for construction costs varies depending on the level of detail to which the project has been defined. Feasibility studies and master plans represent the lowest level of accuracy, while pre-bid estimates (based on detailed plans and specifications) represent the highest level. The American Association of Cost Engineers (AACE) has developed the following guidelines:

Type of Estimate	Anticipated Accuracy
Order-of-Magnitude (Master Plans)	+50% to -30%
Budget Estimate (Predesign Report)	+30% to -15%
Definitive Estimate (Pre-Bid)	+15% to -5%

The estimates presented within this Master Plan are considered the “order-of-magnitude” accuracy level. The estimates for the majority of the projects were developed based on cost curves developed by Carollo Engineers specifically for the purpose of planning level cost estimates. The cost curves were constructed from the following categories of sources:

- **“Bid tabs" from Carollo Design Projects:** These are Carollo project costs taken from contractor's schedule of values or contractor's partial payment requests. These values are low-bid values.
- **Carollo Engineer's Estimates:** These are 100 percent final design cost estimates prepared by Carollo Engineers. These costs are usually higher than contractor's low bid costs. Nonetheless, they are useful data when there are no contractor's costs available.

- **Engineer's Estimates Prepared by Others:** The cost curve data includes several 100 percent final design cost estimates prepared by other consulting companies (e.g., Joint Venture Partners).

For projects that were too project specific for cost curves to apply, cost estimates were developed using quantity takeoffs and unit prices. For example, the costs of the electrical system improvements, which included ductbank and MCC replacement, were calculated in this manner. For the new equalization basins, concrete quantities were calculated and unit prices were applied to calculate the costs of construction.

For specialized equipment, such as sludge collection equipment for the existing and proposed clarifiers, estimates were obtained from vendors (e.g., Westech and Viking). For commodity items, like check valves and pipes, prices were obtained from Carollo's unit price catalog. Due to the length of the equipment list, it was not feasible to conduct a detailed cost estimate for each individual piece of equipment.

8.3.1 Capital Improvements Plan

After the construction cost for each project component was developed, total project costs were calculated. the project cost includes a contingency factor of 30 percent. This contingency represents undeveloped or unforeseen design details at the planning stage level.

An additional allowance of 20 percent for engineering (design and construction-related), legal, and administration was added to the construction cost estimates for each of the major facility additions.

Total Capital Costs for each phase are summarized in Table 8.1. A more detailed breakdown of each phase is included in Table 8.2.

Table 8.1 Summary of Total Capital Costs for Master Planning Phases(1)
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Phase	Capital Costs (Millions of Dollars)
Phase I - Reliability Improvements	$79.0
Phase II - Capacity Improvements	$34.9
Phase III - Improvements to Eliminate Wet Weather Blending	$12.0
Phase IV - Ammonia Removal is Required	(not included due to regulatory uncertainties)

Note:

(1) Based on August 2008 dollars; ENRCCI=9293.

Table 8.2 Capital Improvement Plan
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Design Flow (mgd)	Priority	Project No.	Unit Process Improvement	Purpose	Sustainable Initiative	Description	Construction Cost	Capital Cost[1][4]
Phase I - Improvements to Treat Existing Flows and Loads								
Improvements to treat existing flows and loads with a reasonable level of reliability in an economical manner. Assumes PHWWF of 55 mgd and that WCSD will stop accepting solids from RSSD. Includes EQ Basin and PS to reduce PHWWF to 40 mgd.								
ADWF = 6.5 AMMF = 12.1 PHWWF = 55.0 **Assumes Blending Allowed**	**Highest**		<u>Approved Projects Currently in Design or Construction</u>					
		1.3	Upgrade IPS[2]	Reliability	UN Action 2	Reduces potential for overflows in collection system	$2,000,000	$2,000,000
		1.15	Digester and Heating/Mixing System Upgrade[2]	Performance	UN Actions 1 & 3	Improves performance of digesters	$3,000,000	$3,000,000
			<u>Projects Recommended for Immediate Implementation (within 1 to 2 years)</u>					
		1.6	Convert to Fine Bubble Aeration	Compliance	UN Action 2	Required to meet permitted plant capacity	$3,000,000	$4,500,000
		1.7	Convert existing EQ Basin 1 to third aeration basin (AB)	Compliance/ Capacity	UN Action 12	Provide redundancy and capacity to reliably meet permit requirements	$2,000,000	$3,000,000
		1.8	Build new EQ basin to replace the basin that that is converted to AB	Compliance	UN Action 21	Maintains same volume of wet weather storage per NPDES permit	$4,000,000	$6,000,000
		R&R 1	Priority 1 Rehabilitation and Replacement Projects	Reliability	UN Action 12	Replaces portions of the electrical system and other equipment that are required to operate the plant	$5,500,000	$5,500,000
		1.4	Build new vortex grit basin for dry weather flows	Performance	UN Action 12	Provides for increased grit removal and improves performance of downstream processes (e.g., digesters)	$1,150,000	$1,700,000
			<u>Sludge Dewatering/Drying Projects</u>					
		1.18	Construct sludge dewatering facility[2]	Performance		Allows the plan to dewater digested sludge	$14,700,000	$14,700,000
		1.19	Gas Utilization - Cogeneration	Performance	UN Actions 1 & 3	Produces electricity from digester gas.	$2,500,000	$3,250,000
			<u>Projects Recommended for Implementation within next 5 Years</u>					
		1.12	Grout in bottoms of existing EQ basins	Performance/ Compliance	UN Action 21	Improves drainage to reduce mosquitoes and solids carryover during wet weather events	$250,000	$375,000
		1.1	Construct EQ basin and PS prior to primary clarifiers	Capacity	UN Action 21	Reduces potential for overflows in collection system	$6,000,000	$9,000,000
		1.9	Repair channel aeration system and install flow control for secondary clarifiers	Performance	UN Action 12	Improves performance of secondary treatment process	$875,000	$1,313,000
		1.10A	Grout in corners of Clarifiers 1 and 2	Compliance	UN Action 12	Reduces solids in effluent to SF Bay	$600,000	$900,000
		1.10B	New sludge collection system	Compliance	UN Action 12	Reduces potential for permit violations	$625,000	$937,000
		1.11	Improve hydraulics of Clarifier 3	Performance	UN Action 12	Reduces solids in effluent to SF Bay	$250,000	$375,000
		1.13	Construct low lift pump station	Capacity		Increases outfall capacity	$2,250,000	$3,375,000
		1.5	Add enhanced coagulation to the primary clarifiers	Performance	UN Action 12	Increases clarifier performance during peak flows	$500,000	$750,000
		1.14	Replace DAFT 1 with a GBT	Reliability		Increases reliability by replacing inoperable DAFT	$1,250,000	$1,875,000
		1.16	Install new automatic strainers on 3W pumps	Performance		Increases pressure and flow through 3W system	$100,000	$150,000
		1.17	Odor Control System[2]	Compliance	UN Actions 1&17	Reduces odor complaints	$3,200,000	$3,200,000
		1.2	Construct second bar screen	Reliability/ Capacity	Action 12	Improves screening of trash & rags and improves performance of secondary clarifiers and digesters.	$3,000,000	$4,500,000
		R&R 2	Priority 2 Rehabilitation and Replacement Projects	Reliability/ Compliance	Action 12	Replaces gates, RAS/WAS piping, WAS pumps, and chemical tanks that are required to operate the plant.	$2,400,000	$2,400,000
	Lowest	R&R 3	Priority 3 Rehabilitation and Replacement Projects	Reliability/ Compliance	Action 12	Replaces several structures and gates that are at the end of their useful life	$6,200,000	$6,200,000
							$65,350,000	$79,000,000

Table 8.2 Capital Improvement Plan
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Phase 2 - Capacity Expansion Improvements (Not Required until 2035)								
Improvements to treat future flows and loads in a reliable and economical manner. Assumes PHWWF of 55 mgd and that WCSD will stop accepting solids from RSSD. Includes Scenario I improvements	ADWF = 10.8	2.1	Convert existing EQ Basin 2 to fourth aeration basin (AB)	Capacity		Increases ADWF/ADMMF capacity of WPCP to 11/20 mgd	$2,000,000	$3,000,000
	AMMF = 20.1	2.2	Build new EQ basin to replace the basin that that is converted to AB	Capacity	Action 21	Maintains same volume of wet weather storage per NPDES permit	$3,000,000	$4,500,000
	PHWWF = 55.0	R&R 4	Anticipated Rehabilitation and Replacement Projects (2015 to 2030)[3]	Reliability/ Compliance		Rehabilitates and/or replaces WPCP components that have reached the end of their useful life	$27430 ,000	$27,430,000
	Assumes Blending Allowed							
							$32,430,000	$34,930,000
Phase 3 - Improvements if Blending is Prohibited (Not Required Unless RWQCB Changes Discharge Permit)								
Improvements required if blending of primary effluent is prohibited. Includes Scenario I and II improvements	ADWF = 10.8	3.1	Convert new EQ basins to rectangular clarifiers	Compliance	Action 21	Increases peak wet weather capacity of WPCP to 40 mgd	$4,000,000	$6,000,000
	AMMF = 20.1		(Requires new RAS/WAS PS and sludge coll. equipment)					
	PHWWF = 55.0							
	Assumes No Blending	R&R 5	Anticipated Rehabilitation and Replacement Projects (2030 to 2040)[3]	Reliability/ Compliance		Rehabilitates and/or replaces WPCP components that have reached the end of their useful life	$6,000,000	$6,000,000
							$10,000,000	$12,000,000

Notes:
(1) August 2008 dollars. ENR CCI = 9293. Includes allowances for contingencies, engineering, legal, and administrative expenses.
(2) Costs for these projects provided by Veolia or other consultants.
(3) If the sludge dewatering facility is selected to be constructed and operated by Veolia at the Richmond WPCP.
(4) UN = United Nations Urban Environmental Accords

8.4 IMPLEMENTATION SCHEDULE

An implementation schedule was developed based on criticality rankings and growth projections as described in Chapters 3 and 5. An implementation schedule for annual capital expenditures exceeding $100,000 is presented in Table 8.3. The implementation schedule is based on annual expenditures through the year 2012. Thereafter, expenditures are grouped into 5-year increments. The CIP is shown graphically in Figure 8.5 (unescalated).

8.4.1 Phase I

The Phase I projects are divided into four categories:

8.4.1.1 Approved Projects Currently in Design or Construction

These are projects that were recommended in the Master Plan and have already been approved by the City. The approved projects are as follows:

- **Project 1.3 - Influent Pump Station Upgrade:** This project increases the firm capacity of the pump station by installing larger pumps.
- **Project 1.15 - Digester and Heating/Mixing System Upgrade**: This project rehabilitates and relocates the digester heating and mixing systems. Digester No. 1, which is currently out of service, will be rehabilitated and placed in operation. This will allow Digester No. 2 to be taken out of service for maintenance and grit removal.

8.4.1.2 Projects Recommended for Immediate Implementation

The following projects be implemented as soon as possible (e.g., in next one to two years). These projects were selected based on the criticality ranking described in Chapter 5.

- **Project 1.6 - Convert to Fine Bubble Aeration:** This project converts the aeration system from mechanical aerators to a fine bubble aeration system. The new aeration system would use blowers to blow air through diffusers located at the bottom of the aeration basins. The fine bubble aeration system is necessary to improve mixing and oxygen concentrations in the aeration basins.
- **Project 1.7 - Convert Existing Equalization (EQ) Basin No. 1 to Third Aeration Basin (AB):** A third aeration basin is required to allow the Plant to treat sustained wet weather flows that occur over consecutive days. The existing EQ basin located adjacent to Aeration Basin No. 2 will be converted to Aeration Basin No. 3.
- **Project 1.8 - Construct New EQ Basin to Replace the EQ Basin that is Converted to AB No. 3:** Because an existing EQ Basin will be converted to an aeration basin, a new EQ basin must be constructed to maintain the two million gallons of wet weather storage that is required by the Plant's discharge permit.

Table 8.3 Wastewater Treatment Master Plan - Draft Project Implementation Schedule
Richmond Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Project No.	Project	Project Cost[1] ($M)	2009	2010	2011	2012	2013	2014	2015	2020	2025	2030	2035	2040
Approved Projects Currently in Design or Construction														
1.3	Upgrade IPS[2]	$2,000,000		$2,000,000										
1.15	Digester and Heating/Mixing System Upgrade[2]	$3,000,000		$3,000,000										
Projects Recommended for Immediate Implementation														
1.6	Convert to Fine Bubble Aeration	$4,500,000		$4,500,000										
1.7	Convert existing EQ Basin 1 to third aeration basin (AB)	$3,000,000			$3,000,000									
1.8	Build new EQ basin to replace the basin that that is converted to AB	$6,000,000			$6,000,000									
R&R 1	Priority 1 Rehabilitation and Replacement Projects	$5,500,000			$5,500,000									
1.4	Rehabilitate existing grit basin	$1,700,000		$1,700,000										
Projects Recommended for Implementation After Completion of Higher Priority Projects														
1.12	Grout in bottoms of existing EQ basins	$375,000				$375,000								
1.1	Construct EQ basin and PS prior to primary clarifiers	$9,000,000				$9,000,000								
1.9	Repair channel aeration system and install flow control for secondary clarifiers	$1,313,000				$1,313,000								
1.10A	Grout in corners of Clarifiers 1 and 2	$900,000				$900,000								
1.10B	New sludge collection system	$937,000				$937,000								
1.11	Improve hydraulics of Clarifier 3	$375,000				$375,000								
1.13	Construct low lift pump station	$3,375,000				$3,375,000								
1.5	Add enhanced coagulation to the primary clarifiers	$750,000				$750,000								
1.14	Replace DAFT 1 with a GBT	$1,875,000					$1,875,000							
1.16	Install new automatic strainers on 3W pumps	$150,000					$150,000							
1.17	Odor Control System[2]	$3,200,000					$3,200,000							
1.2	Construct second bar screen	$4,500,000					$4,500,000							
R&R 2	Priority 2 Rehabilitation and Replacement Projects	$2,400,000					$2,400,000							
R&R 3	Priority 3 Rehabilitation and Replacement Projects	$6,200,000					$6,200,000							
Sludge Dewatering/Drying Projects (To be Implemented if Approved by City)														
1.18	Construct sludge dewatering facility[2]	$14,700,000		$14,700,000										
1.19	Gas Utilization - Cogeneration	$3,250,000		$3,250,000										
Capacity Expansion Projects														
2.1	Convert existing EQ Basin 2 to fourth aeration basin (AB)	$3,000,000								$3,000,000				
2.2	Build new EQ basin to replace the basin that that is converted to AB	$4,500,000								$4,500,000				
R&R 4	Anticipated Rehabilitation and Replacement Projects (2015 to 2030)[3]	$27,430,000							$18,670,000	$690,000	$8,070,000			
Improvements Required if Blending is Prohibited by the RWQCB														
3.1	Convert new EQ basins to rectangular clarifiers	$6,000,000								$6,000,000				
R&R 5	Anticipated Rehabilitation and Replacement Projects (2030 to 2040)[3]	$5,990,000										$5,580,000	$410,000	
	Total Unescalated costs	$124,970,000	--	$29,150,000	$14,500,000	$17,025,000	$18,325,000	--	$18,670,000	$14,190,000	$8,070,000	$5,580,000	$410,000	$0
	Total Escalated Costs (3% inflation)		--	$30,024,500	$15,383,050	$18,603,677	$20,624,949	--	$22,961,745	$20,231,547	$13,338,480	$10,691,857	$910,728	$0

Note:
(1) 2008 Dollars (not escalated)

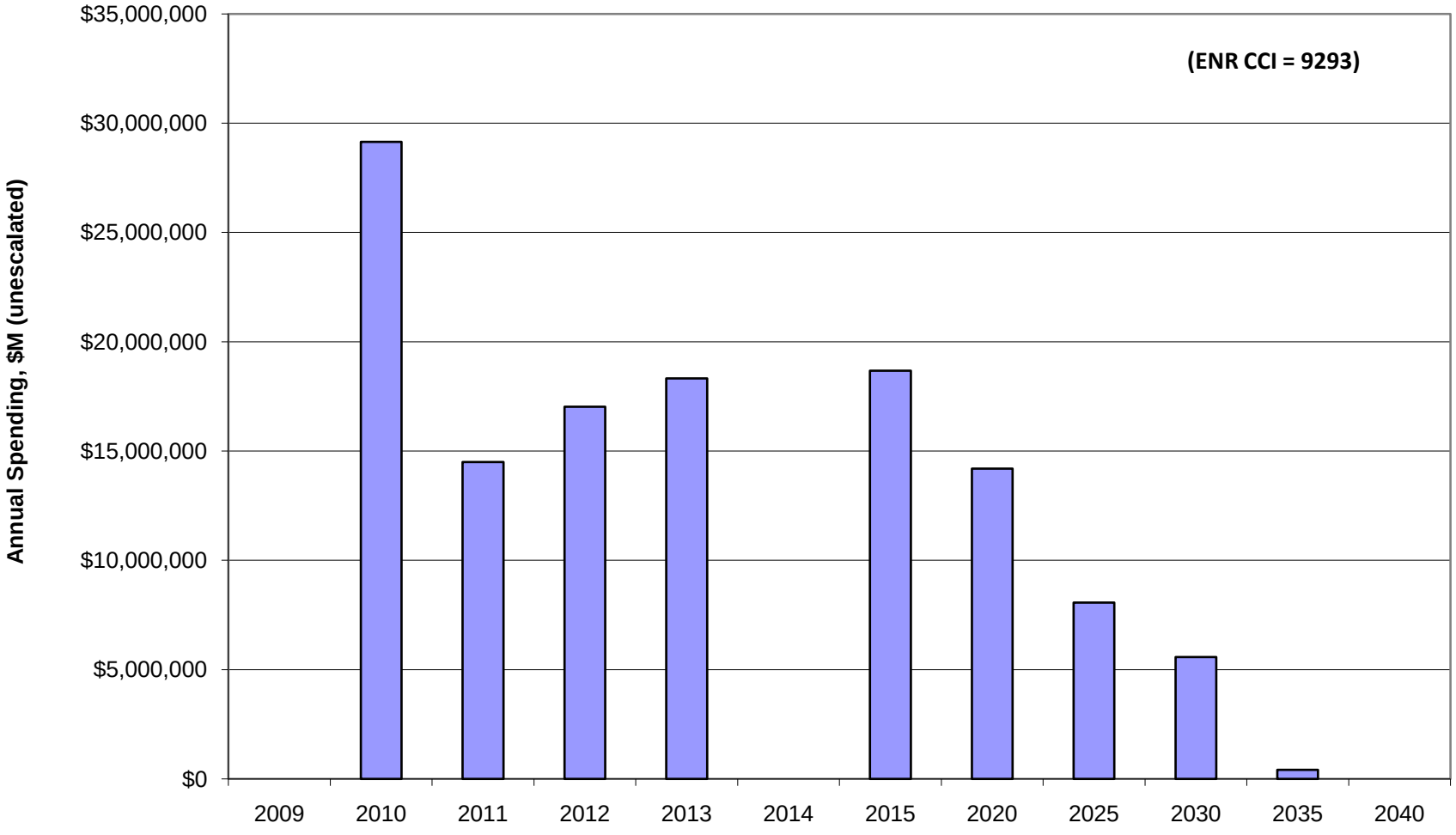

Figure 8.5
CAPITAL IMPROVMENTS PLAN CASH FLOW SUMMARY
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

- **Project 1.4 - Rehabilitate Existing Grit Basin:** This project will repair corroded concrete, rehabilitate the influent well, and construct a new 16 mgd vortex grit basin next to the existing basins. By improving grit removal, wear and tear will be reduced on piping and pumps. In addition, the anaerobic digesters will need to be cleaned less frequently.

- **R&R 1 - Priority 1 Rehabilitation and Replacement Projects:** This project includes the in-kind replacement of Plant components that have reached the end of their useful life. Many of the items on the list are electrical components that were installed in the 1950s and 1960s. The most important equipment is denoted by bold type. If funding is an issue, the Priority 1 equipment denoted by bold type in Appendix G should be replaced first.

8.4.1.3 Projects Recommended for Implementation after Completion of Higher Priority Projects (to be completed within five years)

The following projects be implemented after completion of the higher priority projects. The projects are listed in order of criticality (highest to lowest).

- **Project 1.12 - Improve drainage in existing EQ Basins:** The bottom of the existing EQ Basins should be grouted to improve drainage. Standing water in the basins creates breeding grounds for mosquitoes and allows for the deposition of solids on the basin floors.

- **Project 1.1 - Construct Wet Weather Storage Basin Upstream of Plant:** A wet weather storage basin, with a preliminary volume of 3 million gallons, should be constructed upstream of the influent pump station to reduce the peak flow of 55 mgd to 40 mgd.

- **Project 1.9 - Repair Channel Aeration System and Install Flow Control for the Secondary Clarifiers:** This project includes repairing the channel aeration system to maintain suspension of solids and adequate oxygen concentrations in the channel. In addition, flow control weirs will be installed in the effluent channel to improve distribution of flow to the secondary clarifiers.

- **Project 1.10A - Grout Corners of Clarifiers 1 and 2:** Currently, solids settle in the corners of Clarifiers 1 and 2 where they cannot be collected by the sludge collector mechanism. The corners of Clarifiers Nos. 1 and 2 should be grouted to prevent this problem.

- **Project 1.10B - New Sludge Collection System:** A new sludge collection system for all three clarifiers is required because the draft tube system does not work properly and often clogs with debris/rags. If an additional influent screen is installed,

this project may not be necessary because more debris would be removed upstream of the clarifiers.

- **Project 1.11 - Improve Hydraulics of Clarifier 3:** This project includes the addition of density current baffles and a new energy dissipating/flocculating feed well. These improvements are necessary because solids carryover issues have impacted Clarifier 3 in the past.

- **Project 1.13 - Construct Low Lift Pump Station to Increase Outfall Capacity:** A low lift pump station is recommended to increase the hydraulic capacity of the outfall during peak flows and high tides.

- **Project 1.5 - Add Enhanced Coagulation to the Primary Clarifiers:** It is recommended that ferric chloride be added to the primary clarifiers during wet weather events to better capture suspended solids.

- **Project 1.14 - Sludge Thickening Improvements:** This project consists of replacing Dissolved Air Flotation Thickener (DAFT) No. 1 with a gravity belt thickener (GBT). The existing DAFT, which was constructed in 1967, has reached its useful life and should be replaced.

- **Project 1.16 - Plant Water System:** A new automatic strainer system is required for the plant water pumps to prevent damage to pumps that use seal water and to increase pressure throughout the plant water system.

- **Project 1.17 - Construct Odor Control System:** An odor control system is recommended to control odors from the influent pump station, grit basin, and primary treatment processes.

- **Project 1.2 - Additional Influent Screen:** An additional influent screen is recommended to provide a standby for the existing bar screen. This will allow for maintenance of the existing screen and concrete structure, as well as improved screening efficiency. The second screen should have a finer opening to reduce the amount of paper, rags and plastics that reach the primary and secondary treatment systems.

- **R&R 2 - Priority 2 Rehabilitation and Replacement Projects:** This project includes the in-kind replacement of Plant components that have reached the end of their useful life. Priority 1 R&R projects should be completed before Priority 2 projects are implemented.

- **R&R 3 - Priority 3 Rehabilitation and Replacement Projects:** This project includes the in-kind replacement of Plant components that have reached the end of their useful life. Priority 3 items are the lowest priority R&R projects.

8.4.1.4 Sludge Dewatering/Gas Utilization Projects

The City and Veolia have been evaluating sludge dewatering and gas utilization projects in parallel with the Master Plan. The projects below should be implemented after further discussions with the City and Veolia, regarding the merits of each of these projects, take place.

- **Project 1.18 - Sludge Dewatering Facility:** The City has been evaluating options for disposing of the biosolids, including on-site dewatering and trucking to a landfill, or participation in a regional biosolids disposal program. Veolia has prepared preliminary design documents for a dewatering facility at the Richmond plant. For planning purposes, the estimated costs for this project have been included in the CIP. The total cost for this project is estimated at $14,700,000. If the City selects another dewatering alternative, that project cost should be substituted for this cost.

- **Project 1.19 - Digester Gas Utilization:** Digester gas can be used to fuel a cogeneration facility to produce electricity or to fuel sludge drying equipment to reduce the amount to sludge that must be disposed of in a landfill. The cogeneration project has a lower capital cost but higher operating costs than a sludge drying facility has higher capital costs and lower operating costs. When evaluated on a present value basis, the economics hinge on tipping fees. If tipping fees remain relatively low, cogeneration is favored. If tipping fees rise, sludge drying is preferred. Because cogeneration is more advantageous in the short term, cogeneration is recommended. However, because a drying facility provides flexibility if biosolids disposal locations and/or regulations change, provisions to allow for the installation of thermal drying in the dewatering facility in the future should be provided. If the dewatering facility is not located at the Richmond Plant, a sludge drying facility would no longer be an option.

8.4.2 Phases II and III

The Phase II capacity expansion (adding a fourth aeration basin by converting existing equalization basin 2 and constructing a new equalization basin) is not required until approximately 2035, based on flow and loading projections. However, if primary/secondary effluent blending were prohibited in the future, the Phase II projects would have to be completed earlier. This is because Phase III consists of converting the equalization basins from Phase II to secondary clarifiers. For planning purposes it is assumed that blending would be prohibited after two permit cycles plus a five-year compliance schedule (total of 15 years). Because the permit was last renewed in 2008, blending would end in 2023 and Phase III (including the basins for Phase II) would need to be operational by that time.

Rehabilitation and replacement (R&R) projects are included in the implementation schedule based on their priority. The R&R projects will be required by the WPCP regardless of impacts from future growth or future regulations.

APPENDIX A - NPDES PERMIT

California Regional Water Quality Control Board
San Francisco Bay Region

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http://www.waterboards.ca.gov/sanfranciscobay

Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

ORDER NO. R2-2008-0003
NPDES NO. CA0038539

The following Dischargers are authorized to discharge in accordance with the conditions set forth in this Order.

Table 1. Discharger Information

Dischargers	1. West County Agency (WCA), including its member agencies listed below: 2. West County Wastewater District (WCWD), 3. City of Richmond 4. Richmond Municipal Sewer District No.1
Name of Facilities	1. West County Agency Common Outfall 2. WCWD Treatment Plant and Its Collection System, and 3. RMSD Water Pollution Control Plant and Its Collection System
Facility 1 Address	West County Agency (mailing address) 2910 Hilltop Drive Richmond, CA 94806
Facility 2 Address	West County Wastewater District Treatment Plant 2377 Garden Tract Road Richmond, CA 94801
Facility 3 Address	RMSD Water Pollution Control Plant 601 Canal Boulevard Richmond, CA 94804
The U.S. Environmental Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

The discharge by the above listed Dischargers from the discharge point identified below is subject to waste discharge requirements as set forth in this Order:

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Secondary treated POTW effluent	37º 54' 47" N	122º 25' 06" W	Central San Francisco Bay

Table 3. Administrative Information

This Order was adopted by the Regional Water Board on:	**January 30, 2008**
This Order shall become effective on:	**April 1, 2008**
This Order shall expire on:	**March 31, 2013**
The Dischargers shall file a Report of Waste Discharge in accordance with title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than:	**180 days prior to the Order expiration date**

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 January 30, 2008.

_____

Bruce H. Wolfe**,** Executive Officer

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I. FACILITY INFORMATION

The following Dischargers are subject to waste discharge requirements as set forth in this Order:

Table 4. Facility Information

Dischargers	1. West County Agency (WCA), including its member agencies 2. West County Wastewater District (WCWD), and 3. City of Richmond 4. Richmond Municipal Sewer District No.1 (RMSD)		
Name of Facilities	1. West County Agency Common Outfall 2. WCWD Treatment Plant and Its Collection System, 3. RMSD Water Pollution Control Plant and Its Collection System		
Facility Addresses	1.2910 Hilltop Drive	2. 2377 Garden Tract Road	3. 601 Canal Boulevard
	Richmond, CA 94806	Richmond, CA 94801	Richmond, CA 94804
	Contra Costa County	Contra Costa County	Contra Costa County
Facility Contacts, Titles, and Phones	1&2. E.J. Shalaby, WCA Manager, 510-222-6700 3. Rich Davidson, City Engineer and contact for RMSD, 510-307-8105		
Mailing Addresses	1.2910 Hilltop Drive	2. 2910 Hilltop Drive	3. 1401 Marina Way S.
	Richmond, CA 94806	Richmond, CA 94806	Richmond, CA 94804
	Contra Costa County	Contra Costa County	Contra Costa County
Type of Facilities	Publicly Owned Treatment Plant (POTW)		
Facility Design Flows	2. 12.5 MGD dry weather capacity 21 MGD wet weather capacity 3. 16 MGD dry weather capacity 20 MGD wet weather capacity		

II. FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Regional Water Board), finds:

A. Background. West County Agency (WCA), a Joint Powers Agency whose members are (1) West County Wastewater District (WCWD), (2) the City of Richmond, and (3) Richmond Municipal Sewer District No.1 (RMSD), is currently discharging under Order No. 01-144 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0038539. WCA and its three member agencies are hereinafter referred to as Dischargers. The Dischargers submitted a Report of Waste Discharge, dated May 3, 2006, and applied for an NPDES permit reissuance to discharge treated wastewater to Central San Francisco Bay, a water of the United States, via a submerged diffuser.

B. Facility Description. This permit regulates two separate wastewater treatment plants that combine their treated effluent prior to discharge. The locations of the treatment plants and the combined outfall are shown in Attachment B. WCWD owns and operates a plant at 2377 Garden Tract Road in Richmond. This plant serves a population of about 90,000 covering parts of Richmond, the City of San Pablo, the communities of Tara Hills, Rollingwood, Bayview, El Sobrante, the Crestview portion of Pinole, and some unincorporated portions of Contra Costa County. It has a design flow rate of 12.5 million gallons per day (MGD) during dry weather, but it has a hydraulic capacity of 21 MGD during wet weather conditions. The average daily flow rate in 2006 was approximately 9.8 MGD.

The City of Richmond and RMSD own and operate the RMSD Water Pollution Control Plant (Richmond plant) at 601Canal Boulevard in Richmond. RMSD was formed to facilitate allocation of tax money from residents in the area of Richmond covered by this District, but it has no employees and it is operated by the City of Richmond. This plant serves a population of about 68,000 covering most of the incorporated area of Richmond. It has a design flow rate of 16 MGD during dry weather, but it has a hydraulic capacity of 20 MGD during wet weather conditions. The average daily flow rate in 2006 was about 8.5 MGD. Effluent from the WCWD plant and the Richmond plant are combined prior to discharge from the West County Agency Common Outfall into San Francisco Bay.

WCWD and RMSD independently own and operate their treatment plants and the sanitary sewer collection systems within their separate service areas. WCWD has about 249 miles of gravity sewer and 11 miles of force main with 17 pump stations. RMSD has about 187 miles of sewer line with 12 pump stations.

The wastewater treatment processes at the WCWD plant consist of bar screens, an aerated grit chamber, primary clarifiers, a roughing filter, aeration basins, 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 both the WCWD plant and the Richmond plant are shown in Attachment C. Treated wastewater from the WCWD plant is transported to the Richmond plant for dechlorination and discharge. The treated wastewater from the Richmond plant is combined with the effluent from the WCWD plant where it is dechlorinated and then discharged through WCA's combined 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 systems. Under these conditions, the excess primary-treated flows are diverted around the biological treatment units to wet weather storage. Once storage is at capacity, excess primary-treated flows are blended with the secondary-treated wastewater. The combined flow is disinfected and dechlorinated prior to discharge to the Bay. The stored wastewater is treated through the secondary treatment units after wet weather flows subside and there is capacity in those units.

C. 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 from this facility 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).

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

E. 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 21100-21177.

F. Technology-Based Effluent Limitations. Section 301(b) of the CWA and implementing USEPA permit regulations at section 122.44, title 40 of the Code of Federal Regulations[1], require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 CFR, Part 133. A detailed discussion of the technology-based effluent limitations development is included in the Fact Sheet (Attachment F).

G. Water Quality-based Effluent Limitations. 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. [This Order contains requirements, expressed as a technology equivalence requirement, more stringent than secondary treatment requirements that are necessary to meet applicable water quality standards. The rationale for these requirements, which consist of equivalent requirements or other provisions, is discussed in the Fact Sheet (Attachment F).]

Section 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) must be established using: (1) 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 section 122.44(d)(1)(vi).

H. Water Quality Control Plans. The Regional Water Board adopted a Water Quality Control Plan for the San Francisco Bay Basin (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 Resources Control Board (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. Because of the marine influence on receiving waters of San Francisco Bay, total dissolved solids levels in the Bay commonly (and often significantly) exceed 3000 mg/L and thereby meet an exemption to State Water Board Resolution No. 88-63. Therefore, the MUN designation is not applicable to Central San Francisco Bay. Beneficial uses applicable to Central San Francisco Bay are as follows:

[1] All further statutory references are to title 40 of the Code of Federal Regulations unless otherwise indicated.

Table 5. Basin Plan Beneficial Uses of Central San Francisco Bay

Discharge Point	Receiving Water Name	Beneficial Use(s)
E-001-DC	Central San Francisco Bay	Ocean Commercial and Sport Fishing (COMM) Estuarine Habitat (EST) Industrial Service Supply (IND) Fish Migration (MIGR), Navigation (NAV) Industrial Process Water Supply (PROC) Preservation of Rare and Endangered Species (RARE) Water Contact Recreation (REC1) Non-contact Water Recreation (REC2) Shellfish Harvesting (SHELL) Fish Spawning (SPWN) Wildlife Habitat (WILD)

Requirements of this Order implement the Basin Plan.

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 forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended 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* (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 NTR 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.

K. **Compliance Schedules and Interim Requirements.** Section 2.1 of the SIP provides that, based on a discharger's request and demonstration that it is infeasible for an existing discharger to achieve immediate compliance with an effluent limitation derived from a CTR criterion, compliance schedules may be allowed in an NPDES permit. Unless an exception has been granted under section 5.3 of the SIP, a compliance schedule may not exceed 5 years from the date that the permit is issued or reissued, nor may it extend beyond 10 years from the effective date of the SIP (or May 18, 2010) to establish and comply with CTR criterion-based effluent limitations. Where a compliance schedule for a final effluent limitation exceeds 1 year, the Order must include interim numeric limitations for that constituent or parameter. Where allowed by the Basin Plan, compliance schedules and interim effluent limitations or discharge specifications may also be granted to allow time to implement a new or revised water quality objective. This Order includes

compliance schedules and interim effluent limitations. A detailed discussion of the basis for the compliance schedules and interim effluent limitations is included in the Fact Sheet (Attachment F).

L. 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. [40 CFR. §131.21; 65 Fed. Reg. 24641 (April 27, 2000)]. 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.

M. Stringency of Requirements for Individual Pollutants. This Order contains both technology-based and water quality-based effluent limitations for individual pollutants. The technology-based effluent limitations consist of restrictions on BOD, TSS, Oil and Grease, pH, and chlorine residual. Restrictions on these pollutants are discussed in the attached Fact Sheet, Attachment F. This Order's technology-based pollutant restrictions implement the minimum, applicable federal technology-based requirements. These limitations are not more stringent than required by the CWA. Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant water quality-based effluent limitations were derived from the CTR, the CTR is the applicable standard pursuant to section 131.38. The scientific procedures for calculating the individual water quality-based effluent limitations for priority pollutants are based on the CTR-SIP, which was approved by USEPA on May 18, 2000. All beneficial uses and water quality objectives contained in the Basin Plan 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 CWA" pursuant to section 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.

N. Antidegradation Policy. 40 CFR 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 in State Water Board Resolution No. 68-16, which incorporates the requirements of federal antidegradation policy. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. As discussed in detail in the Fact Sheet (Attachment F), the permitted discharge is consistent with the antidegradation provision of 40 CFR §131.12 and State Water Board Resolution No. 68-16.

O. Anti-Backsliding Requirements. CWA sections 402(o) (2) and 303(d)(4) and NPDES regulations at 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. Some effluent limitations in the previous Order have been removed. As discussed in detail in the Fact Sheet (Attachment F), this removal of effluent limitations is consistent with the anti-backsliding requirements of the CWA and federal regulations.

P. 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 the applicable Endangered Species Act.

Q. Monitoring and Reporting. Section 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code Sections 13267 and 13383 authorizes the Regional Water Boards to require technical and monitoring reports. The Monitoring and Reporting Program establishes monitoring and reporting requirements to implement federal and State requirements. This Monitoring and Reporting Program is provided in Attachment E.

R. Standard and Special 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. The discharger must comply with all standard provisions and with those additional conditions that are applicable under section 122.42. The Regional Water Board has also included in this Order special provisions applicable to the Dischargers. A rationale for the special provisions contained in this Order is provided in the attached Fact Sheet, Attachment F.

S. Notification of Interested Parties. The Regional Water Board has notified the Dischargers and interested agencies and persons of its intent to adopt an NPDES permit and prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet (Attachment F).

T. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet (Attachment F) of this Order.

THEREFORE, IT IS HEREBY ORDERED, that Order No. 01-144 is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions contained in division 7 of the Water Code (commencing with Section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act (CWA) and regulations and guidelines adopted thereunder, the Dischargers shall comply with the requirements in this Order.

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 of treated wastewater at any point where it does not receive an initial dilution of at least 25:1 is prohibited. During the periods of Delta outflows less than 8,000 cubic feet per second, the wastewater shall receive a minimum initial dilution of 45:1.

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 40 CFR 122.41(m)(4) and in A.13 of the

Standard Provisions and Reporting Requirements for NPDES Surface Water Discharge Permits, August 1993 (Attachment G).

Blended wastewater is biologically treated wastewater blended with wastewater that has been 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) (1) when the peak wet weather effluent flow volumes at the Richmond plant exceed the wet weather capacity of 20.0 MGD, (2) when the discharge complies with the effluent and receiving water limitations contained in this Order, and (3) provided the City of Richmond and RMSD satisfies Provision VI.C.5.c. Furthermore, the City of Richmond and RMSD shall operate their facilities as designed and in accordance with the Operation & Maintenance Manual developed for their facilities. This means that they shall optimize storage and use of equalization units, and shall fully utilize the biological treatment units and advanced treatment units, if applicable. The City of Richmond and RMSD shall report incidents of the anticipated blended effluent discharges in routine monitoring reports, and shall conduct monitoring of this discharge as specified in the attached MRP (Attachment E). Bypasses are prohibited at the WCWD plant.

D. The average dry weather flow, as measured at A-001 for the WCWD treatment plant, shall not exceed 12.5 MGD. The average dry weather flow, as measured at A-002 for the Richmond treatment plant, shall not exceed 16 MGD. Actual 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

1. Effluent Limitations for Conventional Pollutants.

The discharge to Central San Francisco Bay shall maintain compliance with the following effluent limitations, with compliance measured at each treatment facility (monitoring locations E-001-D1 and E-001-D2) and at the combined outfall (monitoring location E-001-DC) as indicated in Table 6 and described in the attached Monitoring and Reporting Program (Attachment E).

Table 6. Conventional Effluent Limitations

Parameter	Units	Location	Effluent Limitations				
			Average Monthly	Average Weekly	Max. Daily	Instant. Min.	Instant. Max.
Biochemical Oxygen Demand (BOD), 5-day @ 20°C (BOD_5)	mg/L	E-001-D1 & E-001-D2	30	45	---	---	---
Percent Removal of BOD_5	%	E-001-D1 & E-001-D2	85	---	---	---	---
Total Suspended Solids (TSS)	mg/L	E-001-D1 & E-001-D2	30	45	---	---	---
TSS percent removal	%	E-001-D1 & E-001-D2	85	---	---	---	---
pH [(1)]	Standard units	E-001-D1 & E-001-D2	---	---	---	6.0	9.0

Parameter	Units	Location	Effluent Limitations				
			Average Monthly	Average Weekly	Max. Daily	Instant. Min.	Instant. Max.
Total Chlorine Residual [2]	mg/L	E-001-DC	---	---	---	---	0.0
Oil and Grease	mg/L	E-001-D1 & E-001-D2	10	---	20	---	---

Footnotes for Table 6:

(1) 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) Requirement defined as below the limit of detection in standard test methods defined in the latest edition of *Standard Methods for the Examination of Water and Wastewater.* The Dischargers may elect to use a continuous on-line monitoring system(s) for measuring flows, 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.

2. **Total Coliform Bacteria**: The five-sample median total coliform density shall not exceed 240 MPN/100 mL and the daily maximum value shall not exceed 10,000 MPN/100mL measured at each treatment facility (monitoring locations E-001-D1 and E-001-D2).

3. **Effluent Limitations for Toxics Substances**: The discharge of treated wastewater shall maintain compliance with the effluent limitations listed in Table 7 for toxic pollutants, at E-001-DC, as described in the attached MRP (**Attachment E)**:

Table 7. Effluent Limitations for Toxic Substances [1,4]

Constituent	Water Quality-Based Effluent Limits (WQBELs)		Interim Limits	
	Maximum Daily (MDEL) (µg/L) [6]	Average Monthly (AMEL) (µg/L) [6]	Maximum Daily (µg/L)	Average Monthly (µg/L)
Copper [2]	100	71	---	----
Mercury	0.038	0.021	---	---
Nickel	59	34	---	---
Selenium	8.9	3.8	---	----
Cyanide [3]	15	7.8	---	----
Bis(2-ethylhexyl)phthalate	150	55	---	----
Dioxin-TEQ[5]	2.8E-08	1.4E-08	---	---
4,4-DDD	0.0017	0.00084	0.05	---
Heptachlor	0.0041	0.0020	0.01	---
Total Ammonia (mg/L as N)	59	32	---	---

Footnotes for Table 7:

(1) (a) All analyses shall be performed using current U.S. EPA approved methods, or equivalent methods approved in writing by the Executive Officer.

(b) Limitations apply to the average concentration of all samples collected during the averaging period (daily = 24-hour period; monthly = calendar month).

(c) All metal limitations are total recoverable.

(2) Alternate Effluent Limits for Copper:

a. If a copper SSO for the receiving water becomes legally effective, resulting in adjusted saltwater CCC of 2.5 µg/L and CMC of 3.9 µg/L as documented in the *North of Dumbarton Bridge Copper and Nickel Site-Specific Objective (SSO) Derivation (Clean Estuary Partnership December 2004)*, upon its effective date, the following limitations shall supersede those copper limitations listed in Table 7 (the rationale for these effluent limitations can be found in the Fact Sheet [Attachment F]).

MDEL of 76 µg/L, and AMEL of 53 µg/L.

(3) Alternate Effluent Limits for Cyanide:

a. If a cyanide SSO for the receiving water becomes legally effective, resulting in adjusted saltwater CCC of 2.9 µg/L (based on the assumption in Staff Report on Proposed Site-Specific Water Quality Objectives of Cyanide for San Francisco Bay, dated December 4, 2006), upon its effective date, the following limitations shall supersede those cyanide limitations listed in Table 7 (the rationale for these effluent limitations can be found in the Fact Sheet [Attachment F]).

MDEL of 41 µg/L, and AMEL of 21 µg/L

(4) Minimum Levels. The Dischargers shall achieve the following minimum levels for compliance determination purposes as defined in Section VII of this Order.

Table 8. Minimum Levels

Constituent	Minimum Level	Units
Copper	0.5 or 2	µg/L
Mercury	0.0005	µg/L
Nickel	1 or 5	µg/L
Selenium	2 or 5	µg/L
Cyanide	5	µg/L
Bis(2-ethylhexyl)phthalate	5	µg/L
4,4-DDD	0.05	µg/L
Heptachlor	0.01	µg/L
2,3,7,8-TCDD	5	pg/L
1,2,3,7,8-PeCDD	25	pg/L
1,2,3,4,7,8-HxCDD	25	pg/L
1,2,3,6,7,8-HxCDD	25	pg/L
1,2,3,7,8,9-HxCDD	25	pg/L
1,2,3,4,6,7,8-HpCDD	25	pg/L
OCDD	50	pg/L
2,3,7,8-TCDF	5	pg/L
1,2,3,7,8-PeCDF	25	pg/L

2,3,4,7,8-PeCDF	25	pg/L
1,2,3,4,7,8-HxCDF	25	pg/L
1,2,3,6,7,8-HxCDF	25	pg/L
1,2,3,7,8,9-HxCDF	25	pg/L
2,3,4,6,7,8-HxCDF	25	pg/L
1,2,3,4,6,7,8-HpCDF	25	pg/L
1,2,3,4,7,8,9-HpCDF	25	pg/L
OCDF	50	pg/L

(5) The WQBEL for dioxin-TEQ shall become effective on November 30, 2011

(6) Units for ammonia are mg/L.

4. Acute Toxicity

a. Representative samples of the discharge at E-001-DC shall meet the following limitations for acute toxicity. Bioassays shall be conducted in compliance with Section V.A of the Monitoring and Reporting Program (MRP, Attachment E).

The survival of organisms in undiluted effluent shall be an eleven (11) sample median value of not less than 90 percent survival, and an eleven (11) sample 90 percentile value of not less than 70 percent survival.

b. These acute toxicity limitations are further defined as follows:

11 sample median: Any bioassay test showing survival of 90 percent or greater is not a violation of this limit. 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.

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.

c. Bioassays shall be performed using the most up-to-date USEPA protocol and the most sensitive species as specified in writing by the Executive Officer based on the most recent screening test results. 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), with exceptions granted to the Dischargers by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP) upon the Dischargers' request with justification.

d. 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 discharge is in compliance with the ammonia limits, then such toxicity does not constitute a violation of this effluent limitation.

5. Chronic Toxicity

   a. Compliance with the Basin Plan narrative chronic toxicity objective shall be demonstrated according to the following tiered requirements based on results from representative samples of the discharge, as measured at E-001-DC, meeting test acceptability criteria and Section V.B of the MRP (Attachment E). Failure to conduct the required toxicity tests or a TRE within a designated period shall result in the establishment of effluent limitations for chronic toxicity.

      1) Conduct routine monitoring.

      2) Accelerate monitoring after exceeding a three sample median value of 10 chronic toxicity units (TUc) or a single sample maximum of 20 TUc or greater. Accelerated monitoring shall consist of monthly monitoring.

      3) Return to routine monitoring if accelerated monitoring does not exceed either "trigger" in (2), above.

      4) If accelerated monitoring confirms consistent toxicity above either "trigger" in (2), above, initiate toxicity identification evaluation/toxicity reduction evaluation (TIE/TRE) in accordance with a workplan submitted in accordance with Section V.B of the MRP (Attachment E), and that incorporates any and all comments from the Executive Officer.

      5) Return to routine monitoring after appropriate elements of TRE workplan are implemented and either the toxicity drops below "trigger" levels in (2), above, or, based on the results of the TRE, the Executive Officer authorizes a return to routine monitoring.

   b. Test Species and Methods

      The Dischargers shall conduct routine monitoring with the test species and protocols specified in Section V.B of the MRP (Attachment E). The Dischargers shall also perform Chronic Toxicity Screening Phase monitoring as described in the Appendix E-1 of the MRP (Attachment E). Chronic Toxicity Monitoring Screening Phase Requirements, Critical Life Stage Toxicity Tests and definitions of terms used in the chronic toxicity monitoring are identified in Appendices E-1 and E-2 of the MRP (Attachment E).

6. Mass Emission Limit for Mercury and Selenium

   Until TMDL and wasteload allocation (WLA) efforts for mercury and selenium provide enough information to establish a different WQBEL, the Dischargers shall demonstrate that the current mercury and selenium mass loadings to the receiving water do not increase by complying with the following:

   a. Mass limit. The 12-month moving average annual load shall not exceed 0.72 kilograms per month (kg/mo) for mercury and 15.2 kg/mo for selenium.

b. Compliance with this limit shall be evaluated using 12-month moving average mass loading over the previous 12 months of monitoring, computed as described below:

Monthly Mass Loading (kg/mo) = monthly plant discharge flow (in MGD) from the Outfall (001) × monthly effluent concentration measurements (in µg/L) corresponding to the above flow, for samples taken at 001 × 0.1151 (conversion factor to convert million gallons/day × µg/L to kg/mo).

12-month Moving Average Mass Loading = Running average of last 12 monthly mass loadings in kg/mo.

c. The Clean Water Act's anti-backsliding rule, Section 402(o), indicates that effluent limits may be modified to include a less stringent requirement following adoption of a TMDL and WLA, if the requirements for an exception to the rule are met. The mercury and selenium TMDLs and their WQBELs and WLAs will supersede the mercury and selenium WQBELs listed in Table 7 and the interim mass limitations listed in Effluent Limitation 6.a upon their implementation through either a permit amendment, a new permit, or adoption of a watershed permit for mercury and selenium.

V. RECEIVING WATER LIMITATIONS

A. Surface Water Limitations

Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this Order. The discharge shall not cause the following in Central San Francisco Bay.

1. The discharge shall not cause the following conditions to exist in waters of the State:

   a. Floating, suspended, or deposited macroscopic particulate matter or foams;

   b. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

   c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

   d. Visible, floating, suspended, or deposited oil and other products of petroleum origin; and

   e. Toxic or other deleterious substances to be present in concentrations or quantities which will cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or which render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

2. The discharge of waste shall not cause the following limits to be exceeded in waters of the State within one foot of the water surface:

   a. Dissolved Oxygen 5.0 mg/L, minimum

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, then the discharge shall not cause further reduction in ambient dissolved oxygen concentrations.

b. Dissolved Sulfide	Natural background levels
c. pH	Within 6.5 and 8.5
d. 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.

B. Groundwater Limitations

N/A

VI. PROVISIONS

A. Standard Provisions

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

2. **Regional Water Board Standard Provisions.** The Dischargers shall comply with all applicable items of the *Standard Provisions and Reporting Requirements for NPDES Surface Water Discharge Permits, August 1993* (Attachment G), and any amendments thereto. Where provisions or reporting requirements specified in this Order and Attachment G are different for equivalent or related provisions or reporting requirements given in the Standard Provisions in Attachment D, the specifications of this Order and/or Attachment G shall apply in areas where those provisions are more stringent. Duplicative requirements in the federal Standard Provisions in VI.A.1.2, above (Attachment D) and the regional Standard Provisions (Attachment G) are not separate requirements. A violation of a duplicative requirement does not constitute two separate violations.

B. Monitoring and Reporting Program Requirements

The Dischargers shall comply with the Monitoring and Reporting Program (MRP), and future revisions thereto, in Attachment E of this Order. The Dischargers shall also comply with the requirements contained in *Self-Monitoring Program, Part A, August 1993* (Attachment G**)**.

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 discharge(s) governed by this Order will or have a reasonable potential to cause or contribute to, or will cease to, have adverse impacts on water quality and/or beneficial uses of the receiving waters.

b. If new or revised WQOs, or 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 WQOs and waste load allocations in TMDLs.

c. If translator or other water quality studies provide a basis for determining that a permit condition(s) should be modified.

d. If administrative or judicial decision on a separate NPDES permit or WDR that addresses requirements similar to this discharge; and

e. As authorized by law.

The Dischargers may request permit modification based on b, c, d, and e above. The Dischargers shall include in any such request an antidegradation and antibacksliding analysis.

2. Special Studies, Technical Reports and Additional Monitoring Requirements

a. Effluent Characterization for Selected Constituents

The Dischargers shall continue to monitor and evaluate the discharge from E-001-DC for the constituents listed in Enclosure A of the Regional Water Board's August 6, 2001 Letter, according to the sampling frequency specified in the attached MRP (Attachment E). Compliance with this requirement shall be achieved in accordance with the specifications stated in the Regional Water Board's August 6, 2001 Letter under Effluent Monitoring for Major Dischargers.

The Dischargers shall evaluate on an annual basis if concentrations of any constituent increase over past performance. The Dischargers shall investigate the cause of the increase. The investigation may include, but need not be limited to, an increase in the effluent monitoring frequency, monitoring of internal process streams, and monitoring of influent sources. This may be satisfied through identification of these constituents as "Pollutants of Concern" in the Dischargers' Pollutant Minimization Programs described in Provision C.3.b, below. A summary of the annual evaluation of data and source investigation activities shall also be reported in the annual self-monitoring report.

A final report that presents all the data shall be submitted to the Regional Water Board no later than 180 days prior to the Order expiration date. This final report shall be submitted with the application for permit reissuance.

b. Ambient Background Receiving Water Study

The Dischargers shall collect or participate in collecting background ambient receiving water monitoring for priority pollutants that are required to perform an RPA and to

calculate effluent limitations. The data on the conventional and certain non-conventional water quality parameters (pH, salinity, and hardness) shall also be sufficient to characterize these parameters in the receiving water at a point after the discharge has mixed with the receiving waters. This provision may be met through monitoring through the Collaborative Bay Area Clean Waters Agencies (BACWA) Study, or a similar ambient monitoring program for San Francisco Bay. This permit may be reopened, as appropriate, to incorporate effluent limits or other requirements based on Regional Water Board review of these data.

Final Report: The Dischargers shall submit (or cause to be submitted on its behalf) a final report that presents all the data to the Regional Water Board 180 days prior to Order expiration. This final report shall be submitted with the application for permit reissuance. This requirement can be met through the submittal of receiving water data as it becomes available through the BACWA study or a similar program.

c. Optional Mass Offset

If the Dischargers can demonstrate that further net reductions of the total mass loadings of 303(d)-listed pollutants to the receiving water cannot be achieved through economically feasible measures such as aggressive source control, wastewater reuse, and treatment plant optimization, but only through a mass offset program, the Dischargers may submit to the Regional Water Board for approval a mass offset plan to reduce 303(d)-listed pollutants to the same watershed or drainage basin. The Regional Water Board may modify this Order to allow an approved mass offset program.

3. Best Management Practices and Pollutant Minimization Program

a. The Dischargers shall continue to improve, in a manner acceptable to the Executive Officer, its existing Pollutant Minimization Program to promote minimization of pollutant loadings to the treatment plant and therefore to the receiving waters.

b. The Dischargers shall submit an annual report, acceptable to the Executive Officer, no later than February 28 of each calendar year. Each annual report shall include at least the following information:

i. *A brief description of its treatment plant, treatment plant processes and service area*.

ii. *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/or which pollutants may be potential future problems. This discussion shall include the reasons why the pollutants were chosen.

iii. *Identification of sources for the pollutants of concern*. This discussion shall include how the Dischargers intend to estimate and identify sources of the pollutants. The Dischargers should 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.

iv. *Identification of tasks to reduce the sources of the pollutants of concern.* This discussion shall identify and prioritize tasks to address the Dischargers' pollutants of concern. The Dischargers may implement tasks themselves 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.

v. *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 to the program.

vi. *Continuation of Public Outreach Program.* The Dischargers shall prepare public outreach programs to communicate pollution prevention 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 site. Information shall be specific to the target audiences. The Dischargers shall coordinate with other agencies as appropriate.

vii. *Discussion of criteria used to measure Program's and tasks' effectiveness*. The Dischargers shall establish criteria to evaluate the effectiveness of their Pollution Minimization Program. This shall also include a discussion of the specific criteria used to measure the effectiveness of each of the tasks in item b.iii., b.iv., b.v., and b.vi.

viii. *Documentation of efforts and progress.* This discussion shall detail all of the Dischargers' activities in the Pollution Minimization Program during the reporting year.

ix. *Evaluation of Program's and tasks' effectiveness.* This Dischargers shall utilize the criteria established in v.ii. to evaluate the Program's and tasks' effectiveness.

x. *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 its 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 (PMP) as further described below when there is evidence (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) that a priority pollutant is present in the effluent above an effluent limitation and either:

i. A sample result is reported as DNQ and the effluent limitation is less than the RL; or

ii. A sample result is reported as ND and the effluent limitation is less than the MDL, using definitions described in the SIP.

d. If triggered by the reasons in c. above, the Dischargers' PMP shall include, but not be limited to, the following actions and submittals acceptable to the Regional Water Board:

i. An annual review and semi-annual monitoring of potential sources of the reportable priority pollutant(s), which may include fish tissue monitoring and other bio-uptake sampling, or alternative measures approved by the Executive Officer when it is demonstrated that source monitoring is unlikely to produce useful analytical data;

ii. Quarterly monitoring for the reportable priority pollutant(s) in the influent to the wastewater treatment system, or alternative measures approved by the Executive Officer, 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 pollutant(s) in the effluent at or below the effluent limitation;

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

v. The annual report required by 3.b. above, shall specifically address the following items:

1. All PMP monitoring results for the previous year;

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

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

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

4. Construction, Operation and Maintenance Specifications

a. Wastewater Facilities, Review and Evaluation, and Status Reports

(1) The Dischargers shall operate and maintain their wastewater collection, treatment, and disposal facilities in a manner to ensure that all facilities are adequately staffed, supervised, financed, operated, maintained, repaired, and upgraded as necessary, in order 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.

(2) The Dischargers shall regularly review and evaluate their wastewater facilities and operation practices in accordance with section a.1 above. Reviews and evaluations shall be conducted as an ongoing component of the Dischargers' administration of their wastewater facilities.

(3) The Dischargers shall provide the Executive Officer, upon his or her request, a report describing the current status of their wastewater facilities and operation practices, including any recommended or planned actions and an estimated time schedule for these actions. The Dischargers shall also include, in each annual self-monitoring report, a description or summary of review and evaluation procedures, and applicable wastewater facility programs or capital improvement projects.

b. Operations and Maintenance (O&M) Manual, Review and Status Reports

(1) The Dischargers shall maintain O&M Manuals as described in the findings of this Order for the Dischargers' wastewater facilities. The O&M Manual shall be maintained in usable condition, and available for reference and use by all applicable personnel.

(2) The Dischargers shall regularly review, revise, or update, as necessary, the O&M Manual(s) so that the document(s) may remain useful and relevant to current equipment and operation practices. Reviews shall be conducted annually, and revisions or updates shall be completed as necessary. For any significant changes in treatment facility equipment or operation practices, applicable revisions shall be completed within 90 days of completion of such changes.

(3) The Dischargers shall provide the Executive Officer, upon his or her request, a report describing the current status of their O&M Manuals, including any recommended or planned actions and an estimated time schedule for these actions. The Dischargers shall also include, in each annual self-monitoring report, a description or summary of review and evaluation procedures, and applicable changes to, its operations and maintenance manual.

c. Contingency Plan, Review and Status Reports

(1) The Dischargers shall maintain Contingency Plans as required by Regional Water Board Resolution No. 74-10 (Attachment G), and as prudent in accordance with current municipal facility emergency planning. The discharge of pollutants in

violation of this Order where the Dischargers have failed to develop and/or adequately implement a contingency plan will be the basis for considering such discharge a willful and negligent violation of this Order pursuant to Section 13387 of the California Water Code.

(2) The Dischargers shall regularly review, and update as necessary, their Contingency Plans so that the plan may remain useful and relevant to current equipment and operation practices. Reviews shall be conducted annually, and updates shall be completed as necessary.

(3) The Dischargers shall provide the Executive Officer, upon his or her request, a report describing the current status of their Contingency Plans review and update. The Dischargers shall also include, in each annual self-monitoring report, a description or summary of review and evaluation procedures, and applicable changes to, their Contingency Plans.

5. Special Provisions for POTW

a. Pretreatment Program

1) Pretreatment Program: The Dischargers shall implement and enforce their approved pretreatment programs in accordance with Federal Pretreatment Regulations (40 CFR § 403), pretreatment standards promulgated under Section 307(b), 307(c), and 307(d) of the Clean Water Act, pretreatment requirements specified under 40 CFR § 122.44(j), and the requirements in **Attachment H**, "Pretreatment Requirements." The Dischargers' responsibilities include, but are not limited to:

   i. Enforcement of National Pretreatment Standards of 40 CFR §§ 403.5 and 403.6;

   ii. 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;

   iii. Submission of reports to USEPA, the State Water Board, and the Regional Water Board, as described in **Attachment H** "Pretreatment Requirements".

   iv. Evaluate 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 the changes with a plan and schedule for implementation.

2) The Dischargers shall implement their approved pretreatment programs and the programs shall be an enforceable condition of this permit. 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 Clean Water Act.

b. Sludge Management Practices Requirements

1) All sludge generated by the Dischargers must be disposed of in a municipal solid waste landfill, reused by land application, or disposed of in a sludge -only landfill in accordance with 40 CFR §503. If the Dischargers desire to dispose of sludge 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 sludge management practices.

2) Sludge 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 sludge use or disposal which has a likelihood of adversely affecting human health or the environment.

4) Sludge at the Dischargers' facilities shall not cause waste material to be in a position where it is or can be carried from the facility and deposited in waters of the State.

5) The sludge 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 sludge that is 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 by February 15 of each year, for the period covering the previous calendar year.

7) Sludge that is disposed of in a municipal solid waste landfill must meet the requirements of 40 CFR §258. In the annual self-monitoring report, the Dischargers shall include the amount of sludge disposed of and the landfill(s) to which it was sent.

8) Permanent on-site sludge storage or disposal activities are not authorized by this permit. 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 by the Dischargers.

9) Sludge Monitoring and Reporting Provisions of this Regional Water Board's Standard Provisions (Attachment G), apply to sludge handling, disposal and reporting practices.

10) The Regional Water Board may amend this permit prior to expiration if changes occur in applicable state and federal sludge regulations.

c. Utility Analysis and Implementation Schedule for Wet Weather Bypass of Secondary Treatment

180 days prior to the Order expiration date, the City of Richmond and RMSD shall complete and submit a utility analysis if they seek to continue to bypass peak wet weather flows around their secondary treatment units. The utility analysis must satisfy 40 CFR 122.4 (m)(4)(i)(A)-(C), and any applicable policy or guidance such as the process set forth in Part 1 of USEPA's Peak Wet Weather Policy's No Feasible Alternatives Analysis Process (available at *http://cfpub.epa.gov/npdes/wetweather.cfm*) once it is finalized. Specifically, the City of Richmond and RMSD shall more fully evaluate the extent to which they maximize their ability to reduce inflow/infiltration throughout their entire collection system.

d. Sanitary Sewer Overflows and Sewer System Management Plan

The Dischargers' collection systems are part of the facilities that are subject to this Order. As such, the Dischargers must properly operate and maintain their collection systems (Attachment D, Standard Provisions - Permit Compliance, subsection I.D). The Dischargers must report any noncompliance (Attachment D, Standard Provision - Reporting, subsections V.E.1 and V.E.2), and mitigate any discharge from the Discharger's collection systems in violation of this Order (Attachment D, Standard Provisions - Permit Compliance, subsection I.C). The General Waste Discharge Requirements for Collection System Agencies (Order No. 2006-0003 DWQ) has requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows. While the Dischargers must comply with both the General Waste Discharge Requirements for Collection System Agencies (General Collection System WDR) and this Order, the General Collection System WDR more clearly and specifically stipulates requirements for operation and maintenance and for reporting and mitigating sanitary sewer overflows. Implementation of the General Collection System WDR requirements for proper operation and maintenance and mitigation of spills will satisfy the corresponding federal NPDES requirements specified in this Order. Following reporting requirements in the General Collection System WDR will satisfy NPDES reporting requirements for sewage spills. Furthermore, the Dischargers shall comply with the schedule for development of sewer system management plans (SSMPs) as indicated in the letter issued by the Regional Water Board on July 7, 2005, pursuant to Water Code Section 13267.

6. Corrective Measures to Minimize Blending

The City of Richmond and RMSD shall comply with the following tasks and deadlines to minimize blending events.

Task	Compliance Date
1. *Wet Weather Improvements.* Submit a technical report that evaluates alternatives for potential wet weather conveyance and treatment plant improvements. The alternatives proposed shall, at a minimum, include the measures described in the City of Richmond's No Feasible Alternatives Analysis (NFAA) Report dated September 27, 2007. The City of Richmond shall commit no less than $20 million over the term of this Permit to reducing or eliminating blending events, consistent with what was committed in the NFAA Report. Comparisons of various alternatives should be based on costs, effectiveness, and implementability. The report should propose preferred alternative(s) based on the results of the analysis.	April 1, 2009
2. *Workplan.* Prepare a workplan to implement the measures proposed in the Wet Weather Improvements report described in Task 1.	July 1, 2009
3. *Implementation.* Implement the measures identified in the workplan submitted in Task 2.	In accordance with the Workplan described in Task 2 above
4. *Annual Status Report.* Provide annual updates on its progress in completing measures specified in the workplan.	Annually with the Annual Self-Monitoring Report
5. Completion Report. Submit a technical report documenting the completion of all measures identified in the workplan submitted in Task 2.	April 1, 2015

7. 4,4-DDD, Heptachlor and Dioxin-TEQ Compliance Schedules

The Dischargers shall comply with the following tasks and deadlines:

Task	Deadline
a. Investigate sample collection, sample handling, and analytical laboratory quality assurance and quality control practices to ensure that analytical results for 4,4-DDD, heptachlor, and dioxin-TEQ are accurately determined and reported. Submit a report by the deadline describing the results of the investigation and any changes in quality assurance and quality control practices implemented.	June 1, 2008
b. If discharge data from the previous two years continue to show discharge is out of compliance (as defined in Section 2.4.5 of the State	November 1, 2008

Implementation Policy) with the permit effluent limits, submit a plan to identify all 4,4-DDD, heptachlor, and dioxin-TEQ sources to the discharge, and complete tasks c, d, and e. If either the WCWD plant or the Richmond plant can demonstrate that their individual waste streams do not violate or threaten to violate final effluent limits specified in effluent limitations and discharge specifications of the Permit, then that facility shall just monitor and submit annual reports.	
c. Implement the plan developed in action "b" within 30 days of the deadline for action "b," and submit by the deadline for this action a report that contains an inventory of the pollutant sources.	March 1, 2009
d. Submit a report documenting development and initial implementation of a program to reduce and prevent the pollutants of concern in the discharge. The program shall consist, at a minimum, of the following elements: i. Maintain a list of sources of pollutants of concern. ii. Investigate each source to assess the need to include it in the program. iii. Identify and implement targeted actions to reduce or eliminate iv. Develop and distribute, as appropriate, educational materials regarding the need to prevent sources to the sewer system.	May 1, 2009
e. Continue to implement the program described in action "d" and submit annual status reports that evaluate its effectiveness and summarize planned changes. Report whether the program has successfully brought the discharge into compliance with the effluent limits in the Permit. If not, identify and implement additional measures to further reduce discharges.	Annually each February 28 in Best Management Practices and Pollutant Minimization Report required by Permit Provision VI.C.3
f. Comply with the following final limits: *4,4-DDD*: 0.0017 µg/L MDEL and 0.00084 µg/L AMEL *heptachlor*: 0.0041 µg/L MDEL and 0.0020 µg/L AMEL	May 18, 2010
g. Implement the plan required in action "e" within 45 days of the deadline for action "e," and submit annual status reports.	Annually each February 1 in Annual Self-Monitoring Report required by Permit Attachment E, Monitoring and Reporting Program
i. Submit documentation confirming complete plan implementation and comply with effluent limits for dioxin-TEQ in the Permit.	November 30, 2011

8. Action Plan for Cyanide

If and when the cyanide alternate limits in Section IV become effective, the Dischargers shall implement an action plan for cyanide in accordance with the measures identified in Appendix I of *Staff Report on Proposed Site-Specific Water Quality Objectives for Cyanide for San Francisco Bay, December 4, 2006*. This condition may be partially satisfied by participation in a collaborative discharger-funded effort, sponsored by BACWA or similar organization.

9. Action Plan for Copper

If and when the copper alternate limits in Section IV become effective, the Dischargers shall initiate implementation of an action plan for copper in accordance with the Basin Plan Copper SSO Amendment. This condition may be partially satisfied by participation in a collaborative discharger-funded effort, sponsored by BACWA or similar organization.

VII. 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 priority pollutants 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, 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).

B. Multiple Sample Data.

When determining compliance with an AMEL, AWEL, or MDEL 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 Dischargers 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 (m), 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 pollutants are 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 pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (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 the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

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

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

Detected, but Not Quantified (DNQ) are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

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) 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 U.S. EPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

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

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 included, but are not limited to, the Sacramento-San Joaquin Delta, as defined in 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 are 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) means 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 is 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 = $(Xn/2 + X(n/2)+1)/2$ (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.

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) are those sample results less than the laboratory's MDL.

Ocean Waters are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program (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 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 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 is 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 is any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

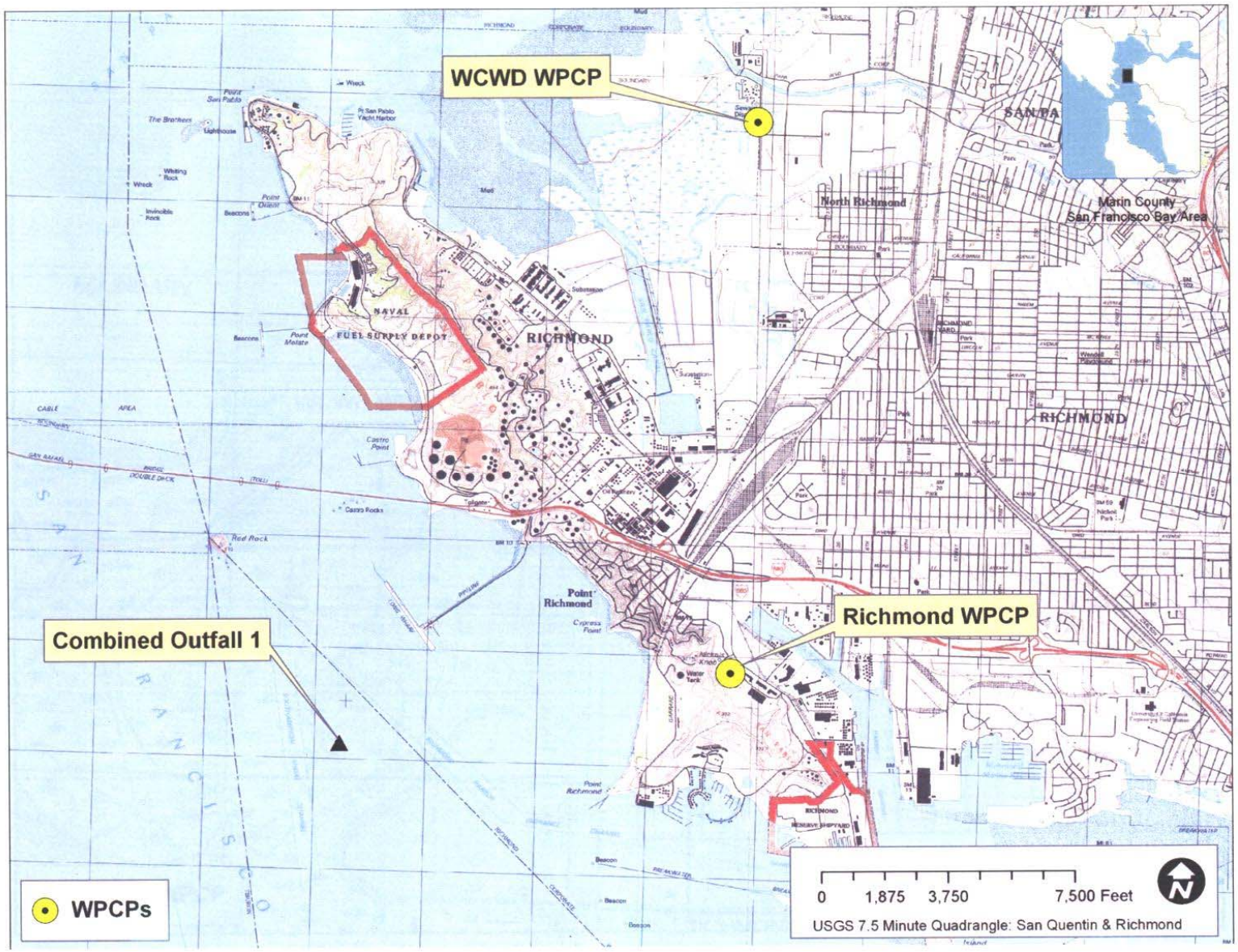
Standard Deviation (σ) is a measure of variability that is calculated as follows:

$$\sigma = \sqrt{\frac{\Sigma(\bar{x} - \mu)^2}{n-1}}$$

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) 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 - LOCATION MAP



ATTACHMENT C (page 1 of 2) – WEST COUNTY AGENCY WWTP FLOW SCHEMATIC

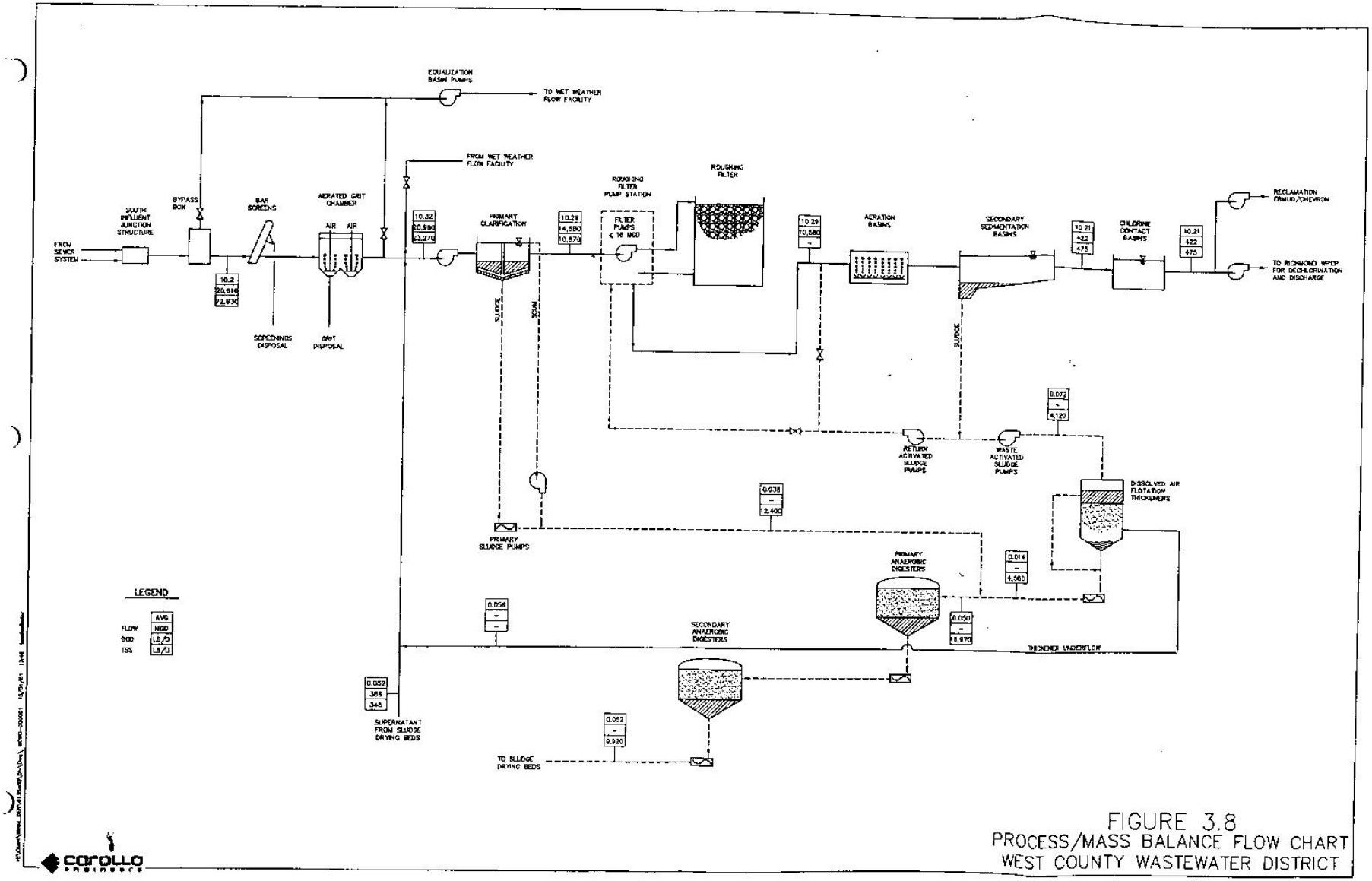
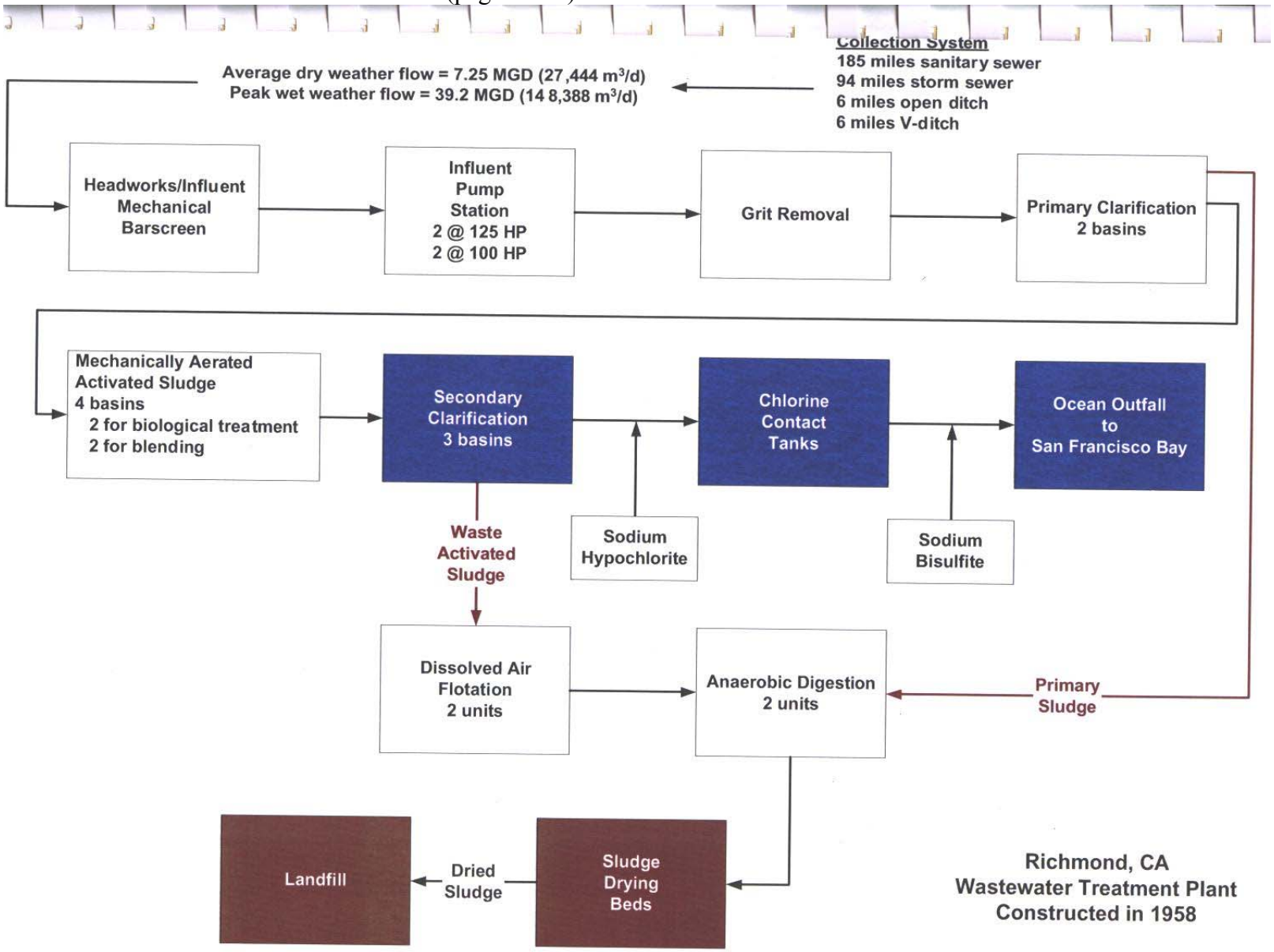


FIGURE 3.8
PROCESS/MASS BALANCE FLOW CHART
WEST COUNTY WASTEWATER DISTRICT

ATTACHMENT C (page 2 of 2) – RICHMOND PLANT FLOW DIAGRAM



ATTACHMENT D - FEDERAL 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 (CWC) and is grounds for enforcement action, for permit termination, revocation and reissuance, 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 Clean Water Act 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 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 Discharger 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 a Discharger 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 Quality Control Board (Regional Water Board), State Water Resources Control Board (State Water Board), United States Environmental Protection Agency (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)*] [*CWC 13383(c)*]:

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)*];

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the CWC, 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 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)(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)(B)*]; and

c. The Discharger(s) submitted notice to the Regional Water Board as required under Standard Provision – Permit Compliance I.G.5 below [*40 CFR §122.41(m)(4)(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 Discharger(s) 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 Discharger(s) shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below [*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 Discharger(s). 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 paragraph H.2 of this section 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 Discharger 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 Discharger 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)(i)];

c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b [*40 CFR §122.41(n)(3)(iii)*]; and

d. The Discharger 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 Discharger(s) 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 Dischargers wish 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 the Order to change the name of the Dischargers and incorporate such other requirements as may be necessary under the CWA and the CWC [*40 CFR §122.41(l)(3)*] [*40 CFR §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 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503 unless other test procedures have been specified in this Order [40 CFR §122.41(j)(4)] [40 CFR §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 40 CFR 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)*] [*CWC 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 paragraph (2.) and (3.) of this provision [*40 CFR §122.41(k)*]

2. All permit applications shall be signed as follows:

a. For a corporation: By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or

operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures [*40 CFR §122.22(a)(1)*];

b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively [*40 CFR §122.22(a)(2)*]; or

c. For a municipality, State, federal, or other public agency: 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 paragraph (b) of this provision, 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 paragraph (2.) of this provision [*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, State Water Board, or USEPA [*40 CFR §122.22(b)(3)*].

4. If an authorization under paragraph (3.) of this provision 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 paragraph (3.) of this provision must be submitted to the Regional Water Board, State Water Board or USEPA 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 paragraph (2.) or (3.) of this provision 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 §122.41(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 monitor any pollutant more frequently than required by this Order using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR 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 Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes 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)*].

    c. Violation of a maximum daily discharge limitation for any of the pollutants listed in this Order to be reported within 24 hours [*40 CFR §122.41(l)(6)(ii)(C)*].

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 40 CFR §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 which are subject neither to effluent limitations in this Order nor to notification requirements under 40 CFR Part122.42(a)(1) (see Additional Provisions—Notification Levels VII.A.1) [*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 E.1, E.2, and E.3 at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E [*40 CFR §122.41(l)(7)*].

I. Other Information

When the Dischargers becomes aware that they 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 CWA provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $25,000 per day for each violation. The CWA provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than two (2) years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than six (6) years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Clean Water Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions [*40 CFR §122.41(a)(2)*] [*CWC 13385 and 13387*].

B. Any person may be assessed an administrative penalty by the Regional Water Board for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the

maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000 [*40 CFR §122.41(a)(3)*].

C. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both [*40 CFR §122.41(j)(5)*].

D. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Order, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both [*40 CFR §122.41(k)(2)*].

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Non-Municipal Facilities

Existing manufacturing, commercial, mining, and silvicultural dischargers shall notify the Regional Water Board as soon as they know or have reason to believe [*40 CFR §122.42(a)*]:

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following "notification levels" [*40 CFR §122.42(a)(1)*]:

    a. 100 micrograms per liter (µg/L) [*40 CFR §122.42(a)(1)(i)*];

    b. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4-dinitrophenol and 2-methyl-4,6-dinitrophenol; and 1 milligram per liter (mg/L) for antimony [*40 CFR §122.42(a)(1)(ii)*];

    c. Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge [*40 CFR §122.42(a)(1)(iii)*]; or

    d. The level established by the Regional Water Board in accordance with 40 CFR §122.44(f) [*40 CFR §122.42(a)(1)(iv)*].

2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" [*40 CFR §122.42(a)(2)*]:

a. 500 micrograms per liter (µg/L) [*40 CFR §122.42(a)(2)(i)*];

b. 1 milligram per liter (mg/L) for antimony [*40 CFR §122.42(a)(2)(ii)*];

c. Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge [*40 CFR §122.42(a)(2)(iii)*]; or

d. The level established by the Regional Water Board in accordance with 40 CFR §122.44(f) [*40 CFR §122.42(a)(2)(iv)*].

B. 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 the 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 (MRP)

NPDES regulations at 40 CFR §122.48 require that all NPDES permits specify monitoring and reporting requirements. CWC sections 13267 and 13383 also authorize the Regional Water Board to require technical and monitoring reports. This Monitoring and Reporting Program **(**MRP) establishes monitoring and reporting requirements that implement the federal and State regulations.

I. GENERAL MONITORING PROVISIONS

A. The Dischargers shall comply with the MRP for this Order as adopted by the Regional Water Board, and with all of the requirements contained in Self-Monitoring Program, Part A, adopted August 1993 (SMP, Attachment G). If any discrepancies exist between the MRP and SMP, the MRP prevails.

B. Sampling is required during the entire year when discharging. All 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 and to perform reasonable potential analysis. 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 Quality Control Board's Quality Assurance Program.

C. Sampling and analysis of additional constituents is required pursuant to Table 1 of the Regional Water Board's August 6, 2001 Letter titled Requirement for Monitoring of Pollutants in Effluent and Receiving Water to Implement New Statewide Regulations and Policy.

D. *Minimum Levels.* For compliance and reasonable potential monitoring, analyses shall be conducted using the commercially available and reasonably achievable detection levels that are lower than the WQOs/WQC or the effluent limitations, whichever is lower. 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 approximately equal to parts per billion (ppb).

Table E-1 lists the test method the Dischargers may use for compliance and reasonable potential monitoring for the pollutants with effluent limits.

Table E-1. Test Methods and Minimum Levels for Pollutants with Reasonable Potential

CTR #	Constituent	Types of Analytical Methods[1] Minimum Levels (µg/L)											
		GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPG FAA	HYD RIDE	CVAF	DCP
6	Copper								0.5	2			
8	Mercury[2]											0.0005	
9	Nickel					20	5	20	1	5			
10	Selenium[3]						5		2	5	1		
14	Cyanide				5								

CTR #	Constituent	Types of Analytical Methods[1] Minimum Levels (µg/L)											
		GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPG FAA	HYD RIDE	CVAF	DCP
68	Bis(2-ethylhexyl)phthalate		5										
110	4,4-DDD	0.05											
117	Heptachlor	0.01											
	Dioxin-TEQ[4]	½ USEPA 1613 specified MLs											

(1) Analytical Methods / Laboratory techniques are defined as follows:

GC = Gas Chromatography;
GCMS = Gas Chromatography/Mass Spectrometry;
Color = Colorimetric;
GFAA = Graphite Furnace Atomic Absorption;
ICPMS = Inductively Coupled Plasma/Mass Spectrometry;
SPGFAA = Stabilized Platform Graphite Furnace Atomic Absorption (i.e. USEPA 200.9); and
CVAF = Cold Vapor Atomic Fluorescence.

(2) The Dischargers shall use ultra-clean sampling (USEPA Method 1669) and ultra-clean analytical methods (USEPA method 1631) for mercury monitoring, which specifies a ML of 0.5 ng/L or 0.0005 µg/L.

(3) Hydride or ICPMS (with helium collision cell) are preferable because they are less subject to positive interferences.

(4) The Dischargers shall achieve MLs for Dioxin-TEQ using ½ the MLs specified in USEPA method 1613.

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-2. Description of Monitoring Stations

Discharge Point Name	Monitoring Location Name	Monitoring Location Description
influent	A-001	At any point in the WCWD plant headworks at which all waste tributary to the treatment system is present, and preceding any phase of treatment.
influent	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.
effluent	E-001-D1	At any point in the WCWD outfall following chlorination, but prior to combining with Richmond plant effluent.
effluent	E-001-D2	At any point in the Richmond outfall following chlorination but prior to combining with WCWD effluent.
effluent	E-001	At any point in the combined outfall
effluent	E-001-DC	At any point in the combined outfall following dechlorination.
sludge	B-001	Sludge monitoring at the WCWD plant.
sludge	B-002	Sludge monitoring at the Richmond plant.

III. INFLUENT MONITORING REQUIREMENTS

A. The Dischargers shall monitor the influent to the facility at A-001 and at A-002 as specified in Table E-3:

Table E-3. Influent Monitoring Requirements for Conventional Pollutants

Parameter	Units	Sample Type	Minimum Sampling Frequency	Monitoring Location
Flow Rate[1]	MGD	Continuous	Daily	A-001 & A-002
BOD_5	mg/L	C-24	3/Week	A-001 & A-002
BOD_5	kg/d	Calculated	3/Week	A-001 & A-002
TSS	mg/L	C-24	3/Week	A-001 & A-002
TSS	kg/d	Calculated	3/Week	A-001 & A-002

Legend: C-24: 24-hour composite

[1] Influent flows shall be monitored continuously and the following shall be reported in monthly self-monitoring reports: average, maximum and minimum daily flows

Influent monitoring identified in the table above is the minimum required monitoring. Additional sampling and analyses may be required in accordance with Pretreatment Program or Pollution Prevention/Source Control Program requirements (see Section IX.A below).

IV. EFFLUENT MONITORING REQUIREMENTS

A. Effluent Monitoring Requirements

The Dischargers shall monitor treated wastewater at as specified in Table E-4 below:

Table E-4. Schedule of Sampling, Measurement, and Analysis

Parameter	Units	Sample Type	Minimum Sampling Frequency	Monitoring Location
Flow Rate[1]	MGD	Continuous	1/Day	E-001
pH	pH units	Grab	3/Week	E-001-D1&D2
Temperature	°C	Grab	3/Week	E-001-D1&D2
Dissolved Oxygen	mg/L	Grab	3/Week	E-001-D1&D2
Ammonia Nitrogen[3]	mg/L	Grab	1/Month	E-001-DC
BOD (5-day @ 20°C)[2]	mg/L	C-24	3/Week	E-001-D1&D2
Total Suspended Solids[2]	mg/L	C-24	1/Day	E-001-D1&D2
Oil and Grease[3]	mg/L	Grab	2/Month	E-001-D1&D2
Total Coliform[4]	MPN/100 ml	Grab	3/Week 5/Week	E-001-D1 E-001-D2
Chlorine, Total Residual	mg/L	Continuous	1 / 2 Hours	E-001-DC
Acute Toxicity	% survival	C-24	1/Month	E-001-DC
Chronic Toxicity[5]	TU_c	C-24	1/Quarter	E-001-DC
Copper	µg/L	C-24	1/Month	E-001-DC
Cyanide[3]	µg/L	Grab	1/Month	E-001-DC
Mercury[6]	µg/L and kg/month	Grab	1/Month	E-001-DC
Nickel	µg/L	C-24	1/Month	E-001-DC
Selenium	µg/L	C-24	1/Month	E-001-DC
Bis(2-ethylhexyl)phthalate	µg/L	Grab	1/Month	E-001-DC
4,4-DDD	µg/L	C-24	2/Year	E-001-DC

Parameter	Units	Sample Type	Minimum Sampling Frequency	Monitoring Location
Heptachlor	µg/L	C-24	2/Year	E-001-DC
Dioxin-TEQ(7)	µg/L	Grab	2/Year (1/Wet, 1/Dry Season)	E-001-DC
Standard Observations	--	--	1/Month	E-001-D1&D2
Remaining Priority Pollutants	µg/L	Grab(8)	2/5 Years (1/Wet, 1/Dry Season)	E-001-DC

Legend: C-24: 24-hour composite

(1) Effluent flows shall be monitored continuously and the following shall be reported in monthly self-monitoring reports: average, maximum and minimum daily flows;

(2) The percent removal for BOD and TSS shall be reported for each calendar month.

(3) Each sampling event shall consist of a composite sample comprised of three grab samples taken at equal intervals during the sampling date, with each grab sample being collected in an appropriate container and appropriately preserved. For oil and grease, each glass container used for sample collection or mixing shall be thoroughly rinsed with solvent rinsings as soon as possible after use, and the solvent rinsings shall be added to the composite sample for extraction and analysis. Grab samples for ammonia and cyanide may also be composited following appropriate laboratory practices prior to analysis.

(4) When replicate analyses are made of a coliform sample, the reported result shall be the arithmetic mean of the replicate analysis sample.

(5) Critical Life Stage Toxicity Test shall be performed and reported in accordance with the Chronic Toxicity Requirements specified in Sections V.B of the MRP. Note that accelerated monitoring required in Section V.B of the MRP is required to occur on a monthly basis.

(6) Mercury: The Dischargers may, at their option, sample effluent mercury either as grab or as 24-hour composite samples.

(7) Chlorinated dibenzodioxins and chlorinated dibenzofurans shall be analyzed using the latest version of USEPA Method 1613.

(8) Per August 6, 2001 Regional Water Board letter.

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

The Dischargers shall monitor acute and chronic toxicity at E-001-DC 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 continuous flow-through bioassays.

2. Test organisms shall be fathead minnow.

3. All bioassays shall be performed according to the most up-to-date protocols in 40 CFR Part 136, currently in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms," 5th Edition.

4. Effluent used for fish bioassays must be dechlorinated prior to testing. 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 or if the control fish survival rate is less than 90 percent, the bioassay test shall be restarted with

new batches of fish and shall continue back to back until compliance is demonstrated.

B. Whole Effluent Chronic Toxicity

1. Chronic Toxicity Monitoring Requirements

   a. *Sampling*. The Dischargers shall collect 24-hour composite samples of the effluent in accordance with the frequency specified in the table above, 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*. *Haliotis rufescens.*

   c. *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 third edition (EPA-821-R-02-014), and "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms," currently fourth Edition (EPA-821-R-02-013), with exceptions granted the Dischargers by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP).

   d. *Dilution Series.* The Dischargers shall conduct tests at 100%, 75%, 50%, 25%, and 12.5%. The "%" represents percent effluent as discharged.

2. Chronic Toxicity Reporting Requirements

   a. *Routine Reporting*. Toxicity test results for the current reporting period shall include, at a minimum, for each test:

      i. Sample date(s)
      ii. Test initiation date
      iii. Test species
      iv. End point values for each dilution (e.g. number of young, growth rate, percent survival)
      v. NOEC value(s) in percent effluent
      vi. IC15, IC25, IC40, and IC50 values (or EC15, EC25 ... etc.) in percent effluent
      vii. TUc values (100/NOEC, 100/IC25, or 100/EC25)
      viii. Mean percent mortality (±s.d.) after 96 hours in 100% effluent (if applicable)
      ix. NOEC and LOEC values for reference toxicant test(s)
      x. IC50 or EC50 value(s) for reference toxicant test(s)
      xi. Available water quality measurements for each test (pH, D.O., temperature, conductivity, hardness, salinity, ammonia)

   b. *Compliance Summary*. The results of the chronic toxicity testing shall be provided in the next self-monitoring report and shall include a summary table of chronic

toxicity data from at least three of the most recent samples. The information in the table shall include items listed above under 2.a, specifically, item numbers i, iii, v, vi (IC25 or EC25), vii, and viii.

3. Chronic Toxicity Reduction Evaluation (TRE)

   a. *Generic TRE Work Plan.* To be prepared for responding to toxicity events, the Dischargers shall prepare a generic TRE work plan within 90 days of the effective date of this Order. The Dischargers shall review and update their work plans as necessary to remain current and applicable to the discharge and discharge facilities.

   b. *Specific TRE Work Plan.* Within 30 days of exceeding either trigger for accelerated monitoring, the Discharge shall submit to the Regional Water Board a TRE work plan, which should be the generic work plan revised as appropriate for this toxicity event after consideration of available discharge data.

   c. *Initiate TRE.* 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:

      i. Tier 1 consists of basic data collection (routine and accelerated monitoring).
      ii. Tier 2 consists of evaluation of optimization of the treatment process, including operation practices and in-plant process chemicals.
      iii. Tier 3 consists of a toxicity identification evaluation (TIE).
      iv. Tier 4 consists of evaluation of options for additional effluent treatment processes.
      v. Tier 5 consists of evaluation of options for modifications of in-plant treatment processes.
      vi. 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 Effluent Limitations Section IV.6.a).

   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 source(s) 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 storm water 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. LAND DISCHARGE MONITORING REQUIREMENTS

(Not applicable)

VII. RECLAMATION MONITORING REQUIREMENTS

(Not applicable)

VIII. RECEIVING WATER MONITORING REQUIREMENTS

A. Regional Monitoring Program (RMP)

The Dischargers shall continue to participate in the Regional Monitoring Program, which involves collection of data on pollutants and toxicity in water, sediment and biota of the Estuary. The Dischargers' participation and support of the RMP is used in consideration of the level of receiving water monitoring required by this Order. With each annual self-monitoring report, the Dischargers shall document how they comply with Receiving Water Limitation V.A. This may include using discharge characteristics (e.g., mass balance with effluent data and closest RMP station), receiving water data, or a combination of both.

IX. OTHER MONITORING REQUIREMENTS

A. Pretreatment Requirements

The Dischargers shall comply with the pretreatment requirements as specified in Table E-6 for influent stations A-001 and A-002, effluent stations E-001-D1 and E-001-D2, and sludge stations B-001 and B-002:

Table E-6. Pretreatment Program Monitoring Requirements

Constituents	Location and Frequency			Required Test Methods
	Influent	Effluent	Biosolids	
VOC [1]	2/Y	2/Y	2/Y	624
BNA [1]	A	A	2/Y	625
Hexavalent Chromium [2]	M	M	2/Y	Standard Methods 3500
Metals [3]	M	M	2/Y	GFAA, ICP, ICP-MS
Mercury [4]	M	M	2/Y	EPA 245, 1631
Cyanide [4]	M	M	2/Y	Standard Methods 4500-CN^- C or I

Legend:

A = once each calendar year
M = once each month
Q = once each quarter
2/Y= each calendar year (at about 6 month intervals, once in the dry season, once in the wet season)
VOC = volatile organic compounds
BNA = base/neutrals and acids extractable organic compounds

Footnotes for Table E-6:

[1] GC/MS methods used must be able to quantify to an equivalent level as applicable GC methods (EPA 601, 602, 603, 604, 606).
[2] Total chromium may be substituted for hexavalent chromium at the Dischargers' discretion.
[3] The parameters are arsenic, cadmium, selenium, copper, lead, mercury, nickel, silver, zinc, and total chromium (if the Dischargers elect to substitute total chromium for hexavalent chromium).
[4] Influent and effluent monitoring conducted per Tables E-3, E-4, and E-5 can be used to satisfy these pretreatment program sampling requirements and vice versa.

B. Sludge Monitoring (B-001 and B-002)

The Dischargers shall continue to analyze sludge on a semi-annual basis prior to disposal for selected priority pollutant metals and organics. Specific requirements for monitoring shall be commensurate with the disposal location, expected to be a landfill during the permit term.

X. LEGEND FOR MRP TABLES

Types of Samples

C-24	=	composite sample, 24 hours (includes continuous sampling, such as flows)
C-X	=	composite sample, X hours
G	=	grab sample

Frequency of Sampling			Parameter and Unit Abbreviations		
Cont.	=	Continuous	BOD	=	Biochemical Oxygen Demand
Cont/D	=	Continuous monitoring & daily reporting	D.O.	=	Dissolved Oxygen
H	=	once each hour (at about hourly intervals)	Est V	=	Estimated Volume (gallons)
W	=	once each week	Metals	=	Multiple metals
2/W	=	twice each week	PAHs	=	Polycyclic Aromatic Hydrocarbons
4/W	=	four times each week	TSS	=	Total Suspended Solids
M	=	once each month	MGD	=	million gallons per day
Q	=	once each calendar quarter (at about three month intervals)	mg/L	=	milligrams per liter
1/Y	=	once each calendar year	mL/L-hr	=	milliliters per liter, per hour
2/Y	=	twice each calendar year (at about 6 months intervals, once during dry season, once during wet season)	µg/L	=	micrograms per liter
			ng/L	=	nanograms per liter, 1 ng/L= 10^{-3} µg/L
			kg/d	=	kilograms per day
			kg/mo	=	kilograms per month
			MPN/100 mL	=	Most Probable Number per 100 milliliters

XI. Modifications to Part A of Self-Monitoring Program

Section C.2.h of Part A shall be amended as follows:

h. When any type of bypass occurs, except for bypasses that are consistent with Prohibition III.C of this Order, composite samples shall be collected on a daily basis for constituents at all affected discharge points that have effluent limits for the duration of the bypass.

When bypassing occurs from any treatment process (primary, secondary, chlorination, dechlorination, etc.) in the Facility that is consistent with Prohibition III.B of this Order during high wet weather inflow, the self-monitoring program shall include the following sampling and analysis in addition tot he schedule given in this MRP:

When bypassing occurs from any primary or secondary treatment(s), representative samples for each 24-hour increment of the bypass discharge shall be collected for the duration of the bypass event for all pollutants with effluent limits. Continuous monitoring shall be conducted for flow and pH. Monitoring for residual chlorine shall be conducted every two hours, and daily grab samples shall be collected for temperature and total coliform. Monitoring location E-001 shall be used for flow measurements; monitoring location E-001-DC shall be used for toxic substances and chlorine residual; and monitoring location E-001-D2 shall be used for pH, temperature, and total coliform.

Modify Section F.4 as follows:

Self-Monitoring Reports

[Add the following to the beginning of the first paragraph]

For each calendar month, a self-monitoring report (SMR) shall be submitted to the Regional Water Board in accordance with the requirements listed in Self-Monitoring Program, Part A. The purpose of the report is to document treatment performance, effluent quality and compliance with waste discharge requirements prescribed by this Order, as demonstrated by the monitoring program data and the Dischargers' operation practices.

[And add at the end of Section F.4 the following:]

g. If the Discharger wishes to invalidate any measurement, the letter of transmittal will include identification of the measurement suspected to be invalid and notification of intent to submit, within 60 days, a formal request to invalidate the measurement, the original measurement in question, the reason for invalidating the measurement, all relevant documentation that supports the 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. The invalidation of a measurement requires the approval of Water Board staff and will be based solely on the documentation submitted at that time.

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 the process approved by the Executive Officer in a letter dated December 17, 1999, Official Implementation of Electronic Reporting System (ERS) and in the Progress Report letter dated December 17, 2000, or in a subsequently approved format that the Permit has been modified to include.

2) Monthly or Quarterly Reporting Requirements: For each reporting period (monthly or quarterly as specified in SMP Part B), an electronic SMR shall be submitted to the Regional Water Board in accordance with Section F.4.a-g. above. However, until USEPA approves the electronic signature or other signature technologies, Dischargers that are using the ERS must submit a hard copy of the original transmittal letter, an ERS printout of the data sheet, a violation report, and a receipt of the electronic transmittal.

3) Annual Reporting Requirements: Dischargers who have submitted data using the ERS for at least one calendar year are exempt from submitting an annual report

electronically, but a hard copy of the annual report shall be submitted according to Section F.5 below.

XII. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Dischargers shall comply with all Standard Provisions (Attachments D and G) related to monitoring, reporting, and recordkeeping, except as otherwise specified below.

B. Self Monitoring Reports (SMRs)

1. At any time during the term of this Order, the State or Regional Water Board may notify the Dischargers to electronically submit self-monitoring reports. Until such notification is given, the Dischargers shall submit self-monitoring reports in accordance with the requirements described below.

2. The Dischargers shall submit monthly Self-Monitoring Reports including the results of all required monitoring using USEPA-approved test methods or other test methods specified in this Order for each calendar month. Monthly SMRs shall be due on the 30th day following the end of each calendar month, covering samples collected during that calendar month; Annual reports shall be due on February 1 following each calendar year.

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3. Monitoring periods and reporting for all required monitoring shall be completed according to the following schedule as given in Table E-6:

Table E-6. Monitoring Period

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	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	1st day of calendar month through last day of calendar month
1 / quarter	Closest of January 1, April 1, July 1, or October 1 following (or on) permit effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
1 / year	Closest of May 1 or November 1 following (or on) permit effective date	Alternate between once during November 1 through April 30 (one year), and once during May 1 through October 31 (following year)
2 / year	Closest of May 1 or November 1 following (or on) permit effective date	One during November 1 through April 30 One during May 1 through October 31
Each Occurrence	Anytime during the discharge event or as soon as possible after aware of the event	At a time which sampling can characterize the discharge event

4. 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 §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 the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical

estimates of data quality may be percent accuracy (+ a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

c. Sample results less than the laboratory's MDL shall be reported as "Not Detected," or ND. In the ERS, the MDL is to be reported and a qualifier of "<" may be reported.

d. The Dischargers shall instruct laboratories to establish calibration standards so that the RL value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. The Dischargers shall not use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

5. 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 interim and/or final effluent limitations.

6. The Dischargers shall attach a cover letter to the SMR. The information contained in the cover letter shall clearly identify violations of the WDRs; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation.

7. SMRs must be submitted to the Regional Water Board, signed and certified as required by the standard provisions (Attachment D), to the address shown below:

   Executive Officer
   California Regional Water Quality Control Board
   San Francisco Bay Region
   1515 Clay Street, Suite 1400
   Oakland, CA 94612
   ATTN: NPDES Division

8. The Dischargers have the option to submit all monitoring results in an electronic reporting format approved by the Executive Officer. The Electronic Reporting System (ERS) format includes, but is not limited to, a transmittal letter, summary of violation details and corrective actions, and transmittal receipt. If there are any discrepancies between the ERS requirements and the "hard copy" requirements listed in the MRP, then the approved ERS requirements supersede.

D. Discharge Monitoring Reports (DMRs)

1. As described in Section X.C.1 above, at any time during the term of this permit, the State or Regional Water Board may notify the Dischargers to electronically submit self-monitoring reports. Until such notification is given, the Dischargers shall submit discharge monitoring reports (DMRs) in accordance with the requirements described below.

2. DMRs must be signed and certified as required by the standard provisions (Attachment D). The Discharge shall submit the original DMR and one copy of the DMR to the address listed below:

   If by standard mail:

   Division of Water Quality
   c/o DMR Processing Center
   P.O. Box 100
   Sacramento, CA 95812-1000

   Or if by FedEx, UPS, or other private carrier:

   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 or modified cannot be accepted.

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 Tables 1 and 2 (attached), and use of the protocols referenced in those tables, or as approved by the Executive Officer.

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 Table 3 (attached).

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 and as approved by the Executive Officer.

3. Appropriate controls.

4. Concurrent reference toxicant tests.

Appendix E-2

SUMMARY OF TOXICITY TEST SPECIES REQUIREMENTS

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	*(Mysidopsis 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/600/4-90/003. July 1994.

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)*	Cell division rate	4 days	4

Toxicity Test Reference:

4. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, third edition. EPA/600/4-91/002. July 1994.

Toxicity Test Requirements for Stage One Screening Phase

Requirements	Receiving Water Characteristics		
	Discharges to Coast	Discharges to San Francisco Bay[2]	
	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[1] Marine/Estuarine	0 4	1 or 2 3 or 4	3 0
Total number of tests	4	5	3

[1] The freshwater species may be substituted with marine species if:

(a) The salinity of the effluent is above 1 part per thousand (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.

[2] (a) Marine/Estuarine refers to receiving water salinities greater than 1 ppt at least 95 percent of the time during a normal water year.

(b) Fresh refers to receiving water with salinities less than 1 ppt at least 95 percent of the time during a normal water year.

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 that are 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" are fully applicable to these Dischargers.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the facility.

Table F-1. Facility Information

WDID	2 071107001
Dischargers	1. West County Agency (WCA), including its member agencies 2. West County Wastewater District (WCWD), and 3. City of Richmond 4. Richmond Municipal Sewer District (RMSD)
Name of Facilities	1. West County Agency Common Outfall 2. WCWD Treatment Plant and Its Collection System, 3. RMSD Water Pollution Control Plant No. 1 and Its Collection Sytem
Facility Addresses	1.2910 Hilltop Drive 2. 2377 Garden Tract Road 3. 601 Canal Boulevard Richmond, CA 94806 Richmond, CA 94801 Richmond, CA 94804 Contra Costa County Contra Costa County Contra Costa County
Discharger Contacts, Titles, Phones	1&2. E.J. Shalaby, WCA Manager, 510-222-6700 3&4. Rich Davidson, City Engineer and contact for RMSD, 510-307-8105
Authorized Person to Sign and Submit Reports	1&2. E.J. Shalaby 3&4. Rich Davidson
Mailing Address	1.2910 Hilltop Drive 2. 2910 Hilltop Drive 3. 1401 Marina Way S. Richmond, CA 94806 Richmond, CA 94806 Richmond, CA 94804
Billing Address	Same as Mailing Addresses
Type of Facilities	Wastewater Treatment Plants
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	A
Pretreatment Program	Yes
Reclamation Requirements	Not Applicable
Facility Permitted Flow	2. 12.5 million gallons per day (MGD) 3. 16.0 MGD
Facility Design Flow	2. 12.5 MGD 3. 16.0 MGD
Watershed	San Francisco Bay
Receiving Water	Central San Francisco Bay
Receiving Water Type	Marine

A. West County Agency (WCA) is a Joint Powers Agency whose members are West County Wastewater District (WCWD), the City of Richmond, and Richmond Municipal Sewer District No. 1 (RMSD). WCWD owns and operates the WCWD Treatment Plant (WCWD plant) located at 2377 Garden Tract Road, Richmond, Contra Costa County, California. The City of Richmond and RMSD own and operate RMSD Water Pollution Control Plant No. 1 (Richmond plant) located at 601 Canal Boulevard, Richmond, Contra Costa County. Together, WCA, WCWD, the City of Richmond, and RMSD are hereinafter referred to as Dischargers.

B. These facilities discharge wastewater to the Central San Francisco Bay, a water of the United States, and they are currently regulated by Order No. 01-144 and NPDES Permit No. CA0038539, which was adopted on November 28, 2001, and expired on November 28, 2006.

C. The Dischargers filed a report of waste discharge and submitted an application for renewal of their Waste Discharge Requirements (WDRs) and National Pollutant Discharge Elimination System (NPDES) permit on May 3, 2006.

II. FACILITY DESCRIPTION

A. Description of Wastewater Treatment or Controls

1. The Dischargers own and operate two municipal wastewater treatment facilities which provide secondary level treatment for domestic and industrial wastewater from the City of Richmond and surrounding areas.

2. The Dischargers' collection systems include about 436 miles of gravity sewer, 11 miles of force main, and 29 pump stations. WCWD has about 249 miles of gravity sewer and 11 miles of force main with 17 pump stations. RMSD has about 187 miles of sewer line with 12 pump stations. The State Water Board on May 2, 2006, adopted Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, Order No. 2006-0003-DWQ. The Dischargers' collection systems are subject to the requirements of 2006-0003-DWQ.

3. Raw influent entering the Dischargers' plants is treated by primary sedimentation, biological treatment, secondary clarification, chlorination and dechlorination. The wastewater treatment processes at the WCWD plant consist of bar screens, an aerated grit chamber, primary clarifiers, roughing filters, aeration basins, 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. Treated wastewater from the WCWD plant is transported to the Richmond plant for dechlorination and discharge. The treated wastewater from the Richmond plant is combined with the effluent from the WCWD plant where it is dechlorinated and then discharged through a deep-water outfall into central San Francisco Bay.

B. Discharge Point and Receiving Waters

1. Treated wastewater is currently discharged 4700 feet offshore at a depth of about 26 feet into the Central San Francisco Bay. The effluent receives an initial dilution of at least 10:1 at all times as required by the Basin Plan.

Table F-2. Outfall Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Secondary treated POTW wastewater	37 º, 54', 47" N	122 º, 25', 06" W	Central San Francisco Bay

2. Storm Water Discharges

   Regulations applicable to storm water discharges were promulgated by the U.S. EPA on November 19, 1990. The regulations (40 CFR Parts 122 – 124) require specific categories of industrial activity (industrial storm water) to obtain an NPDES permit and to implement Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to control pollutants in industrial storm water discharges. Both the WCWD plant and the Richmond plant route all storm water runoff to the headworks.

C. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

Effluent limitations contained in the previous permit (Order No. 01-144) for discharges to the Central San Francisco Bay and representative monitoring data from the term of the previous permit for conventional pollutants are as follows.

Table F-3. Historic Conventional Effluent Limitations and Monitoring Data

Parameter	Units	Effluent Limitations				Data (from January 2003 to December 2006)
		Monthly Average	Weekly Average	Daily Maximum	Instantaneous Maximum	Range of Reported Values
Biochemical Oxygen Demand (BOD)(1)	mg/L	30	45	60	--	2-98
Total Suspended Solids(2)	mg/L	30	45	60	--	1-3640
Oil and Grease	mg/L	10	--	20	--	1-23
Settleable Matter	ml/L-hr	0.1	--	0.2	--	0.05-1.5
Total Chlorine Residual(3)	mg/L	--	--	--	0.0	0-2.25
pH	Units				(4)	6-7.8
Total Coliforms	MPN/100 ml	--	--	--	(5)	2-16,000
Acute Toxicity	% survival	--	--	--	(6)	60-100
Chronic Toxicity	TUc	--	--	--	--	3.3-27.8

(1) Section B.1.a of Order No. 01-144 requires compliance with BOD or CBOD effluent limitations.

(2) The arithmetic mean of BOD and TSS values, for effluent samples collected in each calendar month shall not exceed 15 percent of the arithmetic mean for influent samples collected at approximately the same times during the same period.

(3) Requirement defined as below the limit of detection in standard test methods defined in the latest edition of *Standard Methods for the Examination of Water and Wastewater*. The Dischargers may elect to use a continuous on-line monitoring system(s) for measuring flows, chlorine, and sodium bisulfate 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 will conclude that these false positive chlorine residual exceedances are not violations of the permit limit.

(4) The pH of the effluent shall not exceed 9.0 nor be less than 6.0. The Dischargers shall be in compliance with the pH limitation specified herein, provided that both of the following conditions are satisfied; 1) 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 2) no individual excursion from the range of pH value shall exceed 60 minutes.

(5) The moving median value of total coliform bacteria in five (5) consecutive samples shall not exceed 240 MPN/100 ml; and no single sample shall exceed 10,000 MPN/100 ml.

(6) The survival of bioassay test organisms in 96-hour bioassays of undiluted effluent shall be: 1) an 11-sample median value of not less than 90 percent survival; and 2) an 11-sample 90th percentile value of not les than 70 percent survival.

Effluent limitations contained in the previous permit (Order No. 01-144) for discharges to the Central San Francisco Bay and representative monitoring data from the term of the previous permit for toxic pollutants are as follows.

Table F-4. Historic Toxic Substances Effluent Limitations and Monitoring Data

Parameter	Units	Water Quality-Based Effluent Limits (WQBELs)		Interim Limits		Monitoring Data (From January 2003 to December 2006)
		Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Highest Daily Average
Copper	µg/L				17	15
Mercury	µg/L			0.087		0.032
Nickel	µg/L	34	59			13
Selenium	µg/L				17	9
Zinc	µg/L	490	720			52
Cyanide	µg/L				25	13
Dioxin-TEQ	pg/L			0.14		0.0031
Dieldrin	µg/L	0.00014	0.00028			ND (<0.002)
4,4-DDE	µg/L	0.00059	0.0012			ND (<0.003)

D. Compliance Summary

1. Compliance with Numeric Effluent Limits.

Permit exceedances were observed during the permit term and are summarized in Table F-5 below. In addition to these violations, the Richmond plant does not monitor influent flow at A-002, which is a violation of the monitoring and reporting program. The Regional Water Board staff has prepared a complaint assessing Mandatory Minimum Penalties (MMPs) for the numeric effluent limit violations. The influent flow metering requirement is addressed in a concurrent Cease and Desist Order (CDO). The Regional Water Board plans to consider the MMP complaint and the CDO at the same public hearing for this Order.

Most of these violations were caused by problems at the Richmond plant. According to the City of Richmond's Wet Weather No Feasible Alternatives Analysis, the City of Richmond has spent approximately $22 million in capitol improvement projects since June 2002. A new mechanical bar screen was installed and the primary clarifiers received a major structural rehabilitation. The biological treatment system received new mechanical aerators, new pumps, valves, and piping. Secondary clarifiers No. 1 and No. 2 received a major rehabilitation in 2005 and 2006. These plant upgrades appear to have solved the problems because effluent violations have decreased since these improvements were implemented.

Table F-5. Compliance Summary

Parameter	Type of Limit	Date of Violation	Permit Limit	Reported Value
BOD	Weekly Average	January 2, 2002	45 max	61
BOD	Weekly Average	January 6, 2002	45 max	58.7
BOD	Weekly Average	January 13, 2002	45 max	87
BOD	Weekly Average	January 27, 2002	45 max	98
BOD	Weekly Average	January 31, 2002	45 max	68.2
BOD	Monthly % Removal	January 31, 2002	85 min	56.1
BOD	Weekly Average	February 2, 2002	45 max	48.8
BOD	Weekly Average	February 24, 2002	45 max	51
BOD	Monthly Average	February 28, 2002	30 max	41.7
BOD	Weekly Average	March 10, 2002	45 max	46.7
BOD	Monthly Average	March 31, 2002	30 max	35.2
BOD	Monthly % Removal	March 31, 2002	85 min	84.3
Copper	Daily Maximum	March 6, 2002	17 max	18.3
BOD	Weekly Average	April 1, 2002	45 max	82
BOD	Weekly Average	April 7, 2002	45 max	99
BOD	Weekly Average	April 21, 2002	45 max	67.3
BOD	Monthly Average	April 30, 2002	30 max	69.9
BOD	Monthly % Removal	April 30, 2002	85 min	75
BOD	Weekly Average	May 5, 2002	45 max	54.3
BOD	Weekly Average	June 9, 2002	45 max	52
BOD	Weekly Average	June 16, 2002	45 max	53.7
Total Coliform	Daily Maximum	June 19, 2002	10000 max	16000
BOD	Weekly Average	July 21, 2002	45 max	57.7
BOD	Weekly Average	August 1, 2002	45 max	70.6
BOD	Weekly Average	August 4, 2002	45 max	74
Chlorine Residual	Instantaneous Maximum	August 6, 2002	0	positive
Chlorine Residual	Instantaneous Maximum	August 7, 2002	0	positive
BOD	Weekly Average	August 11, 2002	45 max	47.7
BOD	Weekly Average	August 28, 2002	45 max	74.7
BOD	Monthly Average	August 30, 2002	30 max	61.8
BOD	Weekly Average	September 1, 2002	45 max	63.3
Chlorine Residual	Instantaneous Maximum	September 12, 2002	0	1.3
Total Coliform	5 Sample Moving Median	May 28, 2003	240 max	280
Total Coliform	5 Sample Moving Median	June 2, 2003	240 max	280
Total Coliform	5 Sample Moving Median	June 3, 2003	240 max	300
Total Coliform	5 Sample Moving Median	June 4, 2003	240 max	300
Total Coliform	5 Sample Moving Median	June 10, 2003	240 max	300
Total Coliform	Daily Maximum	February 25, 2004	10000	16000
Chlorine Residual	Instantaneous Maximum	April 21, 2004	0	2
Chlorine Residual	Instantaneous Maximum	May 26, 2004	0	0.29
TSS	Monthly % Removal	May 31, 2004	85 min	84
TSS	Monthly Average	August 31, 2004	30 max	31.3
BOD	Weekly Average	September 4, 2004	45 max	54

Chronic Toxicity	Daily Maximum	June 6, 2005	10 max	27.8
TSS	Weekly Average	December 3, 2005	45 max	71
TSS	Monthly Average	December 31, 2005	30 max	45.1
Oil and Grease	Daily Maximum	February 27, 2006	20 max	23
Oil and Grease	Monthly Average	February 28, 2006	10 max	14
Settleable Solids	Daily Maximum	March 14, 2006	0.2 max	1.5
Chlorine Residual	Instantaneous Maximum	March 15, 2006	0	2.25
Settleable Solids	Monthly Average	March 31, 2006	0.1 max	0.2
BOD	Weekly Average	July 1, 2006	45 max	54.3
TSS	Weekly Average	July 1, 2006	45 max	47.4
Settleable Solids	Daily Maximum	August 29, 2006	0.2 max	1.2
TSS	Monthly Average	August 31, 2006	30 max	30.8
Settleable Solids	Monthly Average	August 31, 2006	0.1 max	1.2
TSS	Monthly Average	September 30, 2006	30 max	32.3

2. Compliance with Permit Provisions.

A list of special activities required in the provisions for Order No. 01-144, and the status of completion, is shown in Table F-6 below.

Table F-6. Status of Special Activities in Provisions for Order No. 01-144

Provision No.	Description of Activity	Status of Completion
2	Mercury Source Control and Reduction Program – 60 days following a violation of a mass emission limit for mercury, the Dischargers were required to develop a source control and pollution prevention program to identify sources and evaluate options for control and reduction of mercury loadings.	No mercury exceedances reported during the term of the permit.
3	Cyanide Study – Requires the Dischargers to participate in a regional effort to conduct a study for cyanide data collection and development of site-specific objectives.	BACWA completed the study. West County Agency is a member of BACWA.
4	Effluent Characterization for Selected Constituents – Requires the Dischargers to monitor and evaluate certain constituents pursuant to the Regional Water Board's August 6, 2001 letter. An interim report was due on May 18, 2003 and a final report was due 180 days prior to permit expiration.	The Dischargers have complied with this provision.
5	Ambient Background Receiving Water Study – Requires the Dischargers to collect or participate in collecting ambient receiving water data.	BACWA has completed the study on behalf of the Dischargers.
6	Pollutant Minimization Plan (PMP) – Requires the Dischargers to continue to improve their PMPs to reduce pollutant loadings to its treatment plants. Annual reports are required.	The Dischargers have complied with this provision.
14	Wastewater Facilities, Review and Evaluation, and Status Reports – Annually, the Dischargers shall submit a report describing the current status of its wastewater facility review and evaluation. This report shall include a description or summary of review and evaluation procedures, and applicable wastewater facility programs or capital improvement projects.	Annual status reports were submitted.

15	Operations and Maintenance Manual, Review and Status Reports – The Dischargers were required to submit annual reports to the Regional Water Board describing the current status of its operations and maintenance manual review and updating. This report is to include estimated time schedules for completion of any revisions determined necessary, a description of any competed revisions, or a statement that no revisions were needed.	Annual status reports were submitted.
16	Contingency Plan, Review and Status Reports – The Dischargers were required to submit an annual report describing the current status of its Contingency Plan review and update. This report should include a description or copy of any completed revisions, or a statement that no changes are needed.	While not submitted in the annual status reports, the Contingency Plan is available on site.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in the proposed 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 from this facility 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 Board adopted a *Water Quality Control Plan for the San Francisco Bay Basin* (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 Resources Control Board (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. Because of the marine influence on receiving waters of San Francisco Bay, total dissolved solids levels in the Bay commonly (and often significantly) exceed 3000 mg/L and thereby meet an exemption to State Water Board Resolution No. 88-63. Therefore, the MUN designation is not applicable to Central San Francisco Bay. Beneficial uses applicable to Central San Francisco Bay are as follows:

Table F-3. Basin Plan Beneficial Uses of Central San Francisco Bay

Discharge Point	Receiving Water Name	Beneficial Use(s)
E-001-DC	Central San Francisco Bay	Ocean Commercial and Sport Fishing (COMM) Estuarine Habitat (EST) Industrial Service Supply (IND) Fish Migration (MIGR), Navigation (NAV) Industrial Process Water Supply (PROC) Preservation of Rare and Endangered Species (RARE) Water Contact Recreation (REC1) Non-contact Water Recreation (REC2) Shellfish Harvesting (SHELL) Fish Spawning (SPWN) Wildlife Habitat (WILD)

Requirements of this Order implement the Basin Plan.

2. Thermal Plan

The State Water Board adopted a *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California* (Thermal Plan) on May 18, 1972, and amended this plan on September 18, 1975. This plan contains temperature objectives for surface waters. Requirements of this Order implement the Thermal Plan.

3. 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 forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that were applicable in the state. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

4. 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 NTR 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.

5. 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. [40 C.F.R. § 131.21; 65 Fed. Reg. 24641 (April 27, 2000)]. 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.

6. 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 discharge must be consistent with the antidegradation provision of section 131.12 and State Water Board Resolution No. 68-16.

7. Anti-Backsliding Requirements

Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at title 40, Code of Federal Regulations[2] 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

On June 6, 2003, 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) requiring 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. Central San Francisco Bay is listed as an impaired waterbody. The pollutants impairing Central San Francisco Bay include chlordane, DDT, diazinon, dieldrin, dioxin compounds, exotic species, furan compounds, mercury, PCBs, dioxin-like PCBs, and selenium. The SIP requires final effluent limitations for all 303(d)-listed pollutants to be based on total maximum daily loads and associated waste load allocations.

1. Total Maximum Daily Loads

The Regional Water Board plans to adopt total maximum daily loads (TMDLs) for

[2] All further statutory references are to title 40 of the Code of Federal Regulations unless otherwise indicated.

pollutants on the 303(d) list in Central San Francisco Bay within the next 10 years. Future review of the 303(d)-list for Central San Francisco Bay may result in revision of the schedules or provide schedules for other pollutants.

2. Waste Load Allocations

The TMDLs will establish waste load allocations (WLAs) for point sources and load allocations (LAs) for non-point sources, and will result in achieving the water quality standards for the waterbodies. Final WQBELs for 303(d)-listed pollutants in this discharge will be based on WLAs contained in the respective TMDLs.

3. Implementation Strategy

The Regional Water Board's strategy to collect water quality data and to develop TMDLs is summarized below:

a. Data Collection. The Regional Water Board has given the Dischargers the option to collectively assist in developing and implementing analytical techniques capable of detecting 303(d)-listed pollutants to at least their respective levels of concern or WQOs/WQC. This collective effort may include development of sample concentration techniques for approval by the USEPA. The Regional Water Board will require dischargers to characterize the pollutant loads from their facilities into the water-quality limited waterbodies. The results will be used in the development of TMDLs, and may be used to update or revise the 303(d) list or change the WQOs/WQC for the impaired waterbodies including Central San Francisco Bay.

b. Funding Mechanism. The Regional Water Board has received, and anticipates continuing to receive, resources from Federal and State agencies for TMDL development. To ensure timely development of TMDLs, the Regional Water Board intends to supplement these resources by allocating development costs among dischargers through the RMP or other appropriate funding mechanisms.

E. Other Plans, Policies and Regulations

This Order is also based on the following plans, policies, and regulations:

1. The Federal *Water Pollution Control Act*, Sections 301 through 305, and 307, and amendments thereto, as applicable (CWA);

2. The State Water Board's March 2, 2000 *Policy for* the USEPA's May 18, 2000 *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California* or CTR;

3. The USEPA's *Quality Criteria for Water* [EPA 440/5-86-001, 1986] and subsequent amendments (the USEPA Gold Book);

4. Applicable Federal Regulations [40 CFR §§ 122 and 131];

5. 40 CFR §131.36(b) and amendments [Federal Register Volume 60, Number 86, 4 May 1995, pages 22229-22237];

6. USEPA's December 10, 1998 National Recommended Water Quality Criteria compilation [Federal Register Vol. 63, No. 237, pp. 68354-68364];

7. USEPA's December 27, 2002 Revision of National Recommended Water Quality Criteria compilation [Federal Register Vol. 67, No. 249, pp. 79091-79095]; and

8. Guidance provided with State Water Board actions remanding permits to the Regional Water Board for further consideration.

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. There are two principal bases for effluent limitations in the Code of Federal Regulations: section 122.44(a) requires that permits include applicable technology-based limitations and standards; and 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 the receiving water.

A. Discharge Prohibitions

1. **Discharge Prohibition III.A. (no discharge other than that described in this Order)**: This prohibition is the same as in the previous permit. This prohibition is based on California Water Code section 13260, which requires filing a Report of Waste Discharge before discharges can occur. Discharges not described in the ROWD, and subsequently in the Order, are prohibited.

2. **Discharge Prohibition III.B. (no discharges receiving less than 45:1 and 25:1 dilution):** This prohibition is similar to the previous permit. It is based on the Basin Plan and the previous permit, which concludes that an initial dilution of 45:1 is required to be protective of shellfish beds, except when Delta outflow is greater than 8000 cubic feet per second. According to the Dischargers' dilution study[3], an initial dilution of 45:1 may not be achieved during periods of greater Delta flow because effluent follows the pathway of the deeper water mass which is typically 10 feet or more below the surface. However, near-shore areas close to shellfish beds are typically six feet or less and thus receive some physical separation from the deeper water mass. The deeper water likely flows parallel to the depth contours rather than mixing laterally into the shallow mudflat areas. Because ammonia and cyanide limits are based on an initial dilution of 25:1, it is necessary to require that the Dischargers achieve this dilution at higher Delta flows.

[3] Evaluation of the initial dilution (45:1) requirement, San Pablo-Richmond Wastewater Outfall (1977). Jones & Stokes Associates and Brown and Caldwell Engineers.

3. **Discharge Prohibition III.C. (No bypasses except under the conditions at 40 CFR 122.41(m)(4)(i)(A), (B) and (C)):** This prohibition is based on 40 CFR 122.41(m)(4). This prohibition grants bypass of peak wet weather flows above 24 MGD at the Richmond plant that are recombined with secondary treatment flows and discharged at the combined outfall which met the conditions at 40 CFR 122.41(m)(4)(i)(A)-(C). Bypasses are prohibited at the WCWD plant.

Background

During significant storm events, these high volumes can overwhelm certain parts of the wastewater treatment process and may cause damage or failure of the system. Operators of wastewater treatment plants must manage these high flows to both ensure the continued operation of the treatment process and to prevent backups and overflows of raw wastewater in basements or on city streets. USEPA recognized that peak wet weather flow diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewer conveyance systems may be necessary in some circumstances.

In December 2005, USEPA invited public comment on its proposed Peak Wet Weather Policy that provides interpretation that 40 CFR 122.41(m) applies to wet weather diversions that are recombined with flow from the secondary treatment, and guidance by which its NPDES permit may be approved by the Regional Water Board. This policy requires that dischargers must still meet all the requirements of NPDES permits, and encourages municipalities to make investments in ongoing maintenance and capital improvements to improve their system's long-term performance.

Criteria of 40 CFR 122.41(m)(4)(i)(A)-(C)

USEPA's Peak Wet Weather policy states that "If the criteria of 40 CFR 122.41(m)(4)(i)(A)-(C) are met, the Regional Water Board can approve peak wet weather diversions that are recombined with flow from the secondary treatment. The criteria of 40 CFR 122.41(m)(4)(i) (Federal Standard Provisions, Attachment D) are (A) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; (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; and (C) the City of Richmond and RMSD submitted notice to the Regional Water Board as required under Federal Standard Provision – Permit Compliance I.G.5.

On September 27, 2007, the City of Richmond and RMSD submitted a no feasible alternatives analysis showing that at this time, there are no feasible alternatives to blending under certain high flow conditions at the Richmond plant. Blending isn't necessary at the WCWD treatment plant. For the calendar years 2002 through 2006, the Richmond plant blended 62 times for an average of about 12.4 times per year. The average volume of blended wastewater was about 7.1 million gallons per blending event, or about 88 million gallons per year. These blending events occurred as a result of high rates of inflow and infiltration (I/I) in the collection system during heavy rainfall. The City of Richmond and RMSD's analysis concluded that improvements to the treatment plant would have little effect on the need for blending because of the I/I problem. Therefore, the City of

Richmond and RMSD are focusing their efforts on repairing and replacing collection system pipes to reduce wet weather blending events. The City of Richmond is currently in the process of evaluating the condition of its pipes using closed-circuit TV to determine which pipes are in the most need of repair. It has allocated $20 million to be spent during the next five years to repair the sanitary sewer system.

The City of Richmond and RMSD have satisfied the criteria of 40 CFR 122.41 (m)(4)(i)(A-C). Bypasses are necessary to prevent severe property damage when flows exceed the capacity of the secondary treatment. The City of Richmond and RMSD have analyzed alternatives to bypassing and has determined that no feasible alternative exists at this time. The City of Richmond and RMSD have submitted notice to the Regional Water Board as required under Federal Standard Provision – Permit Compliance I.G.5.

4. **Discharge Prohibition III.D. (average dry weather flow not to exceed dry weather design capacity)**: This prohibition is based on the historic and tested reliable treatment capacity of the treatment plant. Exceedance of this design, average dry weather flow capacity may result in lowering the reliability of achieving compliance with water quality requirements.

5. **Discharge Prohibition III.E. (No sanitary sewer overflows (SSO) to waters of the United States)**: The Discharge Prohibition No. 15 from Table 4-1 of the Basin Plan, and the Clean Water Act prohibits the discharge of wastewater to surface waters except as authorize under an NPDES permit. POTWs must achieve secondary treatment, at a minimum, and any more stringent limitations that are necessary to achieve water quality standards. (33U.S.C. §1311(b)(1)(B) and (C).) Thus, an SSO that results in the discharge of raw sewage, or sewage not meeting secondary treatment, to waters of the United States is prohibited under the Clean Water Act and the Basin Plan.

B. Technology-Based Effluent Limitations

1. Scope and Authority

The Code of Federal Regulations (CFR) at 40 CFR §122.44(a) requires that permits include applicable technology-based limitations and standards. This Order includes technology-based effluent limitations based on Secondary Treatment Standards at 40 CFR §133. Permit effluent limitations for conventional pollutants are technology-based. Technology-based effluent limitations are put in place to ensure that full secondary treatment is achieved by the wastewater treatment facility, as required under 40 CFR §133.102. Effluent limitations for these conventional pollutants are defined by the Basin Plan, Table 4-2. Further, these conventional effluent limits are the same as those from the previous permit for the following constituents, except settleable solids which is no longer required per the 2004 Basin Plan amendment:

- Biochemical Oxygen Demand (BOD),
- BOD percent removal,
- Total suspended solids (TSS),

- TSS percent removal,
- pH,
- Oil and grease, and
- Total chlorine residual.

2. Applicable Technology-Based Effluent Limitations

Technology-based effluent limitations are summarized below.

Table F-7. Summary of Technology-based Effluent Limitations

Parameter	Com-pliance Point	Units	Effluent Limitations				
			Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Biochemical Oxygen Demand (BOD)		mg/L	30	45	--	--	--
Total Suspended Solids (TSS)		mg/L	30	45	--	--	--
Oil and Grease		mg/L	10	--	20	--	--
pH		standard units	--	--	--	6.0	9.0
Total Coliform Bacteria		MPN/ 100 ml	--	240	--	--	10000
Total Chlorine Residual		mg/L	--	--	--	0.0	0.0

a. *BOD*. This effluent limitation is unchanged from the previous permit, and is based on the Basin Plan (Chapter 4, Table 4-2).

b. *TSS.* This effluent limitation is unchanged from the previous permit, and is based on the Basin Plan (Chapter 4, Table 4-2).

c. *pH*. This effluent limitation is unchanged from the previous permit, and is based on the Basin Plan (Chapter 4, Table 4-2). Pursuant to 40 CFR 401.17, pH effluent limitations under continuous monitoring, 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.

d. *Oil and grease.* This effluent limitation is based on the Basin Plan (Chapter 4, Table 4-2).

e. *Total Chlorine Residual.* This effluent limitation is based on the Basin Plan (Chapter 4, Table 4-2).

f. *BOD and TSS Percent Removal* The average monthly percent removal of BOD and TSS

shall not be less than 85 percent. Demonstration of compliance for removal rates will be based upon concentrations, instead of loads as was in the previous permit, consistent with 40CFR 133.102.

g. *Total Coliform Bacteria.* The five-sample median total coliform density shall not exceed 240 MPN/100 mL and the daily maximum value shall not exceed 10,000 MPN/100mL. These limits are based on the Basin Plan (Chapter 4, Table 4-2).

C. 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.

Section 122.44(d)(1)(i) mandates that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) must be established using: (1) 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 section 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBELs when necessary is intended to protect the designated uses of the receiving water as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR.

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; the California Toxics Rule (CTR), established by USEPA at 40 CFR §131.38; and the National Toxics Rule (NTR), established by USEPA at 40 CFR §131.36. Some pollutants have WQC/WQOs established by more than one of these three sources.

a. *Applicable Beneficial Uses.* Beneficial uses applicable to Central San Francisco Bay are from the Basin Plan and are as follows:

Table F-8. Basin Plan Beneficial Uses of Central San Francisco Bay

Discharge Point	Receiving Water Name	Beneficial Use(s)
001	Central San Francisco Bay	Ocean Commercial and Sport Fishing (COMM) Estuarine Habitat (EST) Industrial Service Supply (IND) Fish Migration (MIGR) Navigation (NAV) Industrial Process Water Supply (PROC) Preservation of Rare and Endangered Species (RARE) Water Contact Recreation (REC1) Non-contact Water Recreation (REC2) Shellfish Harvesting (SHELL) Fish Spawning (SPWN) Wildlife Habitat (WILD)

b. The WQOs/WQC applicable to the receiving water of this discharge are from the Basin Plan, CTR, and NTR.

(1) 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 objectives are arsenic, cadmium, chromium (VI), copper in freshwater, lead, mercury, nickel, silver, zinc, and cyanide. The narrative toxicity objective states in part that "[a]ll waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms." The bioaccumulation objective states in part that "[c]ontrollable 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 are designed, based on available information, to implement these objectives.

(2) 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 Tables 3-3 and 3-4 of the Basin Plan include numeric objectives for certain of these priority toxic pollutants, which supersede criteria of the CTR (except in the South Bay south of the Dumbarton Bridge).

(3) NTR. The NTR establishes numeric aquatic life criteria for selenium, numeric aquatic life and human health criteria for cyanide, and numeric human health criteria for 34 toxic organic pollutants for waters of San Francisco Bay upstream to, and including Suisun Bay and the Delta. These criteria of the NTR are applicable to Central San Francisco Bay, the receiving water for these Dischargers.

c. Where RP exists, but numeric WQOs/WQC have not been established or updated in the Basin Plan, CTR, or NTR, 40 CFR §122.44(d) and Chapter 4 of the Basin Plan specify that WQBELs may be set based on USEPA criteria, supplemented where necessary by other relevant information, to attain and maintain narrative WQC to fully protect designated beneficial uses. This Fact Sheet discusses the specific bases and rationales for the effluent limitations, and is incorporated as part of the Order.

d. *Basin Plan Amendment*. On January 21, 2004, the Regional Water Board adopted Resolution No. R2-2004-0003 amending the Basin Plan to (1) update the dissolved WQOs for metals to be identical to the CTR WQC except for cadmium; (2) to change the Basin Plan definitions of marine, estuarine and freshwater to be consistent with the CTR definitions; (3) to update NPDES implementation provisions to be consistent with the SIP; (4) to remove settleable matter effluent limitations for POTWs, and other editorial changes. Subsequent to approval by the State Water Board and the Office of Administrative Law (OAL) (July 22, 2004, and October 4, 2004, respectively), USEPA approved the amendment on January 5, 2005.

e. *Basin Plan and CTR Receiving Water Salinity Policy.* The Basin Plan and CTR state that the salinity characteristics (i.e., freshwater versus saltwater) of the receiving water shall be considered in determining the applicable WQOs/WQC. Freshwater criteria shall apply to discharges to waters with salinities equal to or less than 1 ppt at least 95 percent of the time. Saltwater criteria shall 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 waters with salinities in between these two categories, or tidally influenced fresh waters that support estuarine beneficial uses, the criteria shall be the lower of the salt- or freshwater criteria (the freshwater criteria for some metals are calculated based on ambient hardness) for each substance.

   The receiving water for these Dischargers, Central San Francisco Bay, is a salt water environment based on salinity data generated through the Regional Monitoring Program (RMP) and the Richardson Bay, Point Isabel, and Yerba Buena Island sampling stations for the period February 1993 – August 2001. In that period, the receiving water's minimum salinity was 11 ppt, its maximum salinity was 31 ppt, and its average salinity was 23 ppt. As salinity was greater than 10 ppt in 100 percent of the receiving water samples, the saltwater criteria from the Basin Plan, NTR, and CTR are applicable to this discharge.

f. *Copper/Nickel Translators.* Because NPDES regulations at 40 CFR §122.45 (c) require effluent limitations for metals to be expressed as total recoverable metal, and applicable water quality criteria for the metals are typically expressed as dissolved metal, factors or translators must be used to convert metals concentrations from dissolved to total recoverable and vice versa. In the CTR, USEPA establishes default translators which are used in NPDES permitting activities; however, site-specific conditions such as water temperature, pH, suspended solids, and organic carbon greatly impact the form of metal (dissolved, filterable, or otherwise) which is present and therefore available in the water to cause toxicity. In general, the dissolved form of the metals is more available and

more toxic to aquatic life than filterable forms. Site-specific translators can be developed to account for site-specific conditions, thereby preventing exceedingly stringent or under protective water quality objectives.

For deep water discharges to Central San Francisco Bay, the Regional Water Board staff are using the following translators for copper and nickel, based on recommendations of the Clean Estuary Partnership's *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2005). In determining the need for and calculating WQBELs for all other metals, the Regional Water Board staff has used default translators established by the USEPA in the CTR at 40 CFR §131.38 (b) (2), Table 2.

Table F-9. Metal Translators

Cu and Ni Translators for Deepwater Discharges to Central San Francisco Bay	Copper		Nickel	
	AMEL Translator	**MDEL Translator**	**AMEL Translator**	**MDEL Translator**
	0.74	0.88	0.65	0.85

3. Determining the Need for WQBELs

NPDES regulations at 40 CFR §122.44 (d) (1) (i) require permits to include WQBELs for all pollutants (non-priority or priority) "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 narrative or numeric criteria within a State water quality standard" (have Reasonable Potential). Thus, assessing whether a pollutant has Reasonable Potential is the fundamental step in determining whether or not a WQBEL is required. For non-priority pollutants, Regional Water Board staff used available monitoring data, receiving water's designated uses, and/or previous permit pollutant limitations to determine Reasonable Potential as described in Sections 3.a. and 3.b. below. For priority pollutants, Regional Water Board staff used the methods prescribed in Section 1.3 of the SIP to determine if the discharge from these Dischargers demonstrate reasonable potential as described below.

a. Reasonable Potential Analysis

Using the methods prescribed in Section 1.3 of the SIP, Regional Water Board staff analyzed the effluent data to determine if the discharge from the WCWD plant or the Richmond plant demonstrates Reasonable Potential. The Reasonable Potential Analysis (RPA) compares the effluent data with numeric and narrative WQOs in the Basin Plan and numeric WQC from the USEPA, the NTR, and the CTR. The Basin Plan objectives and CTR criteria are shown in Appendix A of this Fact Sheet.

b. Reasonable Potential Methodology

Using the methods and procedures prescribed in Section 1.3 of the SIP, Regional Water Board staff analyzed the effluent and background data and the nature of facility

operations to determine if the discharge has reasonable potential to cause or contribute to exceedances of applicable SSOs or WQC. Appendix A of this Fact Sheet shows the stepwise process described in Section 1.3 of the SIP.

The RPA projects a maximum effluent concentration (MEC) for each pollutant based on existing data, while accounting for a limited data set and effluent variability. There are three triggers in determining Reasonable Potential.

(1) The first trigger is activated if the MEC is greater than the lowest applicable WQO (MEC ≥ WQO), which has been adjusted, if appropriate, for pH, hardness, and translator data. If the MEC is greater than the adjusted WQO, then that pollutant has reasonable potential, and a WQBEL is required.

(2) The second trigger 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 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/WQC. A limitation may be required under certain circumstances to protect beneficial uses.

c. Effluent Data

The Regional Water Board's August 6, 2001 letter titled *Requirement for Monitoring of Pollutants in Effluent and Receiving Water to Implement New Statewide Regulations and Policy* (hereinafter referred to as the Regional Water Board's August 6, 2001 Letter) to all permittees, formally required the Dischargers (pursuant to Section 13267 of the CWC) to initiate or continue to monitor for the priority pollutants using analytical methods that provide the best detection limits reasonably feasible. Regional Water Board staff analyzed this effluent data and the nature of the discharge to determine if the discharge has Reasonable Potential. The RPA was based on the effluent monitoring data collected by the Dischargers from January 2004 through December 2006 for most inorganic pollutants, and from February 2002 through September 2006 for most organic pollutants.

d. Ambient Background Data

Ambient background values are used in the RPA and in the calculation of effluent limitations. For the RPA, ambient background concentrations are the observed maximum detected water column concentrations. The SIP states that for calculating WQBELs, ambient background concentrations are either the observed maximum ambient water column concentrations or, for criteria/objectives intended to protect human health from carcinogenic effects, the arithmetic mean of observed ambient water concentrations. The RMP station at Yerba Buena Island, located in the Central Bay, has been monitored for most of the inorganic (CTR constituent numbers 1–15) and some of the organic (CTR constituent numbers 16–126) toxic pollutants, and this data from the

RMP was used as background data in performing the RPA for these Dischargers.

Not all the constituents listed in the CTR have been analyzed by the RMP. These data gaps are addressed by the Regional Water Board's August 6, 2001 Letter. The Regional Water Board's August 6, 2001 Letter formally requires dischargers (pursuant to Section 13267 of the California Water Code) to conduct ambient background monitoring and effluent monitoring for those constituents not currently monitored by the RMP and to provide this technical information to the Regional Water Board.

On May 15, 2003, a group of several San Francisco Bay Region dischargers (known as the Bay Area Clean Water Agencies, or BACWA) submitted a collaborative receiving water study, entitled the *San Francisco Bay Ambient Water Monitoring Interim Report*. This study includes monitoring results from sampling events in 2002 and 2003 for the remaining priority pollutants not monitored by the RMP. The RPA was conducted and the WQBELs were calculated using RMP data from 1993 through 2003 for inorganics and organics at the Yerba Buena Island RMP station, and additional data from the BACWA *Ambient Water Monitoring: Final CTR Sampling Update Report* for the Yerba Buena Island RMP station. The Dischargers may utilize the receiving water study provided by BACWA to fulfill all requirements of the August 6, 2001 letter for receiving water monitoring in this Order.

e. RPA Determination

The MECs, most stringent applicable WQOs/WQC, and background concentrations used in the RPA are presented in the following table, along with the RPA results (yes or no) for each pollutant analyzed. Reasonable potential was not determined for all pollutants, as there are not applicable water quality objectives/criteria for all pollutants, and monitoring data was not available for others. RPA results are shown below. The pollutants that exhibit Reasonable Potential are copper, mercury, selenium, nickel, cyanide, bis(2-ethylhexyl)phthalate, 4,4-DDD, heptachlor, and dioxin–TEQ.

Table F-10. RPA Results for Discharge Point No. 001

CTR #	Priority Pollutants	MEC or Minimum DL [a][b] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [a][b] (µg/L)	RPA Results[c]
1	Antimony	**0.7**	4300	1.8	No
2	Arsenic	**11**	36	2.46	No
3	Beryllium	Not Available	No Criteria	0.215	Ud
4	Cadmium	**0.16**	3.4	0.13	No
5a	Chromium (III)	**1.8**	644	Not Available	No
5b	Chromium (VI)	Not Available	11	4.4	Cannot Determine
6	Copper	**15**	4.2	2.55	**Yes**
7	Lead	**2.4**	8.5	0.80	No
8	Mercury (303d listed)	**0.032**	0.025	0.0086	**Yes**
9	Nickel	**13**	13	3.7	**Yes**
10	Selenium	**9.0**	5.0	0.39	**Yes**
11	Silver	**0.15**	2.2	0.052	No

CTR #	Priority Pollutants	MEC or Minimum DL [a][b] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [a][b] (µg/L)	RPA Results[c]
12	Thallium	Not Available	6.3	0.21	Cannot Determine
13	Zinc	**52**	86	5.1	No
14	Cyanide	**13**	1.0	< 0.4	**Yes**
15	Asbestos	Not Available	No Criteria	Not Available	Ud
16	2,3,7,8-TCDD (303d listed)	< 6.37 E-07	1.4E-08	Not Available	No
16-TEQ	Dioxin TEQ (303d listed)	**1.6 E-08**	1.4E-08	7.10E-08	**Yes**
17	Acrolein	< 0.5	780	< 0.5	No
18	Acrylonitrile	< 0.33	0.66	0.03	No
19	Benzene	< 0.03	71	< 0.05	No
20	Bromoform	**28**	360	< 0.5	No
21	Carbon Tetrachloride	< 0.04	4.4	0.06	No
22	Chlorobenzene	< 0.03	21,000	< 0.5	No
23	Chlorodibromomethane	**7.1**	34	< 0.05	No
24	Chloroethane	**0.07**	No Criteria	< 0.5	Ud
25	2-Chloroethylvinyl ether	< 0.1	No Criteria	< 0.5	Ud
26	Chloroform	**38**	No Criteria	< 0.5	Ud
27	Dichlorobromomethane	**23**	46	< 0.05	No
28	1,1-Dichloroethane	< 0.04	No Criteria	< 0.05	Ud
29	1,2-Dichloroethane	< 0.04	99	0.04	No
30	1,1-Dichloroethylene	< 0.05	3.2	< 0.5	No
31	1,2-Dichloropropane	**<** 0.03	39	< 0.05	No
32	1,3-Dichloropropylene	< 0.02	1,700	Not Available	No
33	Ethylbenzene	< 0.04	29,000	< 0.5	No
34	Methyl Bromide	< 0.05	4,000	< 0.5	No
35	Methyl Chloride	**0.7**	No Criteria	< 0.5	Ud
36	Methylene Chloride	**0.7**	1,600	0.5	No
37	1,1,2,2-Tetrachloroethane	< 0.04	11	< 0.05	No
38	Tetrachloroethylene	**1.6**	8.9	< 0.05	No
39	Toluene	**0.94**	200,000	< 0.3	No
40	1,2-Trans-Dichloroethylene	< 0.05	140,000	< 0.5	No
41	1,1,1-Trichloroethane	< 0.03	No Criteria	< 0.5	Ud
42	1,1,2-Trichloroethane	< 0.03	42	< 0.05	No
43	Trichloroethylene	**0.8**	81	< 0.5	No
44	Vinyl Chloride	< 0.05	525	< 0.5	No
45	2-Chlorophenol	< 0.2	400	< 1.2	No
46	2,4-Dichlorophenol	< 0.3	790	< 1.3	No
47	2,4-Dimethylphenol	**0.29**	2,300	< 1.3	No
48	2-Methyl- 4,6-Dinitrophenol	< 0.9	765	< 1.2	No
49	2,4-Dinitrophenol	< 0.6	14,000	< 0.7	No
50	2-Nitrophenol	< 0.1	No Criteria	< 1.3	Ud
51	4-Nitrophenol	< 0.6	No Criteria	< 1.6	Ud
52	3-Methyl 4-Chlorophenol	< 0.2	No Criteria	< 1.1	Ud
53	Pentachlorophenol	< 0.9	7.9	< 1.0	No
54	Phenol	Not Available	4,600,000	< 1.3	Cannot Determine
55	2,4,6-Trichlorophenol	**0.33**	6.5	< 1.3	No
56	Acenaphthene	< 0.03	2,700	0.0015	No
57	Acenaphthylene	< 0.02	No Criteria	0.00053	Ud
58	Anthracene	< 0.0034	110,000	0.0005	No
59	Benzidine	< 01.0	0.00054	< 0.0015	No
60	Benzo(a)Anthracene	< 0.0058	0.049	0.0053	No

CTR #	Priority Pollutants	MEC or Minimum DL [a][b] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [a][b] (µg/L)	RPA Results[c]
61	Benzo(a)Pyrene	< 0.0079	0.049	0.00029	No
62	Benzo(b)Fluoranthene	< 0.0079	0.049	0.0046	No
63	Benzo(ghi)Perylene	< 0.012	No Criteria	0.0027	Ud
64	Benzo(k)Fluoranthene	< 0.02	0.049	0.0015	No
65	Bis(2-Chloroethoxy)Methane	< 0.1	No Criteria	< 0.3	Ud
66	Bis(2-Chloroethyl)Ether	< 0.2	1.4	< 0.3	No
67	Bis(2-Chloroisopropyl)Ether	< 0.6	170,000	Not Available	No
68	Bis(2-Ethylhexyl)Phthalate	**7.7**	5.9	< 0.5	**Yes**
69	4-Bromophenyl Phenyl Ether	< 0.1	No Criteria	< 0.23	Ud
70	Butylbenzyl Phthalate	**0.2**	5,200	< 0.52	No
71	2-Chloronaphthalene	< 0.2	4,300	< 0.3	No
72	4-Chlorophenyl Phenyl Ether	< 0.2	No Criteria	< 0.3	Ud
73	Chrysene	< 0.0036	0.049	0.0024	No
74	Dibenzo(a,h)Anthracene	< 0.0054	0.049	0.00064	No
75	1,2-Dichlorobenzene	**0.08**	17,000	< 0.8	No
76	1,3-Dichlorobenzene	< 0.03	2,600	< 0.8	No
77	1,4-Dichlorobenzene	**1.1**	2,600	< 0.8	No
78	3,3 Dichlorobenzidine	< 0.1	0.077	< 0.001	No
79	Diethyl Phthalate	**0.38**	120,000	< 0.24	No
80	Dimethyl Phthalate	< 0.1	2,900,000	< 0.24	No
81	Di-n-Butyl Phthalate	**0.29**	12,000	< 0.5	No
82	2,4-Dinitrotoluene	< 0.1	9.1	< 0.27	No
83	2,6-Dinitrotoluene	< 0.2	No Criteria	< 0.29	Ud
84	Di-n-Octyl Phthalate	< 0.1	No Criteria	< 0.38	Ud
85	1,2-Diphenylhydrazine	< 0.6	0.54	0.0037	No
86	Fluoranthene	< 0.009	370	0.011	No
87	Fluorene	< 0.0073	14,000	0.00208	No
88	Hexachlorobenzene	< 0.0015	0.00077	0.0000202	No
89	Hexachlorobutadiene	< 0.4	50	< 0.3	No
90	Hexachlorocyclopentadiene	< 0.4	17,000	< 0.31	No
91	Hexachloroethane	< 0.4	8.9	< 0.2	No
92	Indeno(1,2,3-cd)Pyrene	< 0.0045	0.049	0.004	No
93	Isophorone	< 0.1	600	< 0.3	No
94	Naphthalene	**0.1**	No Criteria	0.0023	Ud
95	Nitrobenzene	< 0.1	1,900	< 0.25	No
96	N-Nitrosodimethylamine	< 0.2	8.1	< 0.3	No
97	N-Nitrosodi-n-Propylamine	< 0.1	1.4	< 0.001	No
98	N-Nitrosodiphenylamine	< 0.1	16	< 0.001	No
99	Phenanthrene	< 0.0063	No Criteria	0.0061	Ud
100	Pyrene	< 0.0027	11,000	0.0051	No
101	1,2,4-Trichlorobenzene	< 0.3	No Criteria	< 0.3	Ud
102	Aldrin	< 0.0018	0.00014	Not Available	No
103	alpha-BHC	**0.002**	0.013	0.000496	No
104	beta-BHC	< 0.001	0.046	0.000413	No
105	gamma-BHC	< 0.002	0.063	0.0007034	No
106	delta-BHC	< 0.00064	No Criteria	0.000042	Ud
107	Chlordane (303d listed)	< 0.005	0.00059	0.00018	No
108	4,4'-DDT (303d listed)	< 0.0013	0.00059	0.000066	No
109	4,4'-DDE (linked to DDT)	< 0.00097	0.00059	0.000693	No

CTR #	Priority Pollutants	MEC or Minimum DL [a][b] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [a][b] (µg/L)	RPA Results[c]
110	4,4'-DDD	**0.0055**	0.00084	0.000313	**Yes**
111	Dieldrin (303d listed)	< 0.00077	0.00014	0.000264	No
112	alpha-Endosulfan	< 0.00067	0.0087	0.000031	No
113	beta-Endolsulfan	< 0.00055	0.0087	0.000069	No
114	Endosulfan Sulfate	< 0.00078	240	0.0000819	No
115	Endrin	< 0.00063	0.0023	0.000036	No
116	Endrin Aldehyde	< 0.00042	0.81	Not Available	No
117	Heptachlor	**0.0028**	0.00021	0.000019	**Yes**
118	Heptachlor Epoxide	< 0.0012	0.00011	0.00002458	No
119-125	PCBs sum (303d listed)	< 0.32	0.00017	Not Available	No
126	Toxaphene	< 0.072	0.0002	Not Available	No
	Tributylin	< 0.00018	0.001	< 0.001	No
	Total PAHs	Not Available	15	0.26	Cannot Determine

[a] The Maximum Effluent Concentration (MEC) or maximum background concentration is the actual detected concentration unless there is a "<" sign before it, in which case the value shown is the minimum detection level.
[b] The MEC or maximum background concentration is "Not Available" when there are no monitoring data for the constituent.
[c] RPA Results = Yes, if MEC > WQO/WQC, or B > WQO/WQC and MEC is detected;
= No, if MEC and B are < WQO/WQC or all effluent data are undetected;
= Undetermined (Ud), if no criteria have been promulgated;
= Cannot Determine, if there are insufficient data.

(1) Constituents with limited data. The Dischargers have performed sampling and analysis for the constituents listed in the CTR. This data set was used to perform the RPA. In some cases, Reasonable Potential cannot be determined because effluent data are limited, or ambient background concentrations are not available. 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 to add numeric effluent limitations to this Order or to continue monitoring.

(2) 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 source(s) of the increase(s). Remedial measures are required if the increases pose a threat to water quality in the receiving water.

The previous permit (Order No. 01-144) included WQBELs for zinc; however, because the RPA showed that discharges no longer demonstrate a reasonable potential to cause or contribute to exceedances of applicable water quality criteria for this pollutant, limitations from the previous permit are not retained.

4. WQBEL Calculations

a. WQBELs were developed for the toxic and priority pollutants that were determined to have reasonable potential to cause or contribute to exceedances of the WQOs or WQC.

The WQBELs were calculated based on appropriate WQOs/WQC and the appropriate procedures specified in Section 1.4 of the SIP. The WQOs or WQC used for each pollutant with Reasonable Potential is discussed below.

b. Dilution Credit - The SIP provides the basis for the dilution credit granted. The outfall is designed to achieve an initial dilution of at least 10:1. However, review of RMP data (local and Central Bay stations) indicates there is variability in the receiving water, and the hydrology of the receiving water is very complex. Therefore, there is uncertainty associated with the representative nature of the appropriate ambient background data for effluent limit calculations. Pursuant to Section 1.4.2.1 of the SIP, "dilution credit may be limited or denied on a pollutant-by-pollutant basis…." The Regional Water Board finds that a conservative 10:1 dilution credit for non-bioaccumulative priority pollutants, except for ammonia and cyanide, and a zero dilution credit for bioaccumulative priority pollutants are necessary for protection of beneficial uses. The detailed basis for each are explained below.

1) For certain bioaccumulative pollutants, based on BPJ, dilution credit is not included in calculating the final WQBELs. This determination is based on available data on concentrations of these pollutants in aquatic organisms, sediment, and the water column. The Regional Water Board placed selenium, mercury, and polychlorinated biphenyls (PCBs) on the CWA Section 303(d) list. U.S. EPA added dioxin and furan compounds, chlordane, dieldrin, and 4,4'-DDT to the CWA Section 303(d) list. Dilution credit is not included for mercury. The following factors suggest that there is no more assimilative capacity in the Bay for these pollutants.

   San Francisco Bay fish tissue data show that these pollutants exceed screening levels. The fish tissue data are contained in *Contaminant Concentrations in Fish from San Francisco Bay 1997* (May 1997). Denial of dilution credits for these pollutants is further justified by fish advisories for San Francisco Bay. The Office of Environmental Health and Hazard Assessment (OEHHA) performed a preliminary review of the data from the 1994 San Francisco Bay pilot study, *Contaminated Levels in Fish Tissue from San Francisco Bay*. The results of the study showed elevated levels of chemical contaminants in the fish tissues. Based on these results, OEHHA issued an interim consumption advisory covering certain fish species from the Bay in December 1994. This interim consumption advice was issued and is still in effect owing to health concerns based on exposure to sport fish from the Bay contaminated with mercury, dioxins, and pesticides (e.g., DDT).

   For selenium, the denial of dilution credits is based on Bay waterfowl tissue data presented in the California Department of Fish and Game's Selenium Verification Study (1986-1990). This data shows elevated levels of selenium in the livers of waterfowl that feed on bottom dwelling organisms such as clams. Additionally, in 1987 the OEHHA issued an advisory for the consumption of two species of diving duck in the north bay found to have high levels of selenium. This advisory is still in effect.

2) Furthermore, Section 2.1.1 of the SIP states that for bioaccumulative compounds on the 303(d) list, the Regional Water Board should consider whether mass-loading limits should be limited to current levels. The Regional Water Board finds that mass-loading limits are warranted for mercury for the receiving waters for these Dischargers. This is to ensure that these Dischargers do not contribute further to impairment of the narrative objective for bioaccumulation.

3). For non-bioaccumulative constituents (except ammonia and cyanide), a conservative allowance of 10:1 dilution for discharges to the Bay has been assigned for protection of beneficial uses. This 10:1 dilution ratio is based on the Basin Plan's Prohibition No. 1 from Table 4, which prohibits discharges like those from Discharge Point 001 with less than 10:1 dilution. As existing outfall structure at Discharge Point 001 is designed to achieve a minimum 10:1 initial dilution. Limiting the dilution credit is based on SIP provisions in Section 1.4.2. The following outlines the basis for derivation of the dilution credit.

i. A far-field background station is appropriate because the receiving water body (the Bay) is a very complex estuarine system with highly variable and seasonal upstream freshwater inflows and diurnal tidal saltwater inputs. The SIP allows background to be determined on a discharge-by-discharge or water body-by-water body basis (SIP 1.4.3). Consistent with the SIP, Regional Water Board staff has chosen to use a water body-by-water body basis because of the uncertainties inherent in accurately characterizing ambient background in a complex estuarine system on a discharge-by-discharge basis. The Yerba Buena Island Station fits the guidance for ambient background in the SIP compared to other stations in the RMP. The SIP states that background data are applicable if they are "representative of the ambient receiving water column that will mix with the discharge." Regional Water Board staff believes that data from this station are representative of water that will mix with the discharge. Although this station is located near the Golden Gate, it would represent the typical water flushing in and out of the Bay each tidal cycle. For most of the Bay, the waters represented by this station make up a large part of the receiving water that will mix with the discharge.

ii. Because of the complex hydrology of the San Francisco Bay, a mixing zone has not been established. There are uncertainties in accurately determining the mixing zones for each discharge. The models that have been used to predict dilution have not considered the three-dimensional nature of the currents in the estuary resulting from the interaction of tidal flushes and seasonal fresh water outflows. Salt water is heavier than fresh water, colder saltwater from the ocean flushes in twice a day generally under the warmer fresh river waters that flow out annually. When these waters mix and interact, complex circulation patterns occur due to the different densities of these waters. These complex patterns occur throughout the estuary but are most prevalent in the San Pablo, Carquinez Strait, and Suisun Bay areas. The locations change depending on the strength of each tide and the variable rate of delta outflow. Additionally, sediment loads to

the bay from the Central Valley also change on a longer-term basis. These changes can result in changes to the depths of different parts of the Bay making some areas more shallow and/or other areas more deep. These changes affect flow patterns that in turn can affect the initial dilution achieved by a diffuser.

iii. The SIP allows limiting a mixing zone and dilution credit for persistent pollutants (e.g., copper, silver, nickel, and lead). Discharges to the bay are defined in the SIP as incompletely mixed discharges. Thus, dilution credit should be determined using site-specific information. The SIP 1.4.2.2 specifies that the Regional Water Board "significantly limit a mixing zone and dilution credit as necessary… For example, in determining the extent of a mixing zone or dilution credit, the RWQCB shall consider the presence of pollutants in the discharge that are …persistent." The SIP defines persistent pollutants to be "substances for which degradation or decomposition in the environment is nonexistent or very slow." The pollutants at issue here are persistent pollutants (e.g., copper). The dilution studies that estimate actual dilution do not address the effects of these persistent pollutants in the Bay environment, such as their long-term effects on sediment concentrations.

iv. In calculating WQBELs for total ammonia and cyanide, an actual initial dilution of 25:1 was used based on the Dischargers' dilution study[4]. This is because ammonia and cyanide are not persistent pollutants. The Basin Plan states: "In most instances, ammonia will be diluted or degraded to a nontoxic state fairly rapidly." In the case of cyanide, like ammonia, it quickly disperses and degrades. As such, there is unlikely to be cumulative toxicity effects associated with discharges containing elevated concentrations of ammonia and cyanide. Therefore, granting dilution credits based on actual initial dilution is protective of water quality.

c. Interim Limitations and Compliance Schedules

(1) The SIP and the Basin Plan authorize compliance schedules in a permit if an existing discharger cannot immediately comply with a new and more stringent effluent limitation. Compliance schedules for limitations derived from CTR WQC are based on Section 2.2 of the SIP, and compliance schedules for limitations derived from Basin Plan WQOs and the NTR are based on the Basin Plan. Both the SIP and the Basin Plan require the Dischargers to demonstrate the infeasibility of achieving immediate compliance with the new limitation to qualify for a compliance schedule.

The SIP and Basin Plan require the following documentation to be submitted to the Regional Water Board to support a finding of infeasibility:

-- Descriptions of diligent efforts the Dischargers have made to quantify pollutant levels in the discharge, sources of the pollutant in the waste stream, and the results of those efforts;

[4] Evaluation of the Initial Dilution (45:1) Requirement San Pablo-Richmond Wastewater Outfall (1977). Jones & Stokes Associates and Brown and Caldwell Engineers

-- Descriptions of source control and/or pollutant minimization efforts currently under way or completed;

-- A proposed schedule for additional or future source control measures, pollutant minimization, or waste treatment; and

-- A demonstration that the proposed schedule is as short as practicable.

The Basin Plan provides for a 10-year compliance schedule to implement measures to comply with new standards as of the effective date of those standards. This provision applies to the objectives adopted in the 2004 Basin Plan Amendment. Additionally, the provision authorizes compliance schedules for new interpretations of other existing standards if the new interpretation results in more stringent limitations. Pursuant to State Water Board Order WQ-2007-0004, new interpretations are limited to existing narrative standards, but not numeric standards.

(2) On June 19, 2007 the Dischargers submitted a feasibility study (the 2007 Feasibility Study), asserting it is infeasible to immediately comply with final WQBELs, for selenium, cyanide, dioxin-TEQ, 4,4-DDD and heptachlor. Based on this analysis and the Regional Water Board's own evaluation of feasibility to comply, the Regional Water Board concurs that it is infeasible to achieve immediate compliance with final limitations for selenium, cyanide, dioxin-TEQ, 4,4-DDD and heptachlor. The basis for the Regional Water Board's conclusion for each parameter is provided in Section IV.C.4.d of this Fact Sheet.

d. WQBEL Calculations for Priority Pollutants

The WQBEL calculations for priority pollutants are summarized below:

Table F-11. Effluent Limitation Calculations for Discharge Point No. E-001-DC

POLLUTANT	Copper		Mercury	Nickel	Selenium	Cyanide		Dioxin-TEQ	Bis(2-ethylhexyl) phthalate	4,4-DDD	Hepta-chlor
Units	µg/L		µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L
Basis and Criteria type	BP & CTR SW Aquatic Life	Alt. limit using SSOs (Dec 04)	BP FW & SW Aquatic Life	BP & CTR SW Aquatic Life	CTR FW & SW Aquatic Life	NTR Criterion for the Bay	Alternate Limits Using Proposed SSOs	Basin Plan HH	CTR HH	CTR HH	CTR HH
CTR Criteria - Acute	5.5	---	2.1	87	20	1.0	9.4	---	---	---	0.053
CTR Criteria - Chronic	4.2	---	0.025	13	5	1.0	2.9	---	---	---	0.0036
SSO Criteria - Acute		3.9									
SSO Criteria - Chronic		2.5									
Water Effects Ratio	2.4	2.4	1	1	1	1	1	1	1	1	1
Lowest WQO (µg/L)	4.19		0.025	13	5.0	1.0	1.0	1.4E-08	5.9	0.00084	0.00021
Site Specific Translator-MDEL	0.88	0.88		0.85							
Site Specific Translator-AMEL	0.74	0.74		0.65							
Dilution Factor (D) (if applicable)	9	9	0	9	0	24	9	0	9	0	9
No. of samples per month	4	4	4	4	4	4	4	4	4	4	4
Aquatic life criteria analysis required? (Y/N)	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y
HH criteria analysis required? (Y/N)	N	N	Y	N	N	N	N	Y	N	Y	N
Applicable Acute WQO	13.09	10.64	2.1	87	20	1	9.4				0.053
Applicable Chronic WQO	10.05	8.11	0.025	13	5.0	1	2.9				0.0036
HH criteria			0.05			220,000	220,000	1.4E-08	54.5	8.4E-04	0.0021
Background (max conc for Aquatic Life calc)	2.55	2.55	0.0086	3.73	0.39	0.4	0.4	7.1E-08	0.5	3.1E-04	1.9E-05
Background (avg conc for HH calc)			0.0022		0.153	0.4	0.4	5.0E-08	0.5	9.4E-05	7.5E-06
Is the pollutant bioaccumulative (Y/N)?	N	N	Y	N	Y	N	N	Y	N	Y	Y

	Copper		Mercury	Nickel	Selenium	Cyanide		Dioxin-TEQ	Bis(2-ethylhexyl) phthalate	4,4-DDD	Hepta-chlor
ECA acute	108	83.4	2.1	837	20.0	15.4	90.4				0.5
ECA chronic	77.6	58.1	0.025	92.6	5.0	15.4	25.4				0.019
ECA HH			0.051			5.5E+06	2.2E+06	1.4E-08	54.5	8.4E-04	0.00203
No. of data points <10 or at least 80% reported non detect?	N	N	N	N	N	N	N	Y	N	Y	Y
Ave of data points	7.22	7.22	0.011	6.9	2.11	4.57	4.57		1.70		
SD	1.90	1.90	0.005	1.7	1.83	2.62	2.62		2.19		
CV calculated	0.26	0.26	0.47	0.25	0.87	0.57	0.57		1.29		
CV (Selected) - Final	0.26	0.26	0.47	0.25	0.87	0.57	0.57	0.60	1.29	0.60	0.60
ECA acute mult99	0.57	0.57	0.394	0.58	0.232	0.33	0.33				0.321
ECA chronic mult99	0.74	0.74	0.602	0.75	0.415	0.54	0.54				0.527
LTA acute	61.1	47.2	0.827	485	4.64	5.14	30.2				0.170
LTA chronic	57.7	43.2	0.015	69.7	2.08	8.33	13.7				0.019
Minimum of LTAs	57.7	43.2	0.015	69.7	2.08	5.14	13.7				0.019
AMEL mult95	1.23	1.23	1.42	1.22	1.82	1.53	1.53	1.55	2.21	1.55	1.55
MDEL mult99	1.77	1.77	2.545	1.73	4.31	3.00	3.00	3.11	6.11	3.11	3.11
AMEL (aq life)	71.0	53.2	0.02	85.0	3.78	7.84	21.0				0.03
MDEL(aq life)	102	76.3	0.04	120	8.94	15.4	41.2				0.06
MDEL/AMEL Multiplier	1.44	1.44	1.79	1.42	2.37	1.96	1.96	2.01	2.76	2.01	2.01
AMEL (human hlth)			0.051			5.5E+06	2.2E+06	1.4E-08	54.5	0.001	0.002
MDEL (human hlth)			0.051					2.8E-08	150	0.002	0.004
Minimum of AMEL for Aq. life vs HH	71	53	0.021	85	3.8	7.8	21	1.4E-08	55	0.00084	0.002
Minimum of MDEL for Aq. Life vs HH	102	76	0.038	120	8.9	15.4	41	2.8E-08	150	0.0017	0.004
Current limit in permit (30-d avg)		0.087 (interim)						1.4E-07 (interim)			
Current limits in permit (daily)	17 (interim)	17 (interim)		59	17 (interim)	25 (interim)	25 (interim)				
Final limit - AMEL	**71**	**53**	**0.021**	**34**	**3.8**	**7.8**	**21**	**1.4E-08**	**55**	**0.00084**	**0.0020**
Final limit - MDEL	**102**	**76**	**0.038**	**59**	**8.9**	**15.4**	**41**	**2.8E-08**	**150**	**0.0017**	**0.0041**

e. WQBEL Calculations for Total Ammonia

The WQBEL calculations for total ammonia are summarized below:

Table F-12. Effluent Limitation Calculations for Ammonia at Discharge Point E-001-DC

Pollutant	Total Ammonia Acute	Total Ammonia Chronic
Basis and Criteria type	Basin Plan	Basin Plan
Lowest WQO (mg/L)	3.31	1.28
Dilution Factor (D) (if applicable)	24	24
No. of samples per month	4	30
Aquatic life criteria analysis required? (Y/N)	Y	Y
HH criteria analysis required? (Y/N)	N	N
Background (max conc for Aquatic Life calc)	0.17	0.08
Is the pollutant bioaccumulative (Y/N)? (e.g., Hg)	N	N
ECA acute	79	---
ECA chronic	---	30
No. of data points <10 or at least 80% reported non detect?	N	N
Avg of data points	21	21
SD	7.1	7.1
CV calculated	0.34	0.34
CV (Selected) - Final	0.34	0.34
ECA acute mult99	0.49	---
ECA chronic mult99	---	0.96
LTA acute	38	---
LTA chronic	---	29
AMEL mult95	1.3	1.1
MDEL mult99	2.1	2.1
AMEL (aq life)	50	32
MDEL(aq life)	79	59
Current limit in permit (30-d avg)	---	---
Current limits in permit (daily)	---	---
Final limit – AMEL (mg/L)	---	32
Final limit – MDEL (mg/L)	---	59

f. Summary of Numeric Effluent Limitations for Discharge Point No. E-001-DC

The numeric water quality-based effluent limitations are summarized below:

Table F-13. Summary of Numeric WQBELs

Parameters	Units	Final Limitations	
		MDEL	AMEL
Copper	µg/L	100	71
Mercury	µg/L	0.038	0.021
Selenium	µg/L	8.9	3.8
Nickel	µg/L	59	34
Cyanide	µg/L	15	7.8
Bis(2-ethylhexyl)phthalate	µg/L	150	55
4,4-DDD	µg/L	0.0017	0.00084
Heptachlor	µg/L	0.0041	0.0020
Dioxin-TEQ	µg/L	2.8E-08	1.4E-08
Total Ammonia	mg/L	59	32

g. Calculation of Pollutant Specific WQBELs

1. Copper

(a) Copper WQC. The salt water, acute and chronic criteria from the Basin Plan and the CTR for copper for protection of aquatic life are 4.2 and 5.5 µg/L, respectively. These criteria were determined using site-specific translators of 0.74 (chronic) and 0.88 (acute), as recommended by the Clean Estuary Partnership's *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2005). Site-specific translators were applied to chronic (3.1 µg/L dissolved metal) and acute (4.8 µg/L dissolved metal) criteria of the Basin Plan and the CTR for protection of salt water aquatic life to calculate the criteria of 4.2 µg/L for acute protection and 5.5 µg/L for chronic protection, which were used to perform the RPA and to calculate effluent limitations.

(b) RPA Results. This Order establishes effluent limitations for copper, as the maximum observed effluent concentration of 15 µg/L exceeds the applicable water quality criteria for this pollutant, demonstrating reasonable potential by Trigger 1, as defined previously.

(*c*) *Copper WQBELs*. WQBELs are calculated based on water quality criteria of the CTR. The criteria are expressed as total recoverable metal, using site-specific translators recommended by the Clean Estuary Partnerships' *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2004), and a water effects ratio (WER) of 2.4, as recommended by the Partnership. The following table compares effluent limitations for copper from the expiring Order (Order No. 01-144) with limitations calculated according to SIP procedures, using the two sets of criteria, described above. The newly calculated limitations take into account the deep water nature of the discharge, and therefore, in accordance with the Basin

Plan, are based on an initial dilution of 10:1.

Final Effluent Limitations for Copper		
	AMEL	**MDEL**
Order No. 01-144	---	17 µg/L (interim)
Based on CTR Criteria	71 µg/L	100 µg/L
Based on Site-Specific Objectives	53 µg/L	76 µg/L

Because the MDEL in the previous Order was an interim limitation, it is not being retained by this Order. The newly calculated limitations, based on CTR criteria are being established as final effluent limitations for copper.

(*d*) *Immediate Compliance Feasible*. Statistical analysis of effluent data for copper, collected over the period of January 2004 through December 2006, shows that the 95th percentile (10 µg/L) is less than the AMEL (71 µg/L); the 99th percentile (12 µg/L) is less than the MDEL (102 µg/L); and the mean (7.2 µg/L) is less than the long term average of the projected lognormal distribution of the effluent data set after accounting for effluent variability (58 µg/L). The Regional Water Board concludes, therefore, that immediate compliance with final effluent limitations for copper is feasible, and final effluent limitations will become effective upon adoption of the Order.

(*e*) *Alternate Limitations for Copper*. As described in the Clean Estuary Partnership's *North of Dumbarton Bridge Copper and Nickel Site-Specific Objective Determination* (December 2004), the Regional Water Board is proposing to develop site-specific criteria for copper in non-ocean, marine waters of the Region. Proposed site-specific objectives for copper are 2.5 and 3.9 µg/L as four-day and one-hour average criteria, respectively. If these site-specific objectives for copper are adopted, final effluent limitations, calculated according to Section 1.4 of the SIP, using a WER of 2.4, would be 53 µg/L (AMEL) and 76 µg/L (MDEL). If these site-specific objectives for copper are adopted, the alternate effluent limits will become effective upon the effective date of the SSO, so long as the site-specific objectives and their current justification remain unchanged.

2. Mercury

(a) Mercury WQC. The most stringent applicable water quality criteria for mercury are established by the Basin Plan for protection of fresh water aquatic life – 2.1 µg/L and 0.025 µg/L, acute and chronic criteria respectively.

(b) RPA Results. This Order establishes effluent limitations for mercury, because the receiving water for this discharge is 303(d) listed for mercury,

and the Regional Water Board's policy in these circumstances is to find Reasonable Potential by Trigger 3 and establish effluent limitations for discharges to Central San Francisco Bay.

(c) Mercury WQBELs. Mercury final WQBELs, calculated according to SIP procedures, are 0.021 µg/L (AMEL) and 0.038 µg/L (MDEL).

(d) Immediate Compliance Feasible. Statistical analysis of effluent data for mercury, collected over the period of January 2004 through December 2006, shows that the 95th percentile (0.019 µg/L) is less than the AMEL (0.021 µg/L); the 99th percentile (0.025 µg/L) is less than the MDEL (0.038 µg/L); and the mean (0.011 µg/L) is less than the long term average of the projected lognormal distribution of the effluent data set after accounting for effluent variability (0.015 µg/L). The Regional Board concludes, therefore, that immediate compliance with final effluent limitations for mercury is feasible, and final effluent limitations will become effective upon adoption of the Order.

3. Selenium

(a) Selenium WQC. The salt water, acute and chronic criteria from the NTR for seleniuim for protection of aquatic life are 20 and 5 µg/L, respectively.

(b) RPA Results. This Order establishes effluent limitations for selenium, as the maximum observed effluent concentration of 9.0 µg/L exceeds the applicable water quality criteria for this pollutant, demonstrating reasonable potential by Trigger 1, as defined previously.

(c) Selenium WQBELs. Final WQBELs for selenium, calculated according to SIP procedures, are 3.8 µg/L (AMEL) and 8.9 µg/L (MDEL).

(d) Immediate Compliance Infeasible. The Dischargers' Feasibility Study asserts that it cannot immediately comply with final WQBELs for selenium. Statistical analysis of effluent data for selenium, collected over the period of January 2004 through December 2006, show that the 95th percentile is greater than the AMEL (6.4 µg/L > 3.8 µg/L), and therefore, based on this analysis, the Regional Water Board concurs with the Dischargers' assertion of infeasibility to comply with final WQBELs for selenium.

(*e*) *Need for Cease and Desist Order.* Pursuant to State Water Board Order WQ2007-0004, compliance schedules are not authorized for numeric objectives or criteria that were in effect prior to the SIP. This includes NTR criteria for selenium. Because it is infeasible for the Dischargers to immediately comply with final WQBELs for selenium, the Dischargers will discharge in violation of this Order. Therefore, a cease and desist order will be adopted concurrent with this Order. The Cease and Desist Order is necessary to ensure that the Dischargers achieve compliance. It establishes

time schedules for the Dischargers to complete necessary investigative, preventive, and remedial actions to address its imminent and threatened violations.

4. Cyanide

(a) Cyanide WQC. The most stringent applicable water quality criteria for cyanide are established by the NTR for protection of salt water aquatic life. The NTR establishes both the saltwater Criterion Maximum Concentration (acute criterion) and the Criterion Chronic Concentration (chronic criterion) at 1.0 µg/L.

(b) RPA Results. This Order establishes effluent limitations for cyanide because the 13 µg/L MEC exceeds the governing WQC of 1 µg/L, demonstrating reasonable potential by Trigger 1, as defined in a previous finding.

(c) Cyanide WQBELs. Final WQBELs for cyanide, calculated according to SIP procedures and using actual dilution (25:1), are 7.8 µg/L (AMEL) and 15 µg/L (MDEL).

(d) Immediate Compliance Infeasible. The Dischargers' Feasibility Study asserts that it cannot immediately comply with final WQBELs for cyanide. Statistical analysis of effluent data for cyanide, collected over the period of January 2004 through December 2006, show that the 95th percentile is greater than the AMEL (8.9 µg/L > 7.8 µg/L), and therefore, based on this analysis, the Regional Water Board concurs with the Dischargers' assertion of infeasibility to comply with final WQBELs for cyanide.

(*e*) *Need for Cease and Desist Order.* Pursuant to State Water Board Order WQ2007-0004, compliance schedules are not authorized for numeric objectives or criteria that were in effect prior to the SIP. This includes NTR criteria for cyanide. Because it is infeasible for the Dischargers to immediately comply with final WQBELs for cyanide, the Dischargers will discharge in violation of this Order. Therefore, a cease and desist order will be adopted concurrent with this Order. The Cease and Desist Order is necessary to ensure that the Dischargers achieve compliance. It establishes time schedules for the Dischargers to complete necessary investigative, preventive, and remedial actions to address its imminent and threatened violations.

(f) Alternative Limit for Cyanide. As described in the Draft Staff Report on Proposed Site-Specific Water Quality Objectives and Effluent Limit Policy for Cyanide for San Francisco Bay, dated December 4, 2006, the Regional Water Board is proposing to develop site-specific criteria for cyanide. In this report, the proposed site-specific criteria for marine waters are 2.9 µg/L as a four-day average, and 9.4 µg/L as a one-hour average. Based on these

assumptions, and the Dischargers' current cyanide data (coefficient of variation of 0.90), final water WQBELs for cyanide will be 41 µg/L as an MDEL, and 21 µg/L as an AMEL. These alternative limits will become effective only if the site-specific objectives adopted for cyanide are based on the same assumptions as in the staff report, dated December 4, 2006.

5. Nickel

(a) Nickel WQC. The salt water, acute and chronic criteria from the Basin Plan and the CTR for nickel for protection of aquatic life are 87 and 13 µg/L, respectively. These criteria were determined using site-specific translators of 0.65 (chronic) and 0.85 (acute), as recommended by the Clean Estuary Partnership's *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2005). Site-specific translators were applied to chronic (8.2 µg/L dissolved metal) and acute (74 µg/L dissolved metal) criteria of the Basin Plan and the CTR for protection of salt water aquatic life to calculate the criteria of 13 µg/L for chronic protection and 87 µg/L for acute protection, which were used to perform the RPA.

(b) RPA Results. This Order establishes effluent limitations for nickel because the 13.0 µg/L MEC equals the governing WQC of 13.0 µg/L, demonstrating reasonable potential by Trigger 1, as defined in a previous finding.

(c) Nickel WQBELs. WQBELs for nickel are calculated based on water quality criteria of the CTR and are expressed as total recoverable metal, using site-specific translators recommended by the Clean Estuary Partnership's *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2004). The following table compares final effluent limitations for nickel from the expiring permit (Order No. 01-144) with limitations calculated according to SIP procedures (using a coefficient of variation of 0.25 based on the mean and standard deviation of the effluent data set). The newly calculated limitations take into account the deep water nature of the discharge and, therefore, in accordance with the Basin Plan, are based on a minimum initial dilution of 10 to 1.

Effluent Limitations for Nickel		
	AMEL	MDEL
Order No. 01-144	34 µg/L	59 µg/L
Newly Calculated Limitations	85 µg/L	120 µg/L

(d) Feasibility to Comply. Because limitations of the previous permit were final limitations, and those limitations are more stringent than newly calculated limits for nickel, final effluent limitations for nickel from the expiring permit are retained in this Order. As final limitations from the previous permit are being retained by the Order, an analysis to determine feasibility to comply with final effluent limitations is not appropriate.

(e) Antibacksliding/Antidegradation. Antibacksliding and antidegradation requirements are satisfied as final effluent limitations for nickel are retained from the previous permit.

6. Bis(2-ethylhexyl)phthalate

(a) Bis(2-ethylhexyl)phthalate WQC. The most stringent applicable water quality criteria for bis(2-ethylhexyl)phthalate is 5.9 µg/L based on the CTR.

(b) RPA Results. This Order establishes effluent limitations for bis(2-ethylhexyl)phthalate, as the maximum observed effluent concentration of 7.7 µg/L exceeds the applicable water quality criteria for this pollutant, demonstrating reasonable potential by Trigger 1, as defined previously.

(c) Bis(2-ethylhexyl)phthalate WQBELs. Final WQBELs for bis(2-ethylhexyl)phthalate, calculated according to SIP procedures, are 55 µg/L (AMEL) and 150 µg/L (MDEL).

(d) Immediate Compliance Feasible. Statistical analysis of effluent data for bis(2-ethylhexyl)phthalate, collected over the period of February 2002 through September 2006, shows that the 95th percentile (4.7 µg/L) is less than the AMEL (55 µg/L) and the 99th percentile (8.4 µg/L) is less than the MDEL (150 µg/L). The Regional Water Board concludes, therefore, that immediate compliance with final effluent limitations for bis(2-ethylhexyl)phthalate is feasible, and final effluent limitations will become effective upon adoption of the Order.

(e) Antibacksliding/Antidegradation. Antibacksliding and antidegradation requirements are satisfied, as the previous Order did not establish effluent limitations for bis(2-ethylhexyl)phthalate.

7. 4,4-DDD

(a) 4,4-DDD WQC. The most stringent applicable water quality criteria for 4,4-DDD is 0.00084 µg/L based on the CTR for protection of human health.

(b) RPA Results. This Order establishes effluent limitations for 4,4-DDD, as the maximum observed effluent concentration of 0.0055 µg/L exceeds the applicable water quality criteria for this pollutant, demonstrating reasonable potential by Trigger 1, as defined previously.

(c) 4,4-DDD WQBELs. Final WQBELs for 4,4-DDD, calculated according to SIP procedures, are 0.00084 µg/L (AMEL) and 0.0017 µg/L (MDEL).

(d) Immediate Compliance Infeasible. The Dischargers' Feasibility Study asserts that it cannot immediately comply with final WQBELs for 4,4-DDD. Since

there is insufficient data to calculate a 95th or 99th percentile concentration, feasibility to comply is determined by comparing the maximum effluent concentration (MEC, 0.0055 µg/L) to the AMEL (0.00084 µg/L) and MDEL (0.0017 µg/L). Based on these comparisons, the Regional Water Board concurs with the Dischargers' assertion of infeasibility to comply with final WQBELs for 4,4-DDD.

(e) *Interim Effluent Limitation.* Because there is insufficient data to statistically determine a performance based interim limitation, a performance-based maximum daily interim limitation is established at the minimum level of 0.05 µg/L.

(f) Term of Interim Effluent Limitation. The 4,4-DDD interim effluent limitation shall remain effective until May 18, 2010. The previous permit did not grant an interim limit for 4,4-DDD. As it is not possible for the Dischargers to document compliance because U.S. EPA approved analytical methods cannot quantify 4,4-DDD at low enough levels, it is not possible to determine compliance with final limits. Because SIP §2.1 provides for a maximum five-year compliance schedule, and the Dischargers have not been previously granted such a schedule under §2.1, the Dischargers qualify for such a §2.1 schedule up to the maximum statutory date (May 17, 2010), which is ten years from the effective date of the CTR/SIP. The basis for this compliance schedule is the CTR/SIP.

8. Heptachlor

(a) Heptachlor WQC. The most stringent applicable water quality criterion for heptachlor is 0.00021 µg/L, established by the CTR for protection of human health, when organisms are consumed from the receiving water.

(b) RPA Results. This Order establishes effluent limitations for heptachlor because the MEC of 0.0028 µg/L exceeds the governing WQC of 0.00021 µg/L, demonstrating reasonable potential by Trigger 1, as defined previously.

(c) Heptachlor WQBELs. Final WQBELs for heptachlor, calculated according to SIP procedures, are 0.0020 µg/L and 0.0041 µg/L, the AMEL and MDEL, respectively.

(d) Immediate Compliance Infeasible. The Dischargers' Feasibility Study asserts that the facility cannot immediately comply with final WQBELs for heptachlor. With insufficient effluent data to determine the distribution of the effluent data set or to calculate a mean and standard deviation, feasibility to comply with final effluent limitations is determined by comparing the MEC (0.0028 µg/L) to the AMEL (0.0020 µg/L) and the MDEL (0.0041 µg/L). Based on this comparison, the Regional Water Board concurs with the Dischargers' assertion of infeasibility to comply with final WQBELs for

heptachlor.

(e) Interim Effluent Limitation. Because the previous permit did not include a final effluent limitation for heptachlor, and there is insufficient data to statistically determine a performance based interim limitation, a performance-based maximum daily interim limitation is established at the minimum level of 0.01 µg/L.

(f) Term of Interim Effluent Limitation. The heptachlor interim effluent limitation shall remain effective until May 18, 2010. The previous permit did not grant an interim limit for heptachlor. As it is not possible for the Dischargers to document compliance because U.S. EPA approved analytical methods cannot quantify heptachlor at low enough levels, it is not possible to determine compliance with final limits. Because SIP §2.1 provides for a maximum five-year compliance schedule, and the Dischargers have not been previously granted such a schedule under §2.1, the Dischargers qualify for such a §2.1 schedule up to the maximum statutory date (May 17, 2010), which is ten years from the effective date of the CTR/SIP. The basis for this compliance schedule is the CTR/SIP.

9. Dioxin-TEQ

(a) Dioxin-TEQ WQC. The most stringent applicable water quality criterion for dioxin-TEQ is 1.4×10^{-8} µg/L, which is translated from the narrative bioaccumulation objective established by the Regional Water Board through the Basin Plan. The Basin Plan's narrative bioaccumulation objective is applicable to dioxins and furans, since these constituents accumulate in sediments and bioaccumulate in the fatty tissue of fish and other organisms. The narrative objective is translated into a numeric objective expressed in 2,3,7,8-TCDD equivalents (or dioxin-TEQ) based on the CTR criterion for 2,3,7,8-TCDD and the application of the Toxic Equivalence Factors (TEFs) for dioxin and furans adopted by the World Health Organization in 1998.

(b) RPA Results. Because the receiving water is currently listed on the CWA 303(d) list as impaired due to dioxins and furans, and the maximum observed effluent concentration of dioxin–TEQ is 1.6×10^{-7} µg/L, which exceeds the translated water quality objective of 1.4×10^{-8} µg/L, dioxin-TEQ in the discharge has a reasonable potential to contribute to exceedances of the narrative bioaccumulation objective.

(c) WQBELs. Concentration-based WQBELs for dioxin–TEQ, using SIP procedures and guidance, are 2.8×10^{-8} and 1.4×10^{-8} µg/L as the maximum daily effluent limit (MDEL) and the average monthly effluent limit (AMEL), respectively. Because dioxin-TEQ is a bioaccumulative pollutant, these limitations are calculated without credit for dilution.

(d) Immediate Compliance Infeasible. Because effluent concentrations of dioxin-TEQ have been measured at levels greater than newly calculated limitations (calculated based on Section 1.4 of the SIP), the Regional Water Board concurs with the Dischargers' assertion of infeasibility.

10. Total Ammonia

(a) Ammonia WQC. The Basin Plan contains WQOs for un-ionized ammonia of 0.025 mg/L as an annual median, and 0.16 mg/L as a maximum north of the Golden Gate Channel. The WQOs are translated from un-ionized ammonia objectives to equivalent total ammonia concentrations since sampling and lab methods are not available to analyze for un-ionized ammonia and because the fraction of total ammonia that is converted to the toxic un-ionized form is dependent on pH, salinity, and temperature of the receiving water.

To translate the Basin Plan's un-ionized ammonia objectives, pH, salinity, and temperature data from March 1993 to August 2001 from the RMP station at Point Isabel were used. The following equation was used to determine the fraction of total ammonia in a discharge that will be converted to the toxic un-ionized phase in receiving waters (U.S. EPA. 1989. *Ambient Water Quality Criteria for Ammonia (Saltwater) -1989*. EPA Publication Number 440/5-88-004).

$$fraction\ of\ NH_3 = \frac{1}{1+10^{(pk-pH)}}$$

where

$$pK = 9.245 + 0.116 * I + 0.0324 * (298 - T) + \frac{0.0415 * (P)}{T + 273}$$

$$\text{I = molal ionic strength of saltwater} = \frac{19.9273 * S}{1000 - 1.005109 * S}$$

S = salinity (parts per thousand)
T = temperature in ^{o}C
P = Pressure (one atmosphere)

To convert the Basin Plan's chronic un-ionized ammonia WQO to an equivalent total ammonia concentration, the median un-ionized ammonia fraction at the Richardson Bay monitoring station was used. To convert the Basin Plan's acute un-ionized ammonia WQO to an equivalent total ammonia concentration, the 90th percentile un-ionized ammonia fraction at Richardson Bay was used. Using the median and 90th percentile to translate chronic and acute ammonia WQOs is consistent with U.S. EPA guidance on translating dissolved metal WQOs to total recoverable metal WQOs[5]. The equivalent total ammonia acute and chronic concentrations are 3.31 mg/L and 1.28 mg/L, respectively.

[5] The Metals Translator: Guidance for Calculating a Total Recoverable Limit for a Dissolved Criterion 1996. EPA Publication No. 823-B-96-007

(b) RPA Results. The SIP methodology was used to perform RPA and to calculate effluent limitations because it is consistent with the methodology used to calculate WQBELs for other toxic pollutants. This Order establishes effluent limitations for total ammonia, as the maximum observed effluent concentration of 52 mg/L exceeds the applicable water quality criteria for this pollutant, demonstrating reasonable potential by Trigger 1, as defined previously.

(c) WQBELs. To calculate total ammonia limits some statistical adjustments were made because the Basin Plan's chronic objective is based on an annual median instead of a 4-day average. For chronic criterion, the SIP assumes an averaging period of 4 days and a monthly sampling frequency of 4 days per month to calculate effluent limits. To use the SIP methodology to calculate effluent limits for a Basin Plan objective that is based on an annual median, an averaging period of 365 days and a monitoring frequency of 30 days per month (the maximum daily sampling frequency in a month since the averaging period for the chronic criterion is longer than 30 days) were used. These statistical adjustments are supported by U.S. EPA'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 as guidance, the maximum background total ammonia concentration was used to calculate effluent limits based on the acute criterion. For the chronic criterion, the median background total ammonia concentration was used because the Basin Plan's chronic un-ionized ammonia objective is an annual median. Since the time-scale of this objective is over such a long period, it is more representative to use the central tendency of ambient conditions than a daily maximum.

The newly calculated limitations take into account the deep water nature of the discharge and the non-persistent nature of ammonia, and therefore, are based on an initial dilution of 25:1 (model results for average daily dry weather conditions, 16.3 MGD). Concentration-based WQBELs for total ammonia are 59 mg/L as a maximum daily effluent limit (MDEL) and 32 mg/L as an average monthly effluent limit (AMEL), respectively.

5. **Whole Effluent Acute Toxicity**

a. *Permit Requirements.* This Order includes effluent limits for whole-effluent acute toxicity that are unchanged from the previous Order. All bioassays shall 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 Dischargers are required to use the 5th Edition method for compliance determination upon the effective

date of this Order.

b. *Compliance History.* The Dischargers' acute toxicity monitoring data show that during 2002-2006, with fish survival rates ranged between 60-100%.

c. *Ammonia Toxicity.* If acute toxicity is observed in the future and the Dischargers believe that it is due to ammonia toxicity, this has to be shown through a Toxicity Identification Evaluation (TIE) acceptable to the Executive Officer. If the Dischargers demonstrate to the satisfaction of the Executive Officer that exceedance of the acute toxicity limits is caused by ammonia and that the ammonia in the discharge is in accordance with the ammonia discharge limit, then such toxicity does not constitute a violation of this effluent limit. This is based on the Basin Plan, at page 3-4 under "Un-Ionized Ammonia". If ammonia toxicity is verified in the TIE, the Dischargers may utilize an adjustment protocol approved by the Executive Officer for the routine bioassay testing.

6. Whole Effluent Chronic Toxicity

a. *Permit Requirements.* This permit includes requirements for chronic toxicity monitoring based on the Basin Plan narrative toxicity objective, and in accordance with USEPA and State Water Board Task Force guidance, and BPJ. This permit includes the Basin Plan narrative toxicity objective as the applicable effluent limit, implemented via monitoring with numeric values as "triggers" to initiate accelerated monitoring and to initiate a chronic toxicity reduction evaluation (TRE) as necessary. The permit requirements for chronic toxicity are also consistent with the CTR and SIP requirements.

b. *Chronic Toxicity Triggers.* This Order includes chronic toxicity triggers, which are three sample median of 10 chronic toxicity (TUc[6]) and a single sample maximum of 20 TUc.

c. *Monitoring History.* The Dischargers' chronic toxicity monitoring data from 2002 through 2006, TUc values ranged from 3.3 to 27.8.

d. *Screening Phase Study.* The Dischargers has prepared a chronic toxicity screening phase study plan and the results of this study have been incorporated herein.

7. Mercury and Selenium Mass Emission Limitations

This Order includes mass-based effluent limitations of 0.72 kg/month for mercury and 15.2 kg/month for selenium. These mass-based effluent limitations are intended to maintain the discharge at current loadings. The mass limit will maintain current loadings until a TMDL is established for San Francisco Bay. The final mercury effluent limitations will be based on the Dischargers' WLA in the TMDL.

[6] A TUc equals 100 divided by the no observable effect level (NOEL). The NOEL is determined from IC, EC, or NOEC values. Monitoring and TRE requirements may be modified by the Executive Officer in response to the degree of toxicity detected in the effluent or in ambient waters related to the discharge. Failure to conduct the required toxicity tests or a TRE within a designated period shall result in the establishment of effluent limits for chronic toxicity.

The inclusion of performance-based mass limits for bioaccumulative pollutants is consistent with the guidance described in section 2.1.1 of the SIP. Because of their bioaccumulative nature, an uncontrolled increase in the total mass load of these pollutants in the receiving water will have significant adverse impacts on the aquatic ecosystem.

D. Final Effluent Limitations

1. Satisfaction of Anti-Backsliding Requirements

All final and interim effluent limitations in this Order are at least as stringent as the respective final and interim effluent limitations in the previous Order.

2. Satisfaction of Antidegradation Policy

40 CFR 131.12 requires that State water quality standards include an antidegradation policy consistent with federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16, which incorporates the requirements of the federal antidegradation policy. Resolution 68-16 requires that existing water quality is maintained unless degradation is justified based on specific findings.

The permitted discharge is consistent with the antidegradation provision of 40 CFR § 131.12 and State Water Board Resolution 68-16, and the final limitations in this Order are in compliance with antidegradation requirements and meet the requirements of the SIP because these limits hold the Dischargers to performance levels that will not cause or contribute to water impairment or further water quality degradation. This is because this Order does not provide for as increase in the permitted design flow, allow for a reduction in the level of treatment, or increase effluent limitations with the exception of cyanide and copper.

In the case of cyanide, alternate limits based on a site-specific objective will be higher than the current limit if the site-specific objective for cyanide becomes effective during the permit term. However, the standards setting process for cyanide addressed antidegradation, and therefore, an analysis in this permit is unnecessary. As such, there will be no lowering of water quality beyond the current level authorized in the previous permit, which is the baseline by which to measure whether degradation will occur.

For copper, this Order establishes final WQBELs, whereas the previous permit included an interim limit. Although the final WQBELs are above the pervious interim limitation, the concentration of copper discharges is unlikely to change because the Dischargers propose no changes to the treatment process. The Dischargers will maintain current treatment performance for copper because they cannot manipulate their processes to adjust effluent copper levels independently of other treatment parameters. To maintain compliance with other effluent limits, the Dischargers will maintain their current performance with respect to copper. Moreover, pollution minimization requirements are

designed to maintain current performance.

Additionally, the Order establishes alternate limits of copper based on site-specific objectives developed since the previous permit. These limits will become effective if the site-specific objective is adopted during the permit term. Like cyanide, the standards setting process for copper addressed antidegradation, and therefore, ana analysis in this permit is unnecessary.

The Order continues the status quo with respect to the level of discharge authorized in the previous permit and thus there will be no change in water quality beyond the level that was authorized in the last permit. Findings authorizing degradation are thus not applicable.

3. Stringency of Requirements of Individual Pollutants

Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant water quality-based effluent limitations were derived from the CTR, the CTR is the applicable standard pursuant to section 131.38. The scientific procedures for calculating the individual water quality-based effluent limitations for priority pollutants are based on the CTR-SIP, which was approved by USEPA on May 18, 2000. All beneficial uses and water quality objectives contained in the Basin Plan 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 CWA" pursuant to section 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.

E. Interim Limitations

As authorized in the SIP, this Order grants interim limitations for 4,4-DDD and heptachlor because the Dischargers cannot immediately comply with final effluent limitations as demonstrated by the Dischargers' infeasibility analysis. This is described in more detail in sections IV.C.4.7 and IV.C.4.8 of this Fact Sheet.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

A. Receiving Water Limitations V.A. (Surface Water Limitations)

These limitations are in the existing permit and are based on water quality objectives for physical, chemical, and biological characteristics of receiving waters from Chapter 3 of the Basin Plan.

B. Receiving Water Limitation V.B. (Ground Water Limitations)

N/A

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS (PROVISION B)

40 CFR 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.

A. Influent Monitoring

The Order requires continuous influent flow monitoring reported daily, and TSS and BOD_5 monitoring 3/week to determine compliance with removal requirements of the Order.

B. Effluent Monitoring

The following bulleted text summarizes effluent monitoring requirements in the Monitoring and Reporting Program, which accompanies this Order, including changes from the previous Program.

- Monitoring requirements for flow rate, pH, temperature, BOD_5, TSS, oil and grease, chlorine residual, acute toxicity, chronic toxicity, copper, cyanide, mercury, selenium, zinc, 2,3,7,8-TCDD and congeners, standard observations, and priority pollutants are unchanged from the previous permit.

- Dissolved oxygen is a new parameter not required by the previous permit. Dissolved oxygen is an important parameter for determining the efficacy of the treatment plant. It will be monitored 3/week.

- Monitoring frequency for total coliform was increased from 3/week to 5/week because there were multiple violations of this parameter during the permit term.

- Monitoring is no longer required for settleable solids because this parameter is no longer limited by the Order.

- Monitoring is no longer required for dieldrin, silver, chromium IV, cadmium, and arsenic because reasonable potential was not triggered for these pollutants during this permit term. However, monitoring is now required for bis(2-ethylhexyl)phthalate (1/month), 4,4-DDD (2/year), and heptachlor (2/year) because reasonable potential was triggered for these pollutants.

- Routine monitoring for toxic pollutants is limited to those pollutants which have

numeric limitations established by the Order. Less frequent monitoring for all CTR pollutants is required in accordance with the August 6, 2001 letter from the Regional Water Board to all dischargers.

C. Whole Effluent Toxicity Testing Requirements

The Basin Plan requires dischargers to conduct flow-through effluent toxicity tests (Chapter 4, Acute Toxicity) to measure the toxicity of wastewaters and to assess negative impacts upon water quality and beneficial uses caused by the aggregate toxic effect of the discharge of pollutants. This Order includes effluent limitations for whole effluent acute toxicity and monitoring requirements for whole effluent chronic toxicity. All tests shall be performed according to the U.S. EPA-approved method in 40 CFR Part 136, currently "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water, 5th Edition."

This Order requires that the Dischargers continue their effluent toxicity monitoring efforts as part of the compliance requirements. This requirement is based on the Basin Plan and BPJ.

D. Receiving Water Monitoring

Regional Monitoring Program

On April 15, 1992, the Regional Water Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program (RMP) for the San Francisco Bay. Subsequent to a public hearing and various meetings, Regional Water Board staff requested major permit holders in this region, under authority of section 13267 of California Water Code, to report on the water quality of the estuary. These permit holders responded to this request by participating in a collaborative effort, through the San Francisco Estuary Institute. This effort has come to be known as the San Francisco Bay Regional Monitoring Program for Trace Substances. This Order specifies that the Dischargers shall continue to participate in the RMP, which involves collection of data on pollutants and toxicity in water, sediment and biota of the estuary. Certain receiving water limited parameters are not monitored by the RMP or are not monitored close enough to the Dischargers' outfall to assure compliance with receiving water limits. This annual assessment is not burdensome and will assure compliance with limits.

E. Other Monitoring Requirements

This Order requires standard observations to be made for all bypasses and overflows from manholes, pump stations, collection systems, and sludge drying bed areas.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions (Provision VI.A)

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. The Dischargers must comply with all

standard provisions and with those additional conditions that are applicable under section 122.42.

Section 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. If incorporated by reference, a specific citation to the regulations must be included in the Order. Section 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. In accordance with section 123.25, this Order omits federal conditions that address enforcement authority specified in sections 122.41(j)(5) and (k)(2) because the enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates by reference Water Code section 13387(e).

B. Monitoring and Reporting Requirements (Provision VI.B)

The Dischargers are required to conduct monitoring of the permitted discharges in order to evaluate compliance with permit conditions. Monitoring requirements are contained in the MRP (Attachment E), Standard Provisions and SMP, Part A (Attachment G) of the Permit. This provision requires compliance with these documents, and is based on 40 CFR 122.63. The Standard Provisions and SMP, Part A are standard requirements in almost all NPDES permits issued by the Regional Water Board, including this Order. They contain definitions of terms, specify general sampling and analytical protocols, and set out requirements for reporting of spills, violations, and routine monitoring data in accordance with NPDES regulations, the California Water Code, and Regional Water Board's policies. The MRP contains a sampling program specific for the facility. It 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 to conduct reasonable potential analyses in the future.

C. Special Provisions (Provision C)

1. Reopener Provisions

These provisions are based on 40 CFR Part 123 and allow future modification of this Order and its effluent limitations as necessary in response to updated WQOs that may be established in the future.

2. Special Studies and Additional Monitoring Requirements

a. Effluent Characterization Study

This Order does not include effluent limitations for the selected constituents addressed in the August 6, 2001 Letter that do not demonstrate Reasonable Potential, but this provision requires the Dischargers to continue monitoring for these pollutants as described in the August 6, 2001 Letter and as specified in the MRP of this Order. If concentrations of these constituents increase significantly, the Dischargers will be required to investigate the source of the increases and establish

remedial measures, if the increases result in reasonable potential to cause or contribute to an excursion above the applicable WQO/WQC. This provision is based on the Basin Plan and the SIP.

This provision is based on the Basin Plan, the SIP, and the August 6, 2001 Letter for priority pollutant monitoring.

b. Ambient Background Receiving Water Study

This provision is based on the Basin Plan, the SIP, and the August 6, 2001 letter for priority pollutant monitoring. As indicated in this Order, this requirement may be met by participating in the collaborative BACWA study.

c. Optional Mass Offset

This option is provided to encourage the Dischargers to further implement aggressive reduction of mass loads to the Central San Francisco Bay.

3. Best Management Practices and Pollution Prevention

This provision is based on Chapter 4 of the Basin Plan and Section 2.4.5 of the SIP.

Additionally, on October 15, 2003, the Regional Water Board adopted Resolution R2-2003-0096 in support of a collaborative working approach between the Regional Water Board and the BACWA to promote Pollution Minimization Program development and excellence. Specifically, the Resolution embodies a set of eleven guiding principles that will be used to develop tools such as "P2 menus" for specific pollutants, as well as provide guidance in improving P2 program efficiency and accountability. Key principles in the Resolution include promoting watershed, cross-program and cross-media approaches to pollution prevention, and jointly developing tools to assess program performance that may include peer reviews, self-audits or other formats.

4. Construction, Operation, and Maintenance Specifications

a. Wastewater Facilities, Review and Evaluation, Status Reports. This provision is based on the previous permit and the Basin Plan.

b. Operations and Maintenance Manual, Review and Status Reports. This provision is based on the Basin Plan, the requirements of 40 CFR Part 122, and the previous permit.

c. Contingency Plan, Review and Status Reports. This provision is based on the Basin Plan, the requirements of 40 CFR Part 122, and the previous permit.

5. Special Provisions for POTWs

a. Pretreatment Program. This provision is based on 40 CFR part 403 (General

Pretreatment Regulations for Existing and New Sources of Pollution).

b. Sludge Management Practices Requirements. This provision is based on the Basin Plan (Chapter 4) and 40 CFR Parts 257 and 503.

c. No Feasible Alternatives and Implementation Schedule. This provision is based on 40 CFR 122.41(m). It requires that the City of Richmond and RMSD reevaluate prior to the next permit reissuance that it has explored every feasible alternative to eliminate blending.

d. Sanitary Sewer Overflows and Sewer System Management Plan. This provision is to explain the Order's requirements as they relate to the Dischargers' collection systems, and to promote consistency with the State Water Board-adopted Statewide General Waste Discharge Requirements for Sanitary Sewer Overflow (SSO WDRs) and a related Monitoring and Reporting Program (Order No. 2006-0003-DWQ). The bases for these requirements are described elsewhere in this Fact Sheet for those requirements.

6. Corrective Measures to Minimize Blending

This provision is based on 40 CFR 122.41(m). The Richmond plant currently blends about 12 days/year. The City of Richmond and RMSD submitted an infeasibility analysis that indicates that elimination or reduction of blending is currently infeasible in the short-term. This provision is necessary to ensure the implementation of corrective measures at the Richmond plant to minimize or eliminate blending consistent with 40 CFR 122.41(m).

7. Compliance Schedules for 4,4-DDD, heptachlor and dioxin-TEQ

The compliance schedules and the requirement to submit reports on further measures to reduce concentrations of 4,4-DDD, heptachlor and dioxin-TEQ to ensure compliance with final limits are based on the Basin Plan (page 4-14), and 40 CFR 122.47(a)(3). As previously described, the Dischargers submitted Infeasibility Reports, and the Regional Water Board staff confirmed their assertions. Based on this, a compliance schedule is appropriate for 4,4-DDD, heptachlor, and dioxin-TEQ because the Dischargers have made good faith and reasonable efforts towards characterizing the sources so time to allow additional efforts is necessary to achieve compliance. Maximum allowable compliance schedules are granted to the Dischargers for these pollutants because of the considerable uncertainty in determining an effective measure (e.g., pollution prevention, treatment upgrades) that should be implemented to ensure compliance with final limits. In our view, it is appropriate to allow the Dischargers sufficient time to first explore source control measures before requiring them to propose further actions, such as treatment plant upgrades, that are likely to be much more costly. This approach is supported by the Basin Plan (page 4-25) which states: "In general, it is often more economical to reduce overall pollutant loadings into the treatment systems than to install

complex and expensive technology at the plant."

Finally, because of the ubiquitous nature of the sources of dioxin-TEQ, this provision allows the Dischargers to address compliance with calculated WQBELs through other strategies such as mass offsets.

i. 4,4-DDD. For 4,4-DDD, the previous permit did not grant an interim limit. As it is not possible for the Dischargers to document compliance because U.S. EPA approved analytical methods cannot quantify 4,4-DDD at low enough levels, it is not possible to determine compliance with final limits. Because SIP §2.1 provides for a maximum five-year compliance schedule, and the Dischargers have not been previously granted such a schedule under §2.1, the Dischargers qualify for such a §2.1 schedule up to the maximum statutory day (May 17, 2010), which is ten years from the effective date of the CTR/SIP. The basis for this compliance schedule is the CTR/SIP.

ii. Heptachlor. For heptachlor, the previous permit did not grant an interim limit. As it is not possible for the Dischargers to document compliance because U.S. EPA approved analytical methods cannot quantify heptachlor at low enough levels, it is not possible to determine compliance with final limits. Because SIP §2.1 provides for a maximum five-year compliance schedule, and the Dischargers have not been previously granted such a schedule under §2.1, the Dischargers qualify for such a §2.1 schedule up to the maximum statutory day (May 17, 2010), which is ten years from the effective date of the CTR/SIP. The basis for this compliance schedule is the CTR/SIP.

iii. Dioxin-TEQ. For Dioxin-TEQ, the previous permit included a compliance schedule until November 30, 2011. Therefore, this Order carries over the compliance schedule from the previous permit.

8. Action Plan for Cyanide

Since the proposed SSO for cyanide has associated action plans for source control, this provision requires an action plan to implement source control requirements once the alternate limits become effective.

9. Action Plan for Copper

Since the proposed SSO for copper has associated action plans for source control, this provision requires an action plan to implement source control requirements once the alternate limits become effective.

VIII. PUBLIC PARTICIPATION

The San Francisco Bay Regional Water Board is considering the issuance of waste discharge requirements (WDRs) that will serve as a National Pollutant Discharge Elimination System (NPDES) permit for West County Agency. As a step in the WDR adoption process, the Regional Water Board staff has developed 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 discharge and has provided them with an opportunity to submit their written comments and recommendations. Notification was provided through the following: (a) paper and electronic copies of this Order were relayed to the Dischargers, and (b) the Contra Costa Times published a notice in November 2007 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 these tentative WDRs. Comments should be submitted either in person or by mail to the Executive Office at the Regional Water Board at the address above on the cover page of this Order, Attention: Vincent Christian.

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 December 26, 2007**.

C. Public Hearing

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date:	January 30, 2008
Time:	9:00 am
Location:	Elihu Harris State Office Building 1515 Clay Street, 1st Floor Auditorium Oakland, CA 94612
Contact:	Vincent Christian, (510) 622-2336, vchristian@waterboards.ca.gov

Interested persons are invited to attend. At the public hearing, the Regional Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be 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.

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 (RWD), 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 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 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 Vincent Christian, 510-622-2336, vchristian@waterboards.ca.gov.

ATTACHMENT G – REGIONAL WATER BOARD ATTACHMENTS

The following documents are part of this Order but are not physically attached due to volume. They are available on the Internet at:
http://www.waterboards.ca.gov/sanfranciscobay/Download.htm.

- Self-Monitoring Program, Part A (August 1993)
- Standard Provisions and Reporting Requirements, August 1993
- Regional Water Board Resolution No. 74-10
- August 6, 2001 Regional Water Board staff letter, "Requirement for Monitoring of Pollutants in Effluent and Receiving Water to Implement New Statewide Regulations and Policy"

ATTACHMENT H - PRETREATMENT REQUIREMENTS

Pretreatment Program Provisions

1. The Dischargers shall implement all pretreatment requirements contained in 40 CFR §403, as amended. The Dischargers shall be subject to enforcement actions, penalties, and fines as provided in the Clean Water Act (33 USC 1351 et seq.), as amended. The Dischargers shall implement and enforce their Approved Pretreatment Programs or modified Pretreatment Programs as directed by the Regional Water Board's Executive Officer or the EPA. The EPA and/or the State may initiate enforcement action against an industrial user for noncompliance with applicable standards and requirements as provided in the Clean Water Act.

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

3. The Dischargers shall perform the pretreatment functions as required in 40 CFR §403 and amendments or modifications thereto including, but not limited to:

   i) Implement the necessary legal authorities to fully implement the pretreatment regulations as provided in 40 CFR §403.8(f)(1);

   ii) Implement the programmatic functions as provided in 40 CFR §403.8(f)(2);

   iii) Publish an annual list of industrial users in significant noncompliance as provided per 40 CFR §403.8(f)(2)(vii);

   iv) Provide for the requisite funding and personnel to implement the pretreatment program as provided in 40 CFR §403.8(f)(3); and

   v) Enforce the national pretreatment standards for prohibited discharges and categorical standards as provided in 40 CFR §§403.5 and 403.6, respectively.

4. The Dischargers shall submit annually a report to the EPA Region 9, the State Water Board and the Regional Water Board describing its pretreatment program activities over the previous twelve months. In the event that the Dischargers are not in compliance with any conditions or requirements of the Pretreatment Program, the Dischargers 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 A entitled, "Requirements for Pretreatment Annual Reports," which is made a part of this Order. The annual report is due on the last day of February each year.

5. The Dischargers shall submit semiannual pretreatment reports to the EPA 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, the information specified in Appendix B entitled, "Requirements for Semiannual Pretreatment Reports," which is made part of this Order. The semiannual reports are due July 31st (for the period January through June) and January 31st (for the period July through December) of each year. The Executive Officer may exempt a Discharger from the semiannual reporting requirements on a case by case basis subject to State Water Board and EPA's comment and approval.

6. The Dischargers may combine the annual pretreatment report with the semiannual pretreatment report (for the July through December reporting period). The combined report shall contain all of the information requested in Appendices A and B and will be due on January 31st of each year.

7. The Dischargers shall conduct the monitoring of its treatment plant's influent, effluent, and sludge as described in Appendix C entitled, "Requirements for Influent, Effluent and Sludge Monitoring," which is made part of this Order. The results of the sampling and analysis, along with a discussion of any trends, shall be submitted in the semiannual reports. A tabulation of the data shall be included in the annual pretreatment report. The Executive Officer may require more or less frequent monitoring on a case by case basis.

APPENDIX A

REQUIREMENTS FOR PRETREATMENT ANNUAL REPORTS

The Pretreatment Annual Report is due each year on the last day of February. [If the annual report is combined with the semiannual report (for the July through December period) the submittal deadline is January 31st of each year.] The purpose of the Annual Report is 1) to describe the status of the Publicly Owned Treatment Works (POTW) pretreatment program and 2) to 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, but is not limited to, the following information:

1) **Cover Sheet**

The cover sheet must contain the name(s) and National Pollutant Discharge Elimination Discharge System (NPDES) permit number(s) of those POTWs that are part of the Pretreatment Program. Additionally, the cover sheet must include the name, address and telephone number of a pretreatment contact person; the period covered in the report; a statement of truthfulness; and the dated signature of a principal executive officer, ranking elected official, or other duly authorized employee who is responsible for overall operation of the POTW (40 CFR §403.12(j)).

2) **Introduction**

The Introduction shall include any pertinent background information related to the Dischargers, the POTWs and/or the industrial user base of the area. Also, this section shall include an update on the status of any Pretreatment Compliance Inspection (PCI) tasks, Pretreatment Performance Evaluation tasks, Pretreatment Compliance Audit (PCA) tasks, Cleanup and Abatement Order (CAO) tasks, or other pretreatment-related enforcement actions required by the Regional Water Board or the EPA. A more specific discussion shall be included in the section entitled, "Program Changes."

3) **Definitions**

This section shall contain a list of key terms and their definitions that the Dischargers use to describe or characterize elements of its pretreatment program.

4) **Discussion of Upset, Interference and Pass Through**

This section shall include a discussion of Upset, Interference or Pass Through incidents, if any, at the POTW(s) that the Dischargers know of or suspect were caused by industrial discharges. Each incident shall be described, at a minimum, consisting of the following

information:

a) a description of what occurred;

b) a description of what was done to identify the source;

c) the name and address of the industrial user (IU) responsible

d) the reason(s) why the incident occurred;

e) a description of the corrective actions taken; and

f) 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.

5) **Influent, Effluent and Sludge Monitoring Results**

This section shall provide a summary of the analytical results from the "Influent, Effluent and Sludge Monitoring" as specified in Appendix C. The results should be reported in a summary matrix that lists monthly influent and effluent metal results for the reporting year.

A graphical representation of the influent and effluent metal monitoring data for the past five years shall also be provided with a discussion of any trends.

6) **Inspection and Sampling Program**

This section shall contain at a minimum, but is not limited to, the following information:

a) Inspections: the number of inspections performed for each type of IU; the criteria for determining the frequency of inspections; the inspection format procedures;

b) Sampling Events: the number of sampling events performed for each type of IU; the criteria for determining the frequency of sampling; the chain of custody procedures.

7) **Enforcement Procedures**

This section shall provide information as to when the approved Enforcement Response Plan (ERP) had been formally adopted or last revised. In addition, the date the finalized ERP was submitted to the Regional Water Board shall also be given.

8) **Federal Categories**

This section shall contain a list of all of the federal categories that apply to the Dischargers.

The specific category shall be listed including the subpart and 40 CFR section that applies. The maximum and average limits for the each category shall be provided. This list shall indicate the number of Categorical Industrial Users (CIUs) per category and the CIUs that are being regulated pursuant to the category. The information and data used to determine the limits for those CIUs for which a combined waste stream formula is applied shall also be provided.

9) **Local Standards**

This section shall include a table presenting the local limits.

10) **Updated List of Regulated SIUs**

This section shall contain a complete and updated list of the Dischargers' Significant Industrial Users (SIUs), including their names, addresses, and a brief description of the individual SIU's type of business. The list shall include all deletions and additions keyed to the list as submitted in the previous annual report. All deletions shall be briefly explained.

11) **Compliance Activities**

a) **Inspection and Sampling Summary:** This section shall contain a summary of all the inspections and sampling activities conducted by the Dischargers over the past year to gather information and data regarding the SIUs. The summary shall include:

(1) the number of inspections and sampling events conducted for each SIU;

(2) the quarters in which these activities were conducted; and

(3) the compliance status of each SIU, delineated by quarter, and characterized using all applicable descriptions as given below:

(a) in consistent compliance;

(b) in inconsistent compliance;

(c) in significant noncompliance;

(d) on a compliance schedule to achieve compliance, (include the date final compliance is required);

(e) not in compliance and not on a compliance schedule;

(f) compliance status unknown, and why not.

b) **Enforcement Summary:** This section shall contain a summary of the compliance and enforcement activities during the past year. The summary shall include the names of all the SIUs affected by the following actions:

(1) 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. For each notice, indicate whether it was for an infraction of a federal or local standard/limit or requirement.

(2) 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. For each notice, indicate whether it was for an infraction of a federal or local standard/limit or requirement.

(3) 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. For each notice, indicate whether it was for an infraction of a federal or local standard/limit or requirement.

(4) 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. For each notice, indicate whether it was for an infraction of a federal or local standard/limit or requirement.

(5) Assessment of monetary penalties. Identify the amount of penalty in each case and reason for assessing the penalty.

(6) Order to restrict/suspend discharge to the POTW.

(7) Order to disconnect the discharge from entering the POTW.

12) **Baseline Monitoring Report Update**

This section shall provide a list of CIUs that have been 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 all of the information specified in 40 CFR §403.12(b). For each of the new CIUs, the summary shall indicate when the BMR was due; when the CIU was notified by the POTW of this requirement; when the CIU submitted the report; and/or when the report is due.

13) **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, legal authority, local limits, monitoring/ inspection program and frequency, enforcement protocol, program's administrative structure, staffing level, resource requirements and funding mechanism. If the manager of the pretreatment program changes, a revised organizational chart shall be included. If any element(s) of the program is in the process of being modified, this intention shall also be indicated.

14) **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 amounts spent on personnel, equipment, chemical analyses and any other appropriate categories. A brief discussion of the source(s) of funding shall be provided.

15) **Public Participation Summary**

This section shall include a copy of the public notice as required in 40 CFR §403.8(f)(2)(vii). If a notice was not published, the reason shall be stated.

16) **Sludge Storage and Disposal Practice**

This section shall have a description of how the treated sludge is stored and ultimately disposed. The sludge storage area, if one is used, shall be described in detail. Its location, a description of the containment features and the sludge handling procedures shall be included.

17) **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: the POTW name, NPDES Permit number, period covered by the report, the number of SIUs in significant noncompliance (SNC) that are on a pretreatment compliance schedule, the number of notices of violation and administrative orders issued against SIUs, the number of civil and criminal judicial actions against SIUs, the number of SIUs that have been published as a result of being in SNC, and the number of SIUs from which penalties have been collected.

18) **Other Subjects**

Other information related to the Pretreatment Program that does not fit into one of the above

categories should be included in this section.

Signed copies of the reports shall be submitted to the Regional Administrator at U.S. EPA, the State Water Board and the Regional Water Board at the following addresses:

Regional Administrator
United States Environmental Protection Agency
Region 9, Mail Code: WTR-7
Clean Water Act Compliance Office
Water Division
75 Hawthorne Street
San Francisco, CA 94105

Pretreatment Program Manager
Regulatory Unit
State Water Resources Control Board
Division of Water Quality
1001 I Street
Sacramento, CA 95814

Pretreatment Coordinator
NPDES Permits Division
SF Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

APPENDIX B:

REQUIREMENTS FOR SEMIANNUAL PRETREATMENT REPORTS

The semiannual pretreatment reports are due on July 31st (for pretreatment program activities conducted from January through June) and January 31st (for pretreatment activities conducted from July through December) of each year, unless an exception has been granted by the Regional Water Board's Executive Officer. The semiannual reports shall contain, at a minimum, but is not limited to, the following information:

1) **Influent, Effluent and Sludge Monitoring**

The influent, effluent and sludge monitoring results shall be included in the report. The analytical laboratory report shall also be included, with the QA/QC data validation provided upon request. A description of the sampling procedures and a discussion of the results shall be given. (Please see Appendix C for specific detailed requirements.) The contributing source(s) of the parameters that exceed NPDES limits shall be investigated and discussed. In addition, a brief discussion of the contributing source(s) of all organic compounds identified shall be provided.

The Dischargers have the option to submit all monitoring results via an electronic reporting format approved by the Executive Officer. The procedures for submitting the data will be similar to the electronic submittal of the NPDES self-monitoring reports as outlined in the December 17, 1999 Regional Water Board letter, Official Implementation of Electronic Reporting System (ERS). The Dischargers shall contact the Regional Water Board's ERS Project Manager for specific details in submitting the monitoring data.

If the monitoring results are submitted electronically, the analytical laboratory reports (along with the QA/QC data validation) should be kept at the dischargers' facilities.

2) **Industrial User Compliance Status**

This section shall contain a list of all Significant Industrial Users (SIUs) that were not in consistent compliance with all pretreatment standards/limits or requirements for the reporting period. The compliance status for the previous reporting period shall also be included. Once the SIU has determined to be out of compliance, the SIU shall be included in the report 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:

a. Indicate if the SIU is subject to Federal categorical standards; if so, specify the category including the subpart that applies.

b. For SIUs subject to Federal Categorical Standards, indicate if the violation is of a categorical or local standard.

c. Indicate the compliance status of the SIU for the two quarters of the reporting period.

d. For violations/noncompliance occurring 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.

3) **POTW's Compliance with Pretreatment Program Requirements**

This section shall contain a discussion of the Dischargers' compliance status with the Pretreatment Program Requirements as indicated in the latest Pretreatment Compliance Audit (PCA) Report, Pretreatment Compliance Inspection (PCI) Report or Pretreatment Performance Evaluation (PPE) Report. It shall contain a summary of the following information:

a. Date of latest PCA, PCI or PPE and report.

b. Date of the Dischargers' response.

c. List of unresolved issues.

d. Plan and schedule for resolving the remaining issues.

The 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 Publicly Owned Treatment Works (POTW) (40 CFR §403.12(j)). Signed copies of the reports shall be submitted to the Regional Administrator at U.S. EPA, the State Water Resources Control Board and the Regional Water Board at the following addresses:

Regional Administrator
United States Environmental Protection Agency
Region 9, Mail Code: WTR-7
Clean Water Act Compliance Office
Water Division
75 Hawthorne Street
San Francisco, CA 94105

Pretreatment Program Manager
Regulatory Unit
State Water Resources Control Board
Division of Water Quality
1001 I Street
Sacramento, CA 95814

Pretreatment Coordinator
NPDES Permits Division
SF Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

APPENDIX B - MICROBIAL ANALYSIS REPORTS

January 24, 2010

DAVID JENKINS AND ASSOCIATES INC.{PRIVATE }
11 YALE CIRCLE
KENSINGTON
CALIFORNIA 94708

Phone or Fax: (510) 527-0672
Email: flocdoc@pacbell.net

By email to: Colin Barrett, Carollo Engineers, Walnut Creek, CA

July 2, 2008

Dear Colin

This letter summarizes the results of the microscopic analysis of the 6/30//08 samples taken from the Richmond, CA plant. Photographs, a lab data sheet and a photograph key are being sent as email attachments. Please acknowledge receipt of these.

Mixed Liquor #1

The sample contained firm, mostly round, compact flocs. The flocs contained some paper fibers and grease particles. The flocs contained many strongly Neisser positive cell clumps of BioP bacteria that had an amorphous zoogloeal form. The flocs, the amorphous zoogloeas and the filaments were all covered with exocellular material that was not penetrated by India ink. The overall filamentous organism level was abundant. The filaments were present both in and attached to the floc and in a dispersed form. The filaments exhibited a little interfloc bridging. The two major filaments present were *Microthrix parvicella* and nocardioform organisms. Also seen were smaller amounts of type 0675, *Haliscomenobacter hydrossis* and type 0041.

Mixed Liquor #2

The sample contained firm, round and irregular, compact flocs. The flocs contained some grease particles. The flocs contained many strongly Neisser positive cell clumps of BioP bacteria that had an amorphous zoogloeal form. The flocs, the amorphous zoogloeas and the filaments were all covered with exocellular material that was not penetrated by India ink. The overall filamentous organism level was abundant. The filaments were present both in and attached to the floc and in a dispersed form. The filaments exhibited a little interfloc bridging. The two major filaments present were *Microthrix parvicella* and nocardioform organisms. Also seen were smaller amounts of type 0675 and type 1701.

Discussion

Any settling problems in this sludge are due to the presence of *Microthrix parvicella.* Foaming may be occurring because both *Microthrix parvicella* and nocardioforms can cause this. Many of the nocardioforms were dispersed indicating that the nocardioform foam is being trapped in the system and that the removed foam may be being recycled back through the plant. The activated sludge is most likely performing enhanced

biological phosphate removal since the flocs contain many strongly Neisser positive cell clumps of BioP bacteria.

I have seen an activated sludge like this on several previous occasions. In all of these cases the aeration basins were aerated mechanically. The *Microthrix parvicella* filaments and the BioP bacteria are favored by the presence of anaerobic zones. In mechanically aerated aeration basins there can zones where 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 both *Microthrix parvicella* and the BioP bacteria.

Microthrix parvicella requires an SRT of approximately 10-12 days to become established in activated sludge. You can get rid of it by lowering the SRT to below these levels. If foam is a problem it can be dealt with by cationic polymer addition or the installation of a surface sludge wasting device.

Please do not hesitate to write or call should you wish to discuss these results and control methods further.

Respectfully submitted

David Jenkins

DAVID JENKINS AND ASSOCIATES INC.{PRIVATE }
11 YALE CIRCLE
KENSINGTON
CALIFORNIA 94708

Phone or Fax: (510) 527-0672
Email: flocdoc@pacbell.net

By email to: Colin Barrett, Carollo Engineers, Walnut Creek, CA

August 9, 2008

Dear Colin

This letter summarizes the results of the microscopic analysis of the 8/6/08 mixed liquor sample taken from the Richmond, CA plant. Photographs, a lab data sheet and a photograph key are being sent as email attachments. Please acknowledge receipt of these.

The sample contained firm, round and irregular, compact flocs. The flocs contained some grease particles. The flocs contained many Neisser positive cell clumps of BioP bacteria and some amorphous zoogloeas. The flocs, the amorphous zoogloeas and the filaments were all covered with exocellular material that was not penetrated by India ink. The overall filamentous organism level was very common-abundant. The filaments were present both in and attached to the floc and in a dispersed form. The filaments exhibited some interfloc bridging. The two major filaments present were *Microthrix parvicella* and nocardioform organisms. Also seen were smaller amounts of type 0675, and *Nostocoida limicola*.

Discussion

As in the previous (6/30/08) sample, any settling problems in this sludge are due to the presence of *Microthrix parvicella.* Foaming may be occurring because both *Microthrix parvicella* and nocardioforms can cause this. Many of the nocardioforms were dispersed indicating that the nocardioform foam is being trapped in the system and that the removed foam may be being recycled back through the plant. The activated sludge is most likely performing enhanced biological phosphate removal since the flocs contain many strongly Neisser positive cell clumps of BioP bacteria.

Please do not hesitate to write or call should you wish to discuss these results and control methods further.

Respectfully submitted

David Jenkins

APPENDIX C - PROPOSED EPA REGULATIONS ON PEAK WET WEATHER DISCHARGES

January 24, 2010

Title VIII of ANILCA requires the Secretaries to administer a subsistence priority on public lands. The scope of this program is limited by definition to certain public lands. Likewise, these regulations have no potential takings of private property implications as defined by Executive Order 12630.

The Secretaries have determined and certify pursuant to the Unfunded Mandates Reform Act, 2 U.S.C. 1502 *et seq.*, that this rulemaking will not impose a cost of $100 million or more in any given year on local or State governments or private entities. The implementation of this rule is by Federal agencies and there is no cost imposed on any State or local entities or tribal governments.

The Secretaries have determined that these regulations meet the applicable standards provided in sections 3(a) and 3(b)(2) of Executive Order 12988, regarding civil justice reform.

In accordance with Executive Order 13132, the rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment. Title VIII of ANILCA precludes the State from exercising subsistence management authority over fish and wildlife resources on Federal lands unless it meets certain requirements.

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951), Executive Order 13175, and 512 DM 2, we have evaluated possible effects on Federally recognized Indian tribes and have determined that there are no effects. The Bureau of Indian Affairs is a participating agency in this rulemaking.

On May 18, 2001, the President issued Executive Order 13211 on regulations that significantly affect energy supply, distribution, or use. This Executive Order requires agencies to prepare Statements of Energy Effects when undertaking certain actions. As this rule is not a significant regulatory action under Executive Order 13211, affecting energy supply, distribution, or use, this action is not a significant action and no Statement of Energy Effects is required.

Drafting Information—William Knauer drafted these regulations under the guidance of Thomas H. Boyd, of the Office of Subsistence Management, Alaska Regional Office, U.S. Fish and Wildlife Service, Anchorage, Alaska. Taylor Brelsford, Alaska State Office, Bureau of Land Management; Nancy Swanton, Alaska Regional Office, National Park Service; Dr. Glenn Chen, Alaska Regional Office, Bureau of Indian Affairs; Jerry Berg, Alaska Regional Office, U.S. Fish and Wildlife Service; and Steve Kessler, USDA—Forest Service provided additional guidance.

List of Subjects

36 CFR Part 242

Administrative practice and procedure, Alaska, Fish, National forests, Public lands, Reporting and recordkeeping requirements, Wildlife.

50 CFR Part 100

Administrative practice and procedure, Alaska, Fish, National forests, Public lands, Reporting and recordkeeping requirements, Wildlife.

For the reasons set out in the preamble, the Federal Subsistence Board proposes to amend 36 CFR part 242 and 50 CFR part 100 for the 2007–08 regulatory year. The text of the amendments would be the same as the final rule for the 2005–06 regulatory year (70 FR 13377) as modified by Federal Subsistence Board actions January 10–12, 2006.

Dated: December 5, 2005.

Thomas H. Boyd,

Acting Chair, Federal Subsistence Board.

Steve Kessler,

Subsistence Program Leader, USDA—Forest Service.

[FR Doc. 05–24353 Filed 12–21–05; 8:45 am]

BILLING CODE 4310–55–P; 3410–11–P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 122 and 123

[EPA–HQ–OW–2005–0523, FRL—8013–9]

National Pollutant Discharge Elimination System (NPDES) Permit Requirements for Peak Wet Weather Discharges From Publicly Owned Treatment Works Treatment Plants Serving Separate Sanitary Sewer Collection Systems

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of availability and request for comment.

SUMMARY: Today, EPA is inviting comment on a draft policy regarding NPDES permit requirements for peak wet weather discharges from publicly owned treatment works (POTW) treatment plants serving separate sanitary sewer collection systems. Regulatory agencies, municipal operators of wastewater facilities, and representatives of environmental advocacy groups have expressed uncertainty about the appropriate regulatory interpretation for such situations. Today's draft policy describes both an interpretation of regulations, as well as guidance to implement such an interpretation. EPA's intention is to ensure that NPDES requirements be developed and applied in a nationally-consistent manner that improves the capacity, management, operation and maintenance of POTW treatment plants and separate sanitary sewer collection systems and protects human health and the environment.

DATES: Comments must be received or postmarked on or before January 23, 2006.

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–HQ–OW–2005–0523, by one of the following methods:

- *http://www.regulations.gov:* Follow the on-line instructions for submitting comments.
- E-mail: Comments may be sent by electronic mail (e-mail) to *OW-Docket@epa.gov,* Attention Docket ID No. EPA–HQ–OW–2005–0523. In contrast to EPA's electronic public docket, EPA's e-mail system is not an ''anonymous access'' system. If you send an e-mail comment directly to the Docket without going through EPA's electronic public docket, EPA's e-mail system automatically captures your e-mail address. E-mail addresses that are automatically captured by EPA's e-mail system are included as part of the comment that is placed in the official public docket, and made available in EPA's electronic public docket.
- Mail: Send an original and three copies of your comments to: Water Docket, Environmental Protection Agency, Mailcode 4101T, 1200 Pennsylvania Ave., NW., Washington, DC 20460, Attention Docket ID No. EPA–HQ–OW–2005–0523.
- Hand Delivery: Deliver your comments to: EPA Docket Center, EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC, Attention Docket ID No. EPA–HQ–OW–2005–0523. Such deliveries are only accepted during the Docket's normal hours of operation and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA–HQ–OW–2005–0523. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *http://www.regulations.gov,* including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information

whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *http://www.regulations.gov* or through e-mail. The *http://www.regulations.gov* Web site is an ''anonymous access'' system, which means EPA will not know your identify or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through *http://www.regulations.gov* your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm.*

Docket: All documents in the docket are listed in the *http://www.regulations.gov* index. Although listed in the index, some information is not publicly available, *e.g.*, CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *http://www.regulations.gov* or in hard copy at the EPA Docket Center, EPA/DC, EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC. The Docket Facility is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Water Docket is (202) 566–2426.

FOR FURTHER INFORMATION CONTACT: For questions about the substance of this draft policy, contact Kevin Weiss (e-mail at *weiss.kevin@epa.gov* or phone at (202) 564–0742) at Water Permits Division, Office of Wastewater Management, U.S. Environmental Protection Agency (Mailcode 4203M), 1200 Pennsylvania Ave., NW., Washington, DC 20460.

SUPPLEMENTARY INFORMATION:

I. General Information

A. What Should I Consider as I Prepare My Comments for EPA?

1. Submitting CBI

Do not submit information that you consider to be CBI electronically through *http://www.regulations.gov* or e-mail. Clearly mark the part or all of the information that you claim to be CBI. For CBI information in a disk or CD ROM that you mail to EPA, mark the outside of the disk or CD ROM as CBI and then identify electronically within the disk or CD ROM the specific information that is claimed as CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR Part 2.

2. Tips for Preparing Your Comments

When submitting comments, remember to:

- Identify the rulemaking by docket number and other identifying information (subject heading, **Federal Register** date and page number).
- Follow directions—The agency may ask you to respond to specific questions or organize comments by referencing a Code or Federal Regulations (CFR) part or section number.
- Explain why you agree or disagree; suggest alternatives and substitute language for your requested changes.
- Describe any assumptions and provide any technical information and/or data that you used.
- If you estimate potential costs or burdens, explain how you arrived at your estimate in sufficient detail to allow for it to be reproduced.
- Provide specific examples to illustrate your concerns, and suggest alternatives.
- Explain your views as clearly as possible, avoiding the use of profanity or personal threats.
- Make sure to submit your comments by the comment period deadline identified.

3. Docket Copying Costs

You may copy 266 pages per day free of charge. Beginning with page 267, you will be charged $0.15 per page plus an administrative fee of $25.00.

Acronyms Used

CSO Combined sewer overflow.
EPA Environmental Protection Agency.
I/I infiltration and inflow.
NPDES National Pollutant Discharge Elimination System.
POTW Publicly owned treatment works.
SSO Sanitary sewer overflow (this does not include CSOs).

II. Background

EPA has received requests from many stakeholders to clarify the NPDES requirements for discharges from POTW treatment plants serving separate sanitary sewers where peak wet weather flow is routed around biological treatment units and then blended with the effluent from the biological units prior to discharge and where the final discharge meets permit effluent limitations based on the secondary treatment regulation (40 CFR Part 133) or any more stringent limitations necessary to attain water quality standards. On November 7, 2003, EPA requested public comment on a proposed policy addressing this issue. Under the proposed interpretation in the November 7, 2003 proposed policy, a wet weather diversion around biological treatment units that was blended with the wastewaters from the biological units prior to discharge would not have been considered to constitute a prohibited bypass if the six criteria specified in the November 7, 2003 proposed policy were met.

EPA received significant public comment on the proposed policy, including over 98,000 comments opposing the policy due to concerns about human health risks. On May 19, 2005, EPA indicated that after consideration of the comments, the Agency had no intention of finalizing the 2003 proposal. On July 26, 2005, Congress enacted the FY 2006 Department of the Interior, Environment, and Related Agencies Appropriations Act (P.L. 109–54). Section 203 of the Appropriations Act provides that none of the funds made available in the Act could be used to finalize, issue, implement or enforce the November 7, 2003 proposed blending policy.

In October of 2005, the Natural Resources Defense Council (NRDC) and the National Association of Clean Water Agencies (NACWA) provided EPA with their joint proposal recommending further action that the Agency should take regarding the blending issue. The NRDC/NACWA recommended approach includes an interpretation of the bypass regulation that is significantly different from the November 7, 2003 proposal, in that it would clarify that the bypass provision would apply, in all instances, to wet weather diversions at POTW treatment plants serving separate

sanitary sewers. Today's draft policy invites comment on this interpretation, as well as the recommended guidance to implement the interpretation, and reflects the approach of the NRDC/NACWA recommendation.

III. General Information

A. Draft Policy

If the draft policy is made final, the following statement will be announced by EPA.

Draft Memorandum

From: Benjamin H. Grumbles, Assistant Administrator, Office of Water.

To: Regional Administrators, Region I-X, Granta Y. Nakayama, Assistant Administrator, Office of Enforcement and Compliance Assurance.

Subject: National Pollutant Discharge Elimination System Permit Requirements for Peak Wet Weather Discharges from Publicly Owned Treatment Works Treatment Plants Serving Separate Sanitary Sewer Collection Systems

Introduction

Many municipalities currently have situations in which high peak influent flows during significant wet weather events exceed the treatment capacity of existing secondary treatment units. In these situations, wet weather flows are sometimes diverted around secondary treatment units and then either recombined with flows from the secondary treatment units or discharged directly into waterways from the treatment plant. This policy only applies to peak wet weather diversions around secondary treatment units that occur at publicly owned treatment works (POTW) treatment plants serving separate sanitary sewer systems that are recombined with flow from the secondary treatment unit. The process by which wet weather diversions can be approved in National Pollutant Discharge Elimination System (NPDES) permits for POTW treatment plants serving combined sewer systems was previously outlined in the 1994 CSO Policy, 59 FR 18,693–18,694 (April 19, 1994). Nothing in this policy addresses the requirements for POTW treatment plants serving combined sewer systems.

While EPA recognizes that peak wet weather flow diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewer conveyance systems may be necessary in some circumstances to prevent temporary loss of function of secondary treatment units, the Agency and stakeholders have been concerned for some time that peak wet weather flow diversions could have adverse environmental or public health impacts because of the higher expected pollutant load of diverted flows.

Accordingly, EPA strongly discourages reliance on peak wet weather flow diversions around secondary treatment units as a long-term wet weather management approach at a POTW treatment plant serving separate sanitary sewer conveyance systems and that such diversions should be minimized to the maximum extent feasible taking into account the factors discussed in this policy. EPA anticipates that, over time, the need to undertake peak wet weather flow diversions at POTW treatment plants serving separate sanitary sewer conveyance systems can be eliminated from most systems in a variety of ways, such as by enhancing storage and treatment capacity and reducing sources of peak wet weather flow volume. EPA expects that aggressive efforts by POTW treatment plant operators in consultation with NPDES authorities can lead to dramatic reductions in the volume and duration of peak wet weather flows and can improve the treatment and quality of peak wet weather flow discharges. EPA also believes that the involvement of the general public will improve the assessment of various options to minimize peak wet weather flow diversions.

In recent years there has been substantial confusion regarding the regulatory status of peak wet weather flow diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewer conveyance systems. In some cases, such diversions have been considered a bypass and held to the criteria of the NPDES bypass regulation (40 CFR 122.41(m)). In other cases, diversion scenarios around secondary treatment units at POTW treatment plants have been constructed and permitted at facilities without consideration of the bypass regulation criteria.

In 2003, EPA proposed a policy to clarify the regulatory status of peak wet weather flows that are combined with secondary effluent, a practice known as blending. 68 FR 63,042 (Nov. 7, 2003). In that proposed policy, EPA stated that if certain procedures were followed, peak wet weather flow blending would not be considered a bypass under 40 CFR 122.41(m). The Agency received over 98,000 comments on the proposed policy and on May 19, 2005 indicated that it no longer intended to pursue further action on the proposal.

Applicability of the Bypass Regulation to Blending

This policy provides the Agency's interpretation that the 40 CFR 122.41(m), the bypass regulation, applies to peak wet weather diversions at POTW treatment plants serving separate sanitary sewer conveyance systems that are recombined with flow from the secondary treatment units. If the criteria of 40 CFR 122.41(m)(4)(i)(A)–(C) are met, NPDES authorities can approve peak wet weather flow diversions around secondary treatment units in a NPDES permit for discharges from a POTW treatment plants as an anticipated bypass under 40 CFR 122.41(m)(4)(ii).

This policy:

- Interprets the provisions of 40 CFR 122.41(m)(4) as they apply to peak wet weather flow diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewer systems where the diverted flow is recombined with flow from the secondary treatment units prior to discharge;
- Interprets the term ''no feasible alternatives'' in 40 CFR 122.41(m)(4)(i)(B) as it applies to such peak wet weather flow diversions;
- Does not apply to discharges or overflows prior to the headworks of a POTW treatment plant; dry weather diversions; diversions around primary or tertiary treatment units; or diverted flow that is not recombined with flow from the secondary treatment units prior to discharge;
- Promotes use of measures to provide the highest possible treatment to the greatest possible peak wet weather flow; and
- Promotes reporting and public notification of peak wet weather diversion events.

A combination of approaches can be used to achieve the goals of this policy. These approaches include:

- Ensuring full utilization of available secondary treatment capacity;
- Reducing infiltration and inflow (I/I);
- Maximizing the use of the collection system for storage;
- Providing off-line storage; and
- Providing sufficient secondary treatment capacity.

EPA recognizes that these approaches, alone or in combination, may not be sufficient in some cases to enable a POTW treatment plant to process its peak wet weather flows through its secondary treatment units. In such cases, a POTW treatment plant operator may have no feasible alternative to peak wet weather flow diversions around

secondary treatment units. This policy sets forth a process for determining whether or not such feasible alternatives to peak wet weather flow diversions exist. If the NPDES authority determines that there are no feasible alternatives to peak wet weather flow diversions around secondary treatment units at the treatment plant using the analysis set forth in this policy, then the NPDES authority may approve peak wet weather flow diversions around secondary treatment units at a POTW treatment plant serving separate sanitary sewer conveyance systems as an anticipated bypass in accordance with 40 CFR 122.41(m) in a new or renewed NPDES permit. The only flow that can be approved as an anticipated bypass around secondary treatment units is flow that is anticipated to exceed the peak flow capacity of the secondary treatment unit(s) even after implementation of the feasible technologies and approaches identified via the process outlined in this policy. NPDES authorities should include an implementation schedule in the permit for the feasible technologies and approaches that would need to be implemented and the associated flow volumes. In NPDES permits with such implementation schedules, the approval of any anticipated bypass would be contingent upon the permittee's performance of the implementation schedule. This implementation schedule would be considered a permit condition as opposed to a schedule of compliance under 40 CFR 122.47.

A thoughtful public planning process at the local level is important to minimize or eliminate overflows in the collection system, minimize I/I into the collection system, maximize treatment of all flows, and improve wet weather flow management. EPA recommends that POTW treatment plant operators work with their NPDES authorities and local communities to proactively minimize peak wet weather influent flow volume and improve effluent quality, reduce the frequency and volume of diversion events, and improve the structural integrity and capacity of collection systems and the reliability of POTW treatment plants.

The use of diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewer conveyance systems to manage peak wet weather flows is not necessary in many cases and cannot be approved if feasible alternatives are identified through the analysis described herein. Accordingly, on permit renewal, the presumption by the NPDES authority would be against the utility's continued use of diversions to manage peak wet weather flows. This presumption could be overcome by the POTW treatment plant operator again demonstrating that there are no feasible alternatives to such diversions through updating and resubmission of the utility analysis described in this policy, ensuring that the submission identifies any changes at the facility, progress made in relevant areas, any new circumstances, the timing of ongoing projects or construction, or I/I reduction schedules. Timely permit renewals for facilities that employ peak wet weather diversions around secondary treatment units at the POTW treatment plant should be a priority. Because of the importance of regular analysis of the ongoing need to utilize diversions at a particular facility, NPDES permits for facilities that employ or seek to employ peak wet weather diversions around secondary treatment units at their treatment plant should be timely renewed rather than administratively continued.

The determination of what constitutes a 'peak wet weather event,' during which the use of a peak wet weather diversion may be approved by a NPDES authority as an anticipated bypass, will be a site-specific determination. Certainly, EPA does not expect diversions at POTW treatment plants serving separate sanitary sewer conveyance systems to be used for routine rain events. EPA also cannot reasonably estimate or endorse an 'acceptable' number of anticipated bypasses (e.g., five per year). Such a one-size-fits all approach would not recognize the site-specific nature of peak wet weather diversions and could lead to excessive use of diversions in some communities. Rather, it is EPA's intention through this policy to ensure that POTW treatment plant operators, NPDES authorities, and the general public evaluate what constitutes a peak wet weather event for a POTW treatment plant for which there is no feasible alternative to a peak wet weather diversion, based upon past diversions, opportunities for eliminating or reducing diversions, and future considerations. Where such peak wet weather diversions at a POTW treatment plant cannot be feasibly avoided, additional technologies (*e.g.*, providing supplemental biological or physical/chemical treatment) and approaches should be used to maximize treatment of diverted flows where feasible. EPA does not support the use of peak wet weather diversions around secondary treatment units at POTW treatment plants when the peak flows are largely due to poor (or lack of) collection system maintenance or the lack of investment in or upgrades to treatment capacity.

Under this policy, NPDES authorities and POTW treatment plant operators need to ensure that all flows that will be diverted from the secondary treatment units in peak wet weather events receive a minimum of primary treatment and any supplemental treatment or technology shown feasible using the factors outlined in this policy. All discharges from POTW treatment plants serving separate sanitary sewer conveyance systems must meet effluent limitations, including the 85 percent removal requirement (unless the discharge from the POTW treatment plant meets the requirements of 40 CFR 133.103(d) (less concentrated influent wastewater for separate sanitary sewers)) and other secondary treatment requirements and any more stringent limitations necessary to meet water quality standards. Failure to meet effluent limitations is a permit violation. NPDES authorities should ensure that the facility, including when diverting, does not have the reasonable potential to cause or contribute to non-attainment of any water quality standards.

EPA recognizes that some POTW treatment plants may be implementing technologies more advanced than or supplementary to secondary treatment. The Agency encourages the use and permitting of such technologies (*e.g.*, membrane, tertiary) where they produce a higher quality effluent. In the case where a POTW treatment plant is using, or plans to use, technology that is more effective in baseline pollutant removal than is required to meet secondary treatment-based permit limits, the NPDES authority should take that improved baseline performance into consideration when determining whether peak flow diversions at a POTW treatment plant are approved and under what conditions.

No Feasible Alternatives Analysis Process

An authority's determination as to whether or not there is a feasible alternative to peak wet weather diversions at a POTW treatment plant serving a separate sanitary sewer collection system should be made using the following inputs and criteria, which are based on 40 CFR 122.41(m)(4)(i)(A)–(C) and 40 CFR 122.21(j). At the time of NPDES permit application or NPDES permit renewal:

1. POTW treatment plant operators seeking approval of peak wet weather diversions at a treatment plant as an anticipated bypass should submit a

comprehensive analysis (utility analysis) to the NPDES authority that:

a. Documents current treatment plant design capacity for all treatment units, the maximum flow that can be processed through those units, and the feasibility of increasing such treatment capacity and related costs;

b. Estimates the frequency, duration, and volume of current wet weather diversions, and evaluates alternatives to reduce the frequency, duration, and volume of such occurrences and related costs;

c. Estimates the potential for future peak wet weather diversions based upon information such as predicted weather patterns, population growth, and projected treatment plant and collection system changes (*e.g.*, upgrades, extensions, deterioration) and evaluates options for reducing diversions based on these variables;

d. Assesses existing storage within the collection system or on-site and options for enhanced utilization or expansion (taking into account physical and technological considerations) of storage to reduce the frequency, duration, and volume of peak wet weather diversions, and the related costs;

e. Assesses other ways to reduce peak wet weather flow volumes, such as limiting collection system extensions or slug loadings from indirect dischargers;

f. Evaluates technologies (such as supplemental biological treatment, physical chemical treatment, ballasted flocculation, deep bed filtration, or membrane technology) that are or could be used to provide additional treatment to peak wet weather flows or peak wet weather diversions at the POTW treatment plant and the costs of implementing those technologies;

g. Evaluates the extent to which the permittee is maximizing its ability to reduce I/I throughout the entire collection system (*i.e.*, not only the portions operated by the utility, but also portions operated by any municipal satellite community), including the use of existing legal authorities, potential improvements in the timing or quality of such efforts, and options for obtaining or expanding legal authorities to reduce I/I from satellite collection systems;

h. Evaluates peak flow reductions obtainable through implementation of existing Capacity, Management, Operations, and Maintenance (C–MOM) programs and potential improvements in the timing or enhancement of those programs and the related costs; or, if no such program exists, reductions obtainable through the development and implementation of a C–MOM program and the related costs;

i. Assesses the community's ability to fund the peak wet weather flow improvements discussed in the utility analysis, taking into consideration: current sewer rates, planned rate increases, and the costs, schedules, anticipated financial impacts to the community of other planned water and wastewater expenditures, and other relevant factors impacting the utility's rate base, using as a guide EPA's CSO Guidance for Financial Capability Assessment and Schedule Development, EPA 832–B–97–004;

j. Proposes a protocol for monitoring the recombined flow at least once daily during diversions for all parameters for which the POTW treatment plant has daily effluent limitations or other requirements (*e.g.*, monitoring only requirements) and ensures appropriate representative monitoring for other monitoring requirements of the permit, the total volume diverted, and the duration of the peak wet weather diversion event; and

k. Projects the POTW treatment plant effluent improvements and other improvements in collection system and treatment plant performance that could be expected should the technologies, practices, and/or other measures discussed in the utility analysis be implemented.

2. For any POTW treatment plant operator seeking approval in an NPDES permit for an anticipated bypass under this policy, the NPDES authority should:

a. Make the utility analysis publicly available with other draft permit information for public review and comment;

b. Review and evaluate the utility analysis and require measures to be undertaken to provide the highest possible treatment to the greatest possible peak wet weather flow, taking into account the full range of economic, environmental, public health, and engineering considerations;

c. Review and approve or deny the peak wet weather diversions based on the determination of whether there are feasible alternatives to those diversions using the analysis set forth in this policy;

d. Include a permit provision recognizing any approved peak wet weather diversions as anticipated bypasses, and specify the conditions for allowing such diversions;

e. Include a permit provision requiring any POTW treatment plant operator that has an approved anticipated bypass to provide notice of the peak wet weather diversion event consistent with 40 CFR 122.41(m)(3);

f. Include a permit provision requiring the operator of any POTW treatment plant that has an approved anticipated bypass to monitor the recombined flow at least once daily during diversions for all parameters for which the POTW treatment plant has daily effluent limitations or other requirements (*e.g.*, monitoring only requirements), the total volume diverted, and the duration of the peak wet weather diversion event. For parameters for which the permit establishes non-daily effluent limitations, include in the permit monitoring requirements sufficient to yield data representative of the final blended discharge, in order to ensure compliance with applicable effluent limitations. See 40 CFR 122.48(b);

g. Describe in the permit Fact Sheet prepared under 40 CFR 124.8(b) how the peak wet weather event was calculated, the reason for allowing peak wet weather diversions, and any requirements for such peak wet weather diversions;

h. Ensure that permit load limitations account for the anticipated flow into secondary treatment units during both wet and dry weather conditions;

i. Include permit provisions for public notification (*e.g.*, via utility website) of the peak wet weather diversion event within 24 hours of the inception of each event; follow up public notification of the duration and volume of the event within 48 hours of its cessation; and for public review of the POTW treatment plant operator's peak wet weather flow diversion practices upon request;

j. Include permit provisions requiring the control authority with an approved pretreatment program to review, and revise if necessary, local pretreatment limits for indirect dischargers to take into account peak wet weather diversion events (*e.g.*, significant industrial users with batch discharging);

k. If the discharge will be to sensitive receiving waters (*i.e.*, waters used for recreation; drinking water; shellfish beds; waters formally designated by state or federal authorities as requiring special consideration or protection; waters with threatened or endangered species), ensure that the impact of any peak wet weather diversion events on these waters is minimized and additional caution exercised as permit limitations are set; and

l. Rigorously review each and every POTW permit renewal request that seeks continued approval of peak wet weather diversions to ensure that a comprehensive utility analysis consistent with section 1 above is submitted and evaluated and that peak wet weather diversions are approved only when no feasible alternatives to

them are identified through the process set forth in this policy.

3. EPA will:

a. Use this policy in making NDPES permitting decisions for all POTW treatment plants serving separate sanitary sewer conveyance systems in non-authorized states;

b. Review permits in NPDES authorized states within the timelines specified in 40 CFR 123.44 for all POTW treatment plant operators seeking approval for diversions pursuant to this policy to ensure that they are consistent with this interpretation of the regulations;

c. Ensure that enforcement actions are taken, where appropriate, against POTW treatment plant operators that fail to move forward expeditiously to meet their legal obligations as determined consistent with this policy; and

d. Ensure that monitoring data received concerning peak wet weather diversions at POTW treatment plants is available to the public on EPA's website in a searchable and correctable database.

Dated: December 19, 2005.

Benjamin H. Grumbles,

Assistant Administrator, Office of Water.

[FR Doc. E5–7696 Filed 12–21–05; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AT90

Endangered and Threatened Wildlife and Plants; Critical Habitat for the Perdido Key Beach Mouse, Choctawhatchee Beach Mouse, and St. Andrew Beach Mouse; Correction

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; correction.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a correction to the proposed rule to revise critical habitat for the endangered Perdido Key beach mouse (*Peromyscus polionotus trissyllepsis*) and Choctawhatchee beach mouse (*Peromyscus polionotus allophrys*), and designate critical habitat for the endangered St. Andrew beach mouse (*Peromyscus polionotus peninsularis*) published in the **Federal Register** on December 15, 2005. The proposed rule was published with an incorrect electronic mail address for submission of comments.

DATES: We will accept comments from all interested parties until February 13, 2006. We must receive requests for public hearings in writing by January 30, 2006.

FOR FURTHER INFORMATION CONTACT: Field Supervisor, U.S. Fish and Wildlife Service, 1601 Balboa Avenue, Panama City, Florida 32405, (telephone 850–769–0552; facsimile 850–763–2177).

SUPPLEMENTARY INFORMATION: On December 15, 2005, a document entitled ''Endangered and Threatened Wildlife and Plants; Critical Habitat for the Perdido Key Beach Mouse, Choctawhatchee Beach Mouse, and St. Andrew Beach Mouse'' was published in the **Federal Register** (70 FR 74426) with an incorrect electronic mail address for submission of comments.

Correction

In the **Federal Register** of December 15, 2005, on page 74426, in the first column, correct item 3 in the **ADDRESSES** section to read: 3. You may send comments by electronic mail (e-mail) to *floridabeachmouse@fws.gov*.

Dated: December 16, 2005.

Sara Prigan,

Federal Register Liaison Officer.

[FR Doc. E5–7701 Filed 12–21–05; 8:45 am]

BILLING CODE 4310–55–P

Draft Guidance on Preparing a Utility Analysis

July 2009

Acronyms and Abbreviations

BOD ..... biochemical oxygen demand

CEPT ..... chemically enhanced primary treatment

CFR ..... *Code of Federal Regulations*

CMOM ..... capacity, management, operations and maintenance

CSO ..... combined sewer overflows

EPA ..... U.S. Environmental Protection Agency

I/I ..... infiltration and inflow

IFAS ..... integrated fixed-film activated sludge

LTCP ..... long-term control plan

MBBR ..... moving bed biofilm reactors

MBR ..... membrane bioreactor

MLSS ..... mixed liquor suspended solids

NPDES ..... National Pollutant Discharge Elimination System

POTW ..... publicly owned treatment works

RAS ..... return activated sludge

SRF ..... State Revolving Fund

SSES ..... Sanitary Sewer Evaluation Survey

SSO ..... sanitary sewer overflow

TSS ..... total suspended solids

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Appendix A: Peak Wet-Weather Flows Utility Analysis Completeness Checklist 1

I. Introduction

The purpose of this document is to provide guidance to permittees that are identifying and evaluating feasible alternatives to peak wet-weather diversions at a treatment plant. This document considers the development of a comprehensive Utility Analysis of feasible alternatives to the diversions that may be submitted to the NPDES authority.

While EPA does not intend that all Utility Analysis be formatted in a certain way or contain the same information or analysis, the Agency believes that the common components of a comprehensive Utility Analysis can be identified. This document is organized to reflect the following components of a Utility Analysis:

- Description of existing treatment plant and collection system.
- Characterization of existing flows
- Projected future flows
- Indentifying and Evaluating Potential Measures to Reduce Diversions
- Ability to Pay / Financial Capability Assessment
- Summary of Public Participation
- Selection of Recommended Measures for Implementation
- Proposed Monitoring Protocol
- Proposed Plan for Public Notice of Diversion

Appendix A is a completeness checklist that is intended to complement the guidance and support permit writers in evaluating the completeness and comprehensiveness of a Utility Analysis. The goal of the checklist is to assist permit writers in efforts to assess and document whether the permit and administrative record provides a complete, comprehensive and transparent record of permit development.

a. Background

Many municipal sewage treatment plant experience high peak influent flows during significant wet-weather events that exceed the treatment capacity of existing secondary treatment units. In such situations, wet-weather flows are sometimes diverted around secondary treatment units. The diverted flows are then either discharged directly to receiving waters or recombined with the flows from the secondary treatment units before discharge. The U.S. Environmental Protection Agency (EPA) interprets

existing regulations, specifically, the *bypass* regulation at Title 40 of the *Code of Federal Regulations* (CFR) section 122.41(m), to apply in both circumstances.

EPA's National Pollutant Discharge Elimination System (NPDES) regulations prohibit bypass—defined as the intentional diversion of waste streams from any portion of the treatment facility—except in very limited circumstances. Section 122.41(m)(4)(i) prohibits bypass, and EPA or the NPDES authority may take enforcement action against a permittee for bypass, unless:

(A) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(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; and

(C) The permittee submitted required notices.

Under section 122.41(m)(4)(ii), the Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that the bypass will meet the criteria listed in subsection (m)(4)(i). An approved anticipated bypass is a recognition that the permitting authority has considered the adverse impacts of the bypass and has determined that the bypass would or does meet the criteria of 40 CFR 122.41(m)(4)(i)(A), (B) and (C) and will not take enforcement action against a permittee for the bypass. Compliance with 40 CFR 122.41(m)(4)(i), in and of itself, would not shield a permittee from citizen suits for conducting a prohibited bypass. *Southern Ohio Coal Company v. Office of Surface Mining, Reclamation and Enforcement*, 20 F.3d 1418, 1427 (6th Cir. 1994).

b. Draft Peak Flows Policy

On December 22, 2005, EPA requested public comments on a draft policy (hereafter called the draft peak flows policy) regarding peak wet-weather discharges from publicly owned treatment works (POTW) treatment plants serving separate sanitary sewer collection systems. The 2005 draft peak flows policy would clarify that the bypass provision applies to wet-weather diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewers that are recombined prior to discharge. It also includes an interpretation that under limited circumstances in which anticipated bypasses meet the requirements of 40 CFT 122.41(m), including implementation of feasible alternatives, bypasses could be approved in a permit under 40 CFR 122.41(m)(4)(ii).

The December 22, 2005, draft policy would apply only to peak wet-weather diversions around secondary treatment units that occur at POTW treatment plants that serve separate sanitary sewer systems. (EPA previously explained the processes by which wet-weather diversions can be approved in NPDES permits for POTW treatment plants serving combined sewer systems in the 1994 *Combined Sewer Overflow Policy*, (CSO Control Policy) 59 *Federal Register* (FR) 18,693-18,694 (April 19, 1994).) The 2005 draft peak flows policy describes the circumstances under which anticipated bypasses that reflect the full implementation of feasible alternatives would be approved for the purposes of section 122.41(m)(4)(ii) in the limited context of this policy.

The draft peak flows policy does not change EPA's interpretation of the bypass regulation as applied in *United States v. City of Toledo, Ohio*, 63 F.Supp.2d 834 (N.D. Ohio 1999). Thus, POTW treatment plants that fail to move forward to meet their obligations under this policy remain subject to the full scope of enforcement remedies for any violations. Furthermore, nothing in the draft policy provides a basis to reopen existing enforcement remedies (e.g., orders, decrees, or agreements) that address measures to reduce or eliminate peak flow wet-weather diversions.

EPA strongly discourages reliance on peak wet-weather flow diversions around secondary treatment units as a long-term, wet-weather management approach at a POTW treatment plant serving separate sanitary sewer conveyance systems. Such diversions should be minimized to the extent feasible. EPA anticipates that, over time, the need to undertake peak wet-weather flow diversions at POTW treatment plants serving separate sanitary sewer conveyance systems can be eliminated from most systems in a variety of ways, such as by enhancing and/or expanding storage and treatment capacity and reducing sources of peak wet-weather flow volume. EPA expects that aggressive efforts by POTW treatment plants in consultation with NPDES authorities can lead to dramatic reductions in the volume and duration of peak wet-weather flows; in most cases completely phase out diversions; and improve the treatment and quality of peak wet-weather flow discharges. EPA also believes that involving the general public will improve the assessment of various options to minimize peak wet-weather flow diversions.

The 2005 draft peak flows policy is limited in scope; it applies only (1) to peak flow wet-weather diversions, (2) from POTW plants, (3) that serve separate sewer collection systems, and (4) that recombine the diverted peak flows prior to discharge. The draft policy describes the circumstances under which anticipated bypasses at these plants could be either approved or denied as a result of the NPDES permitting process. The draft policy identifies the content of an appropriate Utility Analysis that POTWs should submit with their permit applications to facilitate development of appropriate permit conditions. The draft policy outlines the decision process involved in reviewing a Utility Analysis and determining whether approval of peak wet-weather flow diversions is appropriate.

The 2005 draft peak flows policy explains how the NPDES authority should determine whether anticipated peak wet-weather flow diversions, at POTW treatment plants serving separate sanitary sewer collection systems, which are recombined with flow from the secondary treatment units prior to discharge, should be approved or denied under 40 CFR 122.41(m)(4)(ii). Under the draft policy, if the NPDES authority determines, on the basis of a Utility Analysis and any other available information, that the criteria of section 122.41(m)(4)(i) will be met and, if the permit includes any more stringent limits necessary to meet water quality standards (including when an anticipated bypasses occurs (i.e., to take into account its adverse effects)), the NPDES authority may provide for approval of anticipated bypass of peak wet-weather flow diversions around secondary treatment units.

The 2005 draft peak flows policy:

- Explains how EPA intends to apply the bypass regulation, specifically, 40 CFR 122.41(m)(4), to peak wet-weather flow diversions around secondary treatment units at POTW treatment plants

serving separate sanitary sewer systems where the diverted flow is recombined with flow from the secondary treatment units prior to discharge;

- Describes a Utility Analysis and relevant steps of the permit review process;
- Identifies a framework within the permit process through which the criteria of the bypass rule can be evaluated for determining whether anticipated peak wet-weather flow diversions to which this policy applies could be approved as anticipated bypasses;
- Promotes use of measures to provide the highest possible treatment to the greatest possible peak wet-weather flow; and
- Promotes reporting and public notification of peak wet-weather diversion events.

The draft policy is limited in scope. The draft policy:

- Does not apply to discharges or overflows prior to the headworks of a POTW treatment plant; or to dry-weather diversions; or to diversions around primary or diversions that are not recombined with flow from the secondary treatment units prior to discharge; or to treatment plants (municipal or industrial) other than those serving separate sanitary sewer collection systems; and
- Does not address diversions around tertiary treatment units that are separate from secondary treatment units.

A combination of approaches can be used to achieve the goals of the 2005 draft peak flows policy. These approaches include the following:

- Ensuring full utilization of available secondary treatment capacity;
- Reducing infiltration and inflow (I/I);
- Maximizing the use of the collection system for storage;
- Providing off-line storage; and
- Enhancing and/or expanding secondary treatment capacity.

In cases where these approaches, alone or in combination, are not sufficient to enable a POTW treatment plant to process its peak wet-weather flows through its secondary treatment units, a POTW treatment plant might have no feasible alternative to peak wet-weather flow diversions around secondary treatment units. However, EPA believes the use of diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewer systems to manage peak wet-weather flows is not necessary in many cases and cannot be approved for diversions where feasible alternatives are identified through the Utility Analysis or if the other elements of the bypass regulation are not met. If feasible alternatives to avoid all anticipated bypasses are available during the permit term, such that there will be no need for diversions by or before the end of the permit term, approval in the permit under section 122.41(m)(4)(ii) would not be appropriate; rather, the permit would address only the requirements to implement the alternatives, including a schedule with specific dates for implementing, as quickly as feasible, the technologies, upgrades and approaches identified and estimates of the

associated flow volumes. This implementation schedule would be considered a permit condition as opposed to a schedule of compliance under 40 CFR 122.47.

The 2005 draft peak flows policy provides that, at the time of application for an NPDES permit for POTW treatment plants seeking approval of peak wet-weather diversions at a treatment plant as an anticipated bypass, the plant should submit a comprehensive analysis (Utility Analysis) to the NPDES authority that does the following:

a. Documents current treatment plant design capacity for all treatment units, the maximum flow that can be processed through those units, and the feasibility of increasing such treatment capacity and related costs;

b. Estimates the frequency, duration, and volume of current wet-weather diversions, and evaluates alternatives to reduce the frequency, duration, and volume of such occurrences and related costs;

c. Estimates future peak wet-weather flows on the basis of information such as predicted climatic conditions, anticipated dry-weather flows, projected treatment plant and collection system changes (e.g., upgrades, extensions, deterioration), and evaluates options for reducing diversions on the basis of these variables;

d. Assesses existing storage within the collection system or on-site and options for enhanced utilization or expansion (taking into account physical and technological considerations) of storage to reduce the frequency, duration, and volume of peak wet-weather diversions, and the related costs;

e. Assesses other ways to reduce peak wet-weather flow volumes, such as limiting collection system extensions and slug loadings from indirect dischargers, or water conservation or green infrastructure techniques;

f. Evaluates technologies, such as supplemental biological treatment, physical/chemical treatment, (e.g., ballasted flocculation, deep-bed filtration, or membrane technology) that are or could be used to provide additional treatment to peak wet-weather flows or peak wet-weather diversions at the POTW treatment plant and the costs of implementing those technologies;

g. Evaluates the extent to which the permittee is maximizing its ability to reduce I/I throughout the entire collection system (i.e., not only the portions operated by the utility, but also portions operated by any municipal satellite community), including the use of existing legal authorities, potential improvements in the timing or quality of such efforts, and options for obtaining or expanding legal authorities to reduce I/I from satellite collection systems;

h. Evaluates peak flow reductions obtainable through implementation of existing capacity, management, operations, and maintenance (CMOM) programs and potential improvements in the timing or enhancement of those programs and the related costs; or, if no such program exists, reductions obtainable through the development and implementation of a CMOM program and the related costs;

i. Assesses the community's ability to fund the peak wet-weather flow improvements discussed in the Utility Analysis, taking into consideration current sewer rates; planned rate increases; other potential sources of federal, state, or local funds; and the costs, schedules, anticipated financial impacts to the community of other planned water and wastewater expenditures and other relevant factors affecting the utility's rate base, using as a guide EPA's *Combined Sewer Overflows—Guidance for Financial Capability Assessment and Schedule Development* (USEPA 1997);

j. Proposes a protocol for monitoring the total volume diverted, and the duration of each peak wet-weather diversion event, and a protocol monitoring of the recombined flow at least once daily during diversions for all parameters for which the POTW treatment plant has daily effluent limitations or other requirements (e.g., monitoring only requirements) and representative monitoring for other monitoring requirements of the permit; and

k. Projects the POTW treatment plant effluent improvements and other improvements in the collection system and treatment plant performance that could be expected if the technologies, practices or other measures discussed in the Utility Analysis are implemented.

c. CSO-Related Bypasses

EPA has provided guidance on the planning, selection, and implementation of controls to meet technology- and water quality-based requirements for CSOs under the NPDES program in the *National CSO Control Strategy*, 54 FR 37370 (September 8, 1989), and the *CSO Control Policy*, 59 FR 18688 (April 19, 1994). The 1994 CSO Control Policy provides comprehensive guidance for developing site-specific NPDES permit requirements for combined sewer systems to address wet-weather CSO discharges from designed overflow points. The Wet Weather Water Quality Act of 2000 amended the Clean Water Act (CWA) to provide that each permit, order, or decree issued after December 15, 2000, for a discharge from a municipal combined sewer must conform to the CSO Control Policy. 33 United States Code section 1342(q)(1).

Under the CSO Control Policy, permittees with combined sewer systems were to immediately undertake a process to accurately characterize their sewer systems, to demonstrate implementation of nine minimum controls identified in the policy, and to develop and implement a long-term CSO control plan that would ultimately provide for compliance with the requirements of the CWA. See 59 FR 18688 (April 19, 1994). The CSO Control Policy identifies EPA's major objectives for long-term control plans (LTCP).

When developing the CSO Control Policy, EPA recognized that some POTW treatment plants might have primary treatment capacity in excess of their biological treatment capacity. See 59 FR 18693, col. 2. The policy indicates that one effective strategy to abate pollution resulting from CSOs is to maximize the delivery of flows during wet weather to the POTW treatment plant for treatment. This strategy can maximize the use of available POTW facilities for wet-weather flows and ensure that combined sewer flows receive at least primary treatment prior to discharge. In addition, this strategy might enable the permittee to eliminate or minimize overflows to sensitive areas. In recognition of the significant water

quality benefits of maximizing flow to the POTW treatment plant, the CSO Control Policy includes it as a minimum element of an LTCP.

To further the objective of maximizing treatment at the POTW treatment plant, the CSO Control Policy provides guidance on the use of an NPDES permit to recognize approval of anticipated bypasses where the criteria of the bypass provision for such approvals are met. The CSO Control Policy clarifies that it is the responsibility of the permittee to document, on a case-by-case basis, compliance with 40 CFR 122.41(m) to have an anticipated bypass approved in a permit. The policy indicates that for some CSO-related permits, the study of feasible alternatives in the LTCP, along with other information in the permit record, may provide sufficient support for approval of a CSO-related bypass in the permit and to define the specific parameters under which a bypass can be approved. The policy provides that where a permit includes an approval of a CSO-related bypass, the permit would define the specific wet-weather conditions under which a CSO-related bypass would be allowed and would also specify what treatment, monitoring, and effluent limitations would apply to the bypass flow.

The policy provides that permits with approved bypasses should also make it clear that all wet-weather flows passing the headworks of the POTW treatment plant will receive at least primary clarification, solids and floatables removal and disposal, and disinfection where necessary, and any other treatment that can reasonably be provided.

The CSO Control Policy anticipates that POTW operators will document in their LTCP, or other documentation, the evaluation of the analysis of feasible alternatives to the diversions. However, where the analysis of feasible alternatives in the LTCP is incomplete or a facility needs to update its feasibility analysis before permit reissuance, this guidance document, read in conjunction with the CSO Control Policy, might provide some technical assistance.

II. Description of the Existing Treatment Plant and Collection System

A Utility Analysis and permit application should provide a description of the existing treatment plant and collection system. The description of the treatment plant should include:

- A brief summary narrative of the facility;
- Process flow diagrams;
- A description of design capacities for key unit operations; and
- A summary of efforts to characterize the actual capacity of unit operations where diversions have occurred.

a. Summary Narrative

The summary narrative of the facility should provide a brief overview of the existing POTW treatment plant. It should describe the facility location, size, property boundaries, level and type of treatment provided and a brief history of major construction at the plant. This information could include the initial construction date and major expansions or upgrades.

b. Process Flow Diagrams

Schematics showing the process flows during dry- and wet-weather conditions should be included. A description of the possible flow paths and an indication of when the various flow paths are used should accompany the process flow diagram(s). At a minimum, a description of the normal dry-weather and wet-weather flow paths should be provided.

c. Approved Design Capacities of Treatment Units

Section 1.a of the December 22, 2005, draft peak flows policy, provides in part that the Utility Analysis should document current treatment plant design capacity for all treatment units. A summary of the design capacities for all of the treatment units at the treatment plant should be included. These processes could include the following:

- Preliminary treatment
- Equalization
- Primary treatment
- Secondary treatment
- Tertiary Treatment
- Disinfection

This information should include the number of units, tank volumes, basis of tank sizing, and rated capacity. The firm capacity (with the largest unit out of service) and total installed capacity for each process should be identified. The hydraulic capacity of each process should also be discussed, which will require a review of the channels, piping, and pumping systems connecting the treatment processes.

The design capacities can be included on the process flow diagrams to show the maximum flows through each flow path.

d. Determination of Actual Capacities of Treatment Units

Section 1.a of the December 22, 2005, draft peak flows policy, provides in part that a Utility Analysis should document the maximum flow that can be processed through various unit processes. Treatment units where diversions associated with limited capacity should be identified. The actual capacity of such treatment units with limited capacity should be evaluated. The basis of design is often conservative in terms of process capacities, so the plant might have additional treatment capacity available beyond that indicated in the basis of design. Conversely, changes in design standards used by regulatory authorities, operation of the process, or the length of service for a given process could decrease the capacity below that stated in the basis of design.

An evaluation of the actual capacity of the treatment units can be performed by reviewing operational data from peak wet-weather events and comparing this information to that contained in the basis of design, especially during wet-weather conditions, which are drastically different from dry-weather flow in terms of both hydraulic and organic loadings. In addition, stress testing can be conducted to identify the peak flows that can be treated under dry or wet-weather conditions for selected treatment processes. A review of the wet-weather capacities for each process can identify the limiting process. The total installed capacity, rather than the firm capacity, should be used in this analysis as long as the utility can provide justification. For example, the equalization basins have no moving parts and the entire volume should be used for the installed capacity. Another example would be the use of the secondary process to treat the diluted wastewater, as long as the flow can be transported through the process and the oxygen supply capability meets the demand. The utility can then evaluate alternatives to increase the capacity of the bottleneck process through additional modeling and demonstration. The evaluation can help determine the feasibility of avoiding diversions and the plant improvements that would be necessary for this goal to be achieved.

Because the information gained from stress testing is likely to be used to attempt to re-rate the capacities of some or all of the process units, EPA suggests that a plan be developed and shared with the NPDES permitting authority and other applicable state or federal authorities that would be involved in the approval of capacity changes. The results of the stress testing can be used to modify the maximum flows through a given unit operation.

e. Overview of the Collection System

The description of flows in the collection system should be prefaced with a brief overview of the collection system that includes:

- A general description of the size of the collection system and population served;
- Identification of major sewersheds within the collection system;
- Identification of all municipal satellite collection systems in the collection system;
- The number and location of pump stations.

Appropriate maps should be used in this description.

III. Flow Characterization

Characterization of dry-weather and peak wet-weather flows reaching the treatment plant and at key locations in the collection system is a major goal of the Utility Analysis. The applicant should provide detailed information to characterize the following:

- Dry-weather flows at the treatment plant
- Peak wet-weather flows reaching the treatment plant
- Bypasses at the treatment plant
- Overflows in the collection system

This portion of the analysis should describe:

- existing flows at the treatment facility;
- the history of diversions at the treatment plant;
- existing wet weather flows at critical locations in the collection system; and
- the history of wet weather sanitary sewer overflows in the collection system.

a. Treatment Plant Flows

One important objective of the Utility Analysis is to characterize wet- and dry-weather flows at the treatment plant. This is reflected in Section 1.b of the December 22, 2005, draft peak flows policy, which in part provides that the Utility Analysis should provide estimates of the frequency, duration, and volume of current wet-weather diversions. The NPDES permit application regulations require that an applicant provide the design flow rate of the treatment plant (i.e., the wastewater flow rate that the plant was built to handle), along with the average daily flow rate and maximum daily flow rate for each of the past 3 years. The Utility Analysis should provide additional information on flow rates, particularly those related to peak flow conditions.

The location and method used to monitor flow should be briefly described. The Utility Analysis should describe the various measures and terms used as different definitions for flows are sometimes used industry-wide.

If significant changes in flow rates have occurred in recent years, an explanation for the change should be included. For example, flow rate changes associated with I/I elimination projects, expansion of service areas, and capacity increases should be identified.

b. Description of Diversions

Information should be provided for any process bypass that has occurred at the plant including the following:

- Date of bypass event
- Process(es) bypassed
- Amount of precipitation and snowmelt, if applicable, associated with wet-weather diversion
- Volume of flow diversion
- Duration of the diversion
- Cause of bypass (e.g., wet weather, mechanical failure, power loss)

A discussion of the secondary treatment processes and the precipitation events that have resulted in flows greater than the available capacity should be included. The seasons when diversions are most likely to occur should also be discussed. The average frequency, duration, and volume of the diversions should be included. In addition, the range of values observed at the plant for these parameters should also be presented.

c. Collection System Flows

The Utility Analysis should identify sewersheds with high levels of I/I. For sewersheds that have been identified as having high levels of I/I, the Utility Analysis should provide a brief description of studies that have been conducted to identify and quantify sources of I/I within the sewershed and identify and quantify wet weather SSOs. The summary should include a description of when the studies were conducted, provide an overview of methods used and summarize major results of the studies and the corrective actions that were taken in response to the findings.

The peak capacity of major interceptors and main trunk lines feeding into the treatment plant should be identified, at a minimum. The capacities for each pump station should also be included, and any deficiencies noted.

Sewerage authorities can accept flow from tributary customers and might not have comprehensive information regarding the tributary customer system behavior and overflows. In all cases, the data should be characterized to clarify whether the entire system to the POTW is being characterized, or if the characterization is limited to that portion of the system that is under the jurisdiction of the POTW authority.

e. Description of Wet Weather Sanitary Sewer Overflows

The following information should be tabulated for each wet-weather sanitary sewer overflows (SSOs) that have occurred in the collection system in at least the last five years:

- Date of overflow event

- Location of overflows by sewershed
- Estimated volume of overflow
- Rainfall/ snowmelt volume associated with the event
- Duration of overflow event
- Cause of overflow, if known (i.e., I/I)
- Methodology used for identifying the frequency, volume, and duration of wet-weather overflows (e.g., installed monitoring equipment, operator observations, public complaints)
- Steps taken to reduce, eliminate, and prevent recurrence of the overflow

Data should allow for an understanding of how varying precipitation conditions affect system behavior and help to clarify year-to-year variability in system behavior relative to frequency, duration, and amount of rain or snowmelt that occurs. The collection system might respond differently depending on the amount of rain received and the period between precipitation events. If the precipitation data for the SSOs are not available at the plant, a nearby airport might have precipitation records. Local monitoring station data should be used if available, when reporting a specific wet-weather event, because precipitation distribution can vary widely for a given area. When making projections of future flows, an assumption should be made that wet-weather SSO discharges are eliminated with overflow volumes either directed to the plant or eliminated from the system.

f. Summarize Performance (Success/Limitations) of Past I/I Efforts

A description of prior projects to characterize and control wet-weather flows should be identified. This could include such projects as Sanitary Sewer Evaluation Survey (SSES) studies and subsequent corrective actions, increased transport capacity to address limited capacities, construction of sanitary equalization basins in the collection system or private property I/I elimination programs. Completion dates of these projects and impacts of these projects on the overflow history as contained in the previous item should be described in a narrative.

In addition, collection system rehabilitation efforts that improve system reliability and transport capacity should be described. This information should include planned efforts and recently completed rehabilitation. Information from past studies, such as those required under the Clean Water Act Construction Grants program to assure proper and efficient operation and maintenance of treatment works and their associated collection systems should be considered, if available. These provisions required the development of operation and maintenance manuals, emergency operating programs, personnel training, adequate budget, and operational reports. In addition, past trends of collection system rehabilitation should be considered, including a summary of completed projects performed in accordance with an SSES.

Ensuring that the system has adequate capacity, and providing proper management, operation and maintenance, can reduce the occurrence of collection system failures. Effective utility management can

therefore be described in terms of CMOM and is necessary to maintain the capacity of the collection system, to reduce the occurrence of temporary problem situations such as blockages, to protect the structural integrity and capacity of the system, and to anticipate potential problems and take preventive measures. An ancillary effect of a CMOM program controlling remote overflows might be more flow reaching the treatment plant. This is reflected in Section 1.h of the December 22, 2005, draft peak flows policy, which states, in part, that the utility should evaluate peak flow reductions obtainable through implementation of existing CMOM programs and potential improvements in the timing or enhancement of those programs and the related costs; or, if no such program exists, reductions obtainable through the development and implementation of a CMOM program and the related costs.

IV. Projected Peak Wet-Weather Flows

An objective of the Utility Analysis is to provide estimates of future peak wet-weather flows. This is reflected in Section 1.c of the December 22, 2005, draft peak flows policy which, in part provides that the Utility Analysis should provide estimates of future peak wet-weather flows on the basis of information such as predicted climatic conditions, anticipated dry-weather flows, projected treatment plant and collection system changes (e.g., upgrades, extensions, deterioration).

Projections of future flows within the collection system and entering the treatment plant are to be included as part of the Utility Analysis. Plans to expand the service area geographically or consolidate existing treatment plants should be described. Information on population projections within the service area should be included. Data from National Weather Service Stations can be used to develop long-term weather predictions that could affect future flows. The anticipated effect of the service area expansion, population projections, and future climate predictions on average and peak flows should be described. In addition, an analysis of water use trends within the utility's service area for the past several years should be included. Results of such an analysis could be quantitative or qualitative.

The applicant should describe efforts to replace or rehabilitate the system, including projections on how such activities could increase or decrease flows to the plant. A description and schedule for rehabilitation projects at the treatment plant and in the collection system should be provided. The schedule for I/I removal should also be included. The impact of these improvements on the average and wet weather treatment plant flows should be summarized. Although I/I removal projects often decrease the amount of flow that enters the treatment plant, rehabilitation within the collection system could increase the amount of flow needing treatment. The current I/I projections should also be summarized.

V. Identifying and Evaluating Potential Measures to Reduce Diversions

The Utility Analysis should identify and evaluate a comprehensive set of potential alternatives that would reduce or eliminate wet-weather diversions at the treatment plant. Possible measures that should be evaluated can be grouped into the following general categories:

- Operational changes at the treatment plant
- Structural modifications at the treatment plant
- Collection system improvements
- Additional alternatives
- Treatment of diverted flows
- Consideration of emergency back-up equipment

For each alternative identified and evaluated in the Utility Analysis, the following information should be included (to the degree applicable):

- For structural modifications (such as storage or expansion of treatment units), sizing of the equipment or process or a description of the level of effort associated with incorporating the alternative into the existing treatment plant.
- Anticipated performance of the equipment during the diversion of flow.
- Projected plant effluent expected if the alternative is implemented.
- Operational requirements for the process and additional labor hours required annually.
- The capital and operational costs associated with the process. Order of magnitude capital costs might be sufficient for initial screening of options. For example, if a connection to the collection system of the nearest treatment plant does not exist, providing a rough estimate of the piping required might be sufficient.
- Non-monetary factors that might affect the evaluation. Examples might include siting requirements in terms of land availability, topography and the ability to provide sufficient biomass for secondary treatment systems that will be used only during wet-weather events.

a. Operational Measures during Wet-weather flows

Developing an alternate or wet weather mode of operation can minimize or prevent bypasses. The wet weather mode of operation will be specific to the facility in terms of the flow patterns and the process parameters. Some common practices are described below.

Maximum Units in Operation

Maximizing the number of treatment units available during wet-weather events can increase plant capacity. When a wet-weather event is anticipated, all primary clarifiers, aeration basins, secondary

clarifiers, tertiary treatment units, and disinfection units should be placed in service. This might require that routine maintenance be scheduled for periods when wet-weather events are less likely to occur. Unscheduled repairs should be performed as expeditiously as possible, particularly when wet-weather events are likely to occur. These actions can help keep the maximum number of treatment units available for use during wet-weather events. If an emergency repair is required during a wet-weather event, the ability to allow wastewater to flow through the unit should be considered, to provide hydraulic capacity even though treatment would be limited.

Buffer Flow

To increase the likelihood of providing treatment for the peak flows (or providing as much treatment as possible during the peak flow period), it is recommended that a small buffer capacity be maintained, on the order of 5 to 10 percent of the design peak flow when wet-weather events are anticipated. As the plant influent increases with the wet weather progression, this buffer flow would be reduced gradually down to zero, and thus maintain stability of the biomass in the secondary system.

Existing Equalization Basins

Existing equalization basins that are typically used to store the diurnal fluctuations in flow should be emptied when wet-weather events are anticipated. This will allow the entire basin volume to be available to store wet-weather flows.

Protection of Biomass Inventory for Activated Sludge

Loss of the biomass (i.e., washout of the mixed liquor suspended solids [MLSS]) from the aeration system is another operational challenge that should be addressed during wet-weather events. Biomass can be lost when high flows cause the mixed liquor to overwhelm the secondary clarifiers and results in the biomass being discharged through the outfall or captured in the tertiary treatment system without a method of returning the mixed liquor to the aeration tank(s).

An operational strategy that can reduce the loss of biomass is to reduce the return activated sludge (RAS) rate from the secondary clarifiers to the head of the aeration basin during a wet-weather event. This would cause the biomass to accumulate in the secondary clarifiers. To use this strategy, the secondary clarifiers should have sufficient capacity to treat the anticipated peak wet-weather flows. There is a risk that the sludge blanket could rise too high and be resuspended, possibly releasing mixed liquor over the weirs. The operational changes that can be made also include reducing aeration in certain parts of the aeration basin during peak hours (WEF 2006).

Good Settling Biomass

Maintaining a mixed liquor that settles quickly can improve the performance of the secondary clarifiers. If settling is a problem during dry-weather operation, it will be even more difficult to maintain biomass during wet weather periods. There are many causes for poor settling (Jenkins et al. 2003). One possible cause is a young sludge age. A young sludge might not settle properly, which can be prevented by reducing the wasting rate in the secondary clarifier. However, a wasting rate that is too low could lead to anoxic conditions in the sludge blanket in the secondary clarifier, which could lead to sludge bulking,

when the release of nitrogen gas brings settled sludge to the surface of the clarifier. The proper sludge age and wasting rates must be determined by each plant. Increasing the settling velocity of the biomass can increase the efficiency of the secondary clarifiers during wet-weather events. The guidelines for surface overflow rates and solids loading rates were based on assuming an average settling velocity for the particles anticipated to be in the biomass. If the settling velocity is increased, compared to dry-weather operation, a portion of the effect of higher flows can be diminished. The settling velocity can be increased by forming larger, denser, and thus heavier particles. All other causes and cures should be pursued to maintain well settling biomass at the facility.

Chemical Addition during the Wet-Weather Period

The mixed liquor settling velocity can be increased by feeding or increasing the feed rate of metal salts (such as ferric chloride or alum) in the aeration basin or immediately upstream of the secondary clarifiers. This strategy would be most effective when biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations are relatively high, early in a wet-weather event. Dilute flows that often occur later in the wet-weather event might not have a sufficient density of particles to form a floc large enough to settle even with the addition of metal salts.

Minimal Sludge Blanket in the Secondary Clarifiers

Minimizing the sludge blanket (the amount of sludge stored in the bottom of the secondary clarifier) when wet-weather events are anticipated can decrease the likelihood of biomass loss over the weirs. During high flows, the solids that were previously settled in the secondary clarifiers could be resuspended and lost over the weir. Therefore, returning the sludge to the aeration basin will prevent the resuspension and possible biomass loss.

Management of Recycle Flows

To reduce the hydraulic loading rate during the peak wet-weather flows, the return of in-plant recycle flows from tertiary filters or sludge handling processes should be delayed until flows begin to subside. This can be carried out manually by the plant personnel or by automatic control measures at the facility.

b. Structural Modifications at the Treatment Plant

Equalization Basin

Additional storage during wet-weather events can be provided at the treatment plant (additional storage in the collection system is discussed below). Existing storage units could be expanded, or new storage units could be constructed. Equalization basin(s) can be provided at the treatment plant.

Existing storage or equalization tanks could be expanded by building additional compartments adjacent to the existing tanks. If space is not available adjacent to the existing tanks, new storage or equalization could be provided at an available location within the system. Constructing the tanks at a separate location from the existing tanks might require pumping to avoid hydraulic problems depending on the topography of the treatment plant site. Staff at sites with more elevation changes will have to evaluate

the placement of the tank(s) more carefully. Placing a tank that is not adjacent to the collection system or in between the processes at the plant could require additional piping and pumping, which would increase the costs associated with this alternative.

Implement a Step-Feed Activated Sludge Process

Decreasing the MLSS concentration entering the secondary clarifiers will result in a lower suspended solids loading rate, which will improve the performance in the secondary clarifiers during wet-weather events. Using a step-feed approach maintains biomass inventory in the aeration basin and decreases the solids loading rate to the secondary clarifiers. In a step-feed system, the primary effluent can enter the secondary process at the head of the aeration basin or at intermediary points within the aeration basin. During wet-weather flows, a majority of the flow would enter the aeration basin in the downstream feed locations. All the RAS would be pumped to the head of the aeration basin. The result is a higher mixed liquor concentration in the head of the aeration basin, with lower concentrations in the middle of the basin. The lowest MLSS concentrations would be found at the end of the aeration basin, which would then be settled in the secondary clarifiers.

Many secondary treatment processes can be adapted to a step-feed system via the addition of piping. A similar process could be used for an oxidation ditch system with concentric rings, which are used in smaller treatment plants. The applicability of oxidation ditches might be limited, as primary clarifiers are typically not constructed upstream of the process. Any diversions around the oxidation ditch would likely require a separate treatment process to meet NPDES permit limits. One possible strategy would be to operate the outer ring as a separate unit that is isolated from the middle and inner rings. No mixed liquor from the outer ring would be discharged to the secondary clarifiers during the wet-weather event. RAS would be pumped to the outer ring of the oxidation ditch. The middle and inner rings would receive flow during the wet-weather event. In this way, the biomass is preserved in the outer ring of the oxidation ditch, which can be distributed to the middle and inner rings after the wet-weather event has ended.

Tank for Storage of Biomass

A separate storage tank could be built near the aeration basins and secondary clarifiers that could be used to store the biomass during wet-weather events. The primary effluent would be fed to the head of the aeration basin, as under the normal dry-weather operation. A line could be provided to the new storage tank to allow primary effluent containing higher BOD and TSS concentrations to be stored for later treatment. The RAS would be split between the aeration basin and the new storage tank. Once the peak wet-weather flows have passed, the wastewater in the storage tank could be directed to the secondary clarifiers and all RAS could be returned to the aeration basins. The storage tank could be flushed and placed on standby until the next wet-weather event.

Increase Capacity of Individual Treatment Units

The review of the design and actual capacities of the treatment plant processes might have identified treatment or hydraulic bottlenecks. By adding additional treatment units for selected processes or upgrading transfer capacities, additional flow could be treated and might result in fewer diversions.

If the actual capacity of a treatment process is less than the design capacity, the piping between the previous process and the process in question should be reviewed. This could involve a hydraulic analysis of the design or an inspection of the pipe to see if sediments or a blockage has developed during the operation of the plant.

The amount of capacity that will be gained by the planned improvements should be stated, and any changes to the process flow diagram should be explained.

c. Collection System Improvements to Reduce Flows during Wet-Weather Events

Section 1.g of the December 22, 2005, draft peak flows policy, states in part, that utilities should evaluate the extent to which the permittee is maximizing its ability to reduce I/I throughout the entire collection system (i.e., not only the portions operated by the utility, but also portions operated by any municipal satellite community), including the use of existing legal authorities, potential improvements in the timing or quality of such efforts, and options for obtaining or expanding legal authorities to reduce I/I from satellite collection systems.

Increased Transport Capacity

To reduce SSOs in the collection system, the transport capacity can be increased. The actual capacity of a given pipe might be less than the design capacity because of the accumulation of sediment or other materials, such as oil and grease. A maintenance program to clean sections of the collection system that are subject to sedimentation could provide a relatively low-cost process to increase the transport capacity of wet-weather flows. In situations where the design capacity is insufficient to transport the wet-weather flows, replacing a section of pipe with a larger diameter than the existing pipe, installing a parallel pipe, or increasing the pump station capacity should be considered to alleviate the capacity problem. Increased maintenance or expanding the capacity of the collection system could reduce the number of overflows at the designated location, but plant personnel should take care to ensure that the downstream sections of the collection system can accommodate the additional flows. In addition, the changes would result in greater flows entering the treatment plant. The ability of the plant to treat these additional flows should be described in the Utility Analysis.

Remote Storage

Equalization or storage basins or tunnels for wet-weather flow in the collection system should be considered. Storage in the collection system can have added the added benefit of being a component in a comprehensive effort to control of sanitary system overflows. Once flows decreased in the collection system, the water in the storage unit could be released at a rate selected during the design.

Flow Reductions Accomplished by Reducing I/I

A description of the efforts to quantify the I/I entering the collection system should be included. The information could include individual studies that have been performed or a summary of a SSES, if one has been completed recently (i.e., within the past five years). The completed and planned I/I removal

projects should be listed, including the amount of wet-weather flow that will be removed by each project. A review of the alternatives that were considered and the justification for the selected projects should also be provided. If an SSES was completed, the executive summary of the document should be included as an attachment to the Utility Analysis.

If the party preparing the Utility Analysis does not control the entire service area for the treatment plant, a description of the agreements in place that establish how the collection system is operated and controlled should be provided. For example, a description of any intergovernmental agreements in place that require ordinances to be adopted by the member communities within the service area or give regulatory authority to certain parties should be described. Information on I/I reductions in the entire service area should be provided.

I/I can originate from individual residences and businesses, which would then enter the sanitary collection system through the individual building laterals. These I/I sources might include footing drain connections from older homes or aging pipes. If an SSES was conducted, estimates on the number of houses that could have footing drain connections to the sanitary sewer might have been calculated. In addition, tests could have been done at selected residences to predict whether I/I was entering through the building laterals because of the pipe being compromised by tree roots or decay due to age. A summary of this information should be included in the Utility Analysis, if available.

Green Infrastructure

Green infrastructure practices should be evaluated for use in conjunction with I/I reduction efforts. It might be possible to use green infrastructure practices to remove stormwater flows from the sanitary collection system, such as footing drain, downspout, and roof drain disconnections. Green infrastructure projects can include constructing green roofs, rain gardens or larger bioretention facilities, and vegetated swales. These approaches can also be used in conjunction with other methods to capture stormwater, such as rain barrels. Rather than transferring these sources to the stormwater collection system, a green infrastructure practice could allow the water to slowly infiltrate and regenerate groundwater resources. However, when implementing any stormwater storage practice, personnel should ensure that it is not resulting in locally elevated groundwater tables that drain to public or private sewers through cracks or joints.

Flow Reductions by Controlling Slug Loadings during Wet Weather

Section 1.e of the December 22, 2005, draft peak flows policy, suggests in part, assessing other ways to reduce peak wet-weather flow volumes, such as limiting slug loadings from indirect dischargers. When SSOs or diversions occur, wastewater is discharged that has not received treatment (in the case of SSOs) or limited treatment (when a portion of the flow does not receive secondary treatment). During wet-weather events, it is helpful to minimize nondomestic discharges to the extent possible, to decrease the likelihood of toxic pollutants being discharged to the environment. Continuous commercial and industrial discharges are difficult to minimize or eliminate during wet-weather events, but those businesses that discharge slug loadings or batches might be able to hold their discharges until after the wet-weather event has concluded. A review of the companies included in the industrial pretreatment

program could identify the batch dischargers. A review of the slug discharge plans submitted to the treatment plant could identify additional businesses to approach for minimizing or eliminating discharges during wet-weather events.

The treatment plant should discuss the feasibility of minimizing or eliminating the batch and slug discharges during wet-weather events with each individual industry. Agreements reached could be incorporated into the industrial user discharge permits and or slug control plans. These agreements might not be able to eliminate batch and slug discharges during wet-weather events that occur for an extended period of time. Removing the nondomestic discharge from the initial wet-weather flows that can include higher BOD and TSS concentrations and delaying them to the more dilute flows later in a wet-weather event can decrease the impact of toxic pollutants on the environment.

Any agreements that have been reached or are being explored concerning storage of batch and slug discharges should be included in the Utility Analysis.

d. Additional Alternatives

Routing Flows to a Different Wastewater Treatment Plant

The possibility of transferring wet-weather flows to an alternate secondary treatment plant that might have available capacity should be evaluated. If this is a feasible alternative, a discussion of how the transfer of wastewater would occur should be included. Items to be considered include at what flows would the transfer begin and end, would a gate be operated manually or automatically. A brief discussion of the peak flow capacities of the alternate treatment plant to be used should also be included. If the treatment plants are not operated by the same entity, a description of the agreement that should be developed should also be included.

Sewer Moratorium

Section 1.e of the December 22, 2005, draft peak flows policy, suggests in part, assessing other ways to reduce peak wet-weather flow volumes, such as limiting collection system extensions. The feasibility of instituting a moratorium on accepting additional flows in the sanitary collection system should be included in the Utility Analysis. Information that could be included in the discussion is any developments that have been promised sewer capacity and the legal and economic consequences of instituting a building moratorium. The economic analysis could include the amount of undeveloped land or land to be redeveloped that exists in the service area.

e. Treatment of Diverted Flows

A comprehensive Utility Analysis should assess technologies, such as supplemental biological treatment, physical/chemical treatment (e.g., ballasted flocculation, deep bed filtration, or membrane technology) that are or could be used to provide additional treatment to peak wet-weather flows or peak wet-weather diversions at the POTW treatment plant.

Under the bypass regulation, a bypass occurs when there is intentional diversion of peak flows from the secondary treatment units, regardless of whether the diverted flows are treated. If the diverted flow is routed to a treatment unit that is itself a secondary treatment unit, it is not a bypass. The term *secondary treatment unit* refers to a treatment process that meets the effluent imitations in the secondary treatment regulations. See 40 CFR Part 133. If the diverted flows meet the effluent limits in the secondary treatment regulations before mixing or recombination with other flows, the routing scenario does not represent a bypass. The treatment unit(s) in that scenario would represent a parallel treatment facility. In contrast, in situations where flows are diverted around secondary treatment units and receive treatment that is not designed and demonstrated to meet limits based on the secondary treatment regulations, the diversion is a bypass.

Providing Secondary Treatment for Diverted Flows

Section 1.f of the December 22, 2005, draft peak flows policy says in part, that utilities should evaluate technologies (such as supplemental biological treatment, physical chemical treatment, ballasted flocculation, deep bed filtration, or membrane technology) that are or could be used to provide additional treatment to peak wet-weather flows or peak wet-weather diversions at the POTW treatment plant and the costs of implementing those technologies. An evaluation of options that would provide treatment that meets the regulatory definition of secondary treatment at 40 CFR Part 133 for all or a larger portion of the diverted flow than under current operations should be conducted.

Where available land is an issue, considering secondary treatment processes that require less space than the existing technology can be examined. Because these technologies can require less space than the existing secondary treatment system, an evaluation of replacing the existing secondary treatment system with one of these technologies could also be performed. However, the conversion of the secondary treatment system would have to be carefully planned to ensure that sufficient capacity exists to provide treatment during construction.

One possible secondary treatment technology to be considered where land is limited is membrane bioreactors (MBRs), which use microfiltration membranes to separate the biomass from the secondary effluent, which are much more compact than secondary clarifiers (WEF 2005). In addition, because the system relies on filtration, rather than settling rates, the MLSS concentration can be much higher in an MBR than a conventional aeration basin. MBRs are often limited to a hydraulic capacity of twice the average flow and are expensive. An advantage to the MBR process is that they are easier to operate temporarily for the peak flow periods as an extension of the existing biological process compared to other secondary processes (USEPA 2007). The integrated fixed-film activated sludge (IFAS) process and moving bed biofilm Reactors (MBBRs) could also be considered for treating the diversion flows. The IFAS process uses fixed-film treatment in combination with an activated sludge basin. The biomass in an IFAS tank will be larger than in an aeration tank of the same size because of the added growth on the fixed-film media. As with a conventional secondary process, an RAS line returns solids settled in the secondary clarifier. An MBBR is designed to rely solely on the fixed-film growth that occurs on the floating media. In addition, all sludge is wasted from the secondary clarifiers without requiring recycle to the treatment tank. Both the IFAS and MBBR treatment systems are less susceptible to a loss of solids during peak

flows because of the biomass located on the fixed-film media and, thus, can be an economical alternative for temporary treatment of peak flows as an extension of the existing processes.

Providing Treatment that Does Not Meet Secondary Treatment Standards: Physical and Chemical Treatment

Chemical addition can be used to remove TSS and the insoluble fraction of BOD. Chemical addition should be followed by a clarifier or other quiescent zone to allow for settling. One example of chemical addition during wet-weather treatment is chemically enhanced primary treatment (CEPT), which involves feeding relatively large quantities of a metal salt such as ferric chloride or alum to the primary clarifiers. Under dry-weather conditions, a metal salt can be added to the primary clarifiers to decrease the solids and BOD entering the aeration basin. Feeding too much chemical might cause operational problems if there is insufficient phosphorus available in the aeration basin to allow BOD removal. However, during wet-weather events, the treatment plant personnel might want to precipitate and settle as much of the BOD and TSS in the primary effluent as possible, which can be accomplished by increasing the feed rate of the metal salt. Implementing CEPT would be especially important at plants that operate primary and secondary treatment processes in parallel during wet-weather events.

Filtration, including deep bed filters, could be used to remove solids and particulate BOD from the diverted flow. The quality of the effluent from a filter system can be enhanced by chemical addition. Sufficient mixing should be provided between chemical addition and filtration to allow larger particles to form that can be trapped in the filters.

Ballasted flocculation can also be used to treat diverted flows through chemical addition and a media on which the floc can form. These flocs will settle faster than a conventional process. The media is separated from the settled floc and returned to the process. Two examples of processes using ballasted flocculation are Actiflo and DensaDeg. (see www.epa.gov/owm/xxxx) An emerging technology is the CoMag process, which uses magnetic particles as the ballast. A coagulant is added, followed by the magnetic particles and a polymer. Solids are settled in a solids contact clarifier. A magnetic separator captures any magnetic particles that did not settle in the clarifier. The magnetic particles are separated from the solids and returned to the process, and the solids are wasted from the system.

f. Emergency Back-Up Equipment

Replacement Parts and Redundant Capabilities

Common replacement parts should be kept on hand at the POTW treatment plant in accordance with the recommendations contained in the operation and maintenance manual. In particular, pumps that do not a standby or back-up pump installed are required to have a spare pump on-site that can be quickly installed in an emergency. Inadequate pumping capacity can lead to decreased hydraulic and treatment capacity downstream, which could lead to overflows and diversions if a pump should fail before or during a wet-weather event.

Emergency Back-up Power Systems

The loss of power at a treatment plant can lead to flow diversions and bypasses. Back-up power system should be evaluated for typical power loss scenarios, as well as severe wet-weather situations such as tornados and hurricanes. It is recommended that the treatment plant have a fixed, on-site, back-up power generators with an emergency fuel supply. The generator should be properly sized with sufficient output to maintain proper operations during power losses. Aeration equipment is not required to be powered by the generator, unless the POTW has a history of experiencing long power outages that longer than 4 hours. If power outages longer than 4 hours are typical, the generator should provide power for minimum aeration of the activated sludge basins. Disinfection and dechlorination should be provided during all power outages if it is needed to meet NPDES permit limits. If the plant does not have an emergency back-up power system, the cost of such a system should be evaluated.

VI. Ability to Pay / Financial Capability Assessment

A financial assessment of the water and wastewater system should be included in conjunction with the Utility Analysis. This is reflected in Section 1.i of the December 22, 2005, draft peak flows policy, which in part provides that the Utility Analysis should assess the community's ability to fund the peak wet-weather flow improvements discussed in the Utility Analysis, taking into consideration current sewer rates; planned rate increases; and the costs, schedules, anticipated financial impacts to the community of other planned water and wastewater expenditures, and other relevant factors impacting the utility's rate base using as a guide EPA's CSO Guidance for Financial Capability Assessment and Schedule Development, EPA 832-B-97-004.

a. Review of Current Potable and Wastewater Costs

The costs associated with the water treatment system and the current water rates should be provided. A comparison of the treatment costs and amount collected from the water rates should be included. In addition, the costs associated with the wastewater system and the current wastewater rates should be stated, as well as the total amount collected from the wastewater rates. The costs associated with storm water management measures used to improve water quality and any associated storm water rates can be included as wastewater costs and rates. Information on any funds that are targeted for future wastewater improvements would also be useful if included in the Utility Analysis.

Any large projects that are planned for water or wastewater treatment plant improvements outside of this Utility Analysis should be briefly described, as well as the money budgeted for the improvement. If any rate increases are scheduled, the information should also be included in this section.

b. Financial Capability Assessment

Utilities should use the *Combined Sewer Overflows—Guidance for Financial Capability Assessment and Schedule Development* (USEPA 1997). This document provides a planning tool for evaluating the financial resources a community has available to implement projected wastewater controls and to assist

in the development of implementation schedules. It describes a procedure that results in a community cost burden ranking (high, medium, or low) that supports the development of a rational schedule for implementing wastewater projects.

The first goal of the guidance is to introduce and explain the planning tool, which is a two-phased approach for assessing a community's financial capability to implement controls using indicators identified in the guidance. In the first phase, a residential indicator is calculated that characterizes the financial impact of wastewater controls on individual households using the annual wastewater collection and treatment costs as a percentage of median household income. In the second phase, a composite community financial capability score is calculated using a variety of indicators that measure a community's debt, socioeconomic, and financial conditions (e.g., bond rating, unemployment rate, property tax collection rate). Data from the two phases are then compared to a financial capability matrix to arrive at an overall assessment ranking of a community's ability to finance and construct wastewater controls.

The final section of the document focuses on the schedule development process and presents details of how environmental and financial considerations appropriately influence schedule development. The principles of considering wastewater treatment costs as a percentage of median household income for assessing and ranking a community's ability to afford and finance future wastewater controls can be applied to controls necessary to reduce peak wet-weather diversions under this policy.

VII. Summary of Public Participation

The public should be provided the opportunity to review and discuss the alternatives included in the Utility Analysis. Typical administrative procedures for the municipality should be followed. This could include having the engineering firm that is helping prepare the Utility Analysis make presentations and provide updates during municipal board or council meetings. Depending on the complexity of the alternatives involved and the project impact on wastewater and sewer rates, a special meeting or series of meetings in the community might be warranted. The information shared with the public should include the alternatives considered, brief summaries of the design associated with feasible alternatives, and the impact that alternatives under consideration would have on wastewater and sewer rates.

VIII. Selection of Recommended Measures for Implementation

The alternatives that the applicant recommends to implement should be summarized in this section along with a description of the criteria used to select recommended measures and process for applying the criteria. The alternatives may include a combination of construction projects and operational changes in the collection system and treatment plant. A description of the proposed operation of the treatment plant during wet-weather events should be included. In addition, a proposed financial plan and proposed schedule should be provided.

a. Financial Plan

A discussion of the capital funding options considered should be included in the Utility Analysis. Alternative funding options, such as privatization of the wastewater system can be explored.

The municipality should have a revenue system in place to pay for any increased operation and maintenance costs associated with the alternatives to be implemented. In addition, funding to pay any interest on the bonds or loans used to fund the projects may be necessary. A proposed schedule for rate increases should be developed and included in the Utility Analysis. The current wastewater and sewer rates should be restated.

A summary of the selected financial option(s) should be provided. A schedule for the application of any funding that has not already been obtained should be included.

b. Proposed Implementation Schedule

The proposed schedule for implementing each selected alternative should be provided. For projects that are planned to be completed in the near future, a more detailed breakdown of milestones should be provided.

c. Estimate of Projected Frequency, Duration, and Volume of Diversions

Section 1.k of the December 22, 2005, draft peak flows policy provides, in part, the utility analysis should provide projections of the POTW treatment plant effluent improvements and other improvements in collection system and treatment plant performance that could be expected if the technologies, practices or other measures discussed in the Utility Analysis are implemented. Information on the impact on the diversion flows for each measure to be implemented should be provided.

The basis for the future wet-weather flows should include the projections for population and service area expansion from Section III.b of this guidance, projected treatment plant capacity after completion of the improvements, and projected I/I upon completion of reduction efforts. The anticipated frequency, duration, and volume of future diversions after the improvements are completed should be provided. In addition, the projections of the final effluent quality during wet-weather flows should be included.

d. Demonstration of No Additional Feasible Alternatives Beyond the Recommended Measures

POTW treatment plant operators seeking approval of peak wet-weather diversions at a treatment plant as an anticipated bypass should demonstrate to the NPDES permitting authority there are no additional feasible alternatives beyond the measures recommended herein to peak wet-weather diversions at the time of their NPDES permit application or NPDES permit renewal. This could typically be done by

showing that implementing additional controls would create a high financial impact or are otherwise infeasible.

IX. Proposed Monitoring Protocol

Section 1.j of the December 22, 2005, draft peak flows policy provides, in part, that the utility should propose a protocol for monitoring the recombined flow at least once daily during diversions for all parameters for which the POTW treatment plant has daily effluent limitations or other requirements (e.g., monitoring only requirements) and ensure that appropriate representative monitoring for other monitoring requirements of the permit, the total volume diverted, and the duration of the peak wet-weather diversion event are tracked.

The utility should project the POTW treatment plant effluent improvements and other improvements in collection system and treatment plant performance that could be expected if the technologies, practices or other measures discussed in the Utility Analysis are implemented. Future data needs should also be identified.

Utilities should ensure that functional flow metering equipment is in place for determining the volumes and rates of flow through the full secondary treatment process and during the potential diversion flow routes. In addition, access for sampling to assess the process performance of individual units during peak wet-weather conditions should be provided.

X. Proposed Plan for Public Notice of Diversion

POTW treatment plants should provide a plan that describes the framework for how and when the public and other entities would be notified of bypasses that exceed any effluent limitation in the permit or that may endanger health due to a likelihood of human exposure. The plan should be developed in consultation with appropriate authorities at the local, county, and/or state level, and describe how, appropriate local, county and/or State agencies, such as downstream drinking water facilities and public health agencies, as well as the public would be notified of bypasses that exceed any effluent limitation in the permit or that may endanger health due to a likelihood of human exposure the public. The plan should who will be notified and the specific type of information that would be reported. The plan should include a description of lines of communication and the identities of responsible officials.

The proposed framework would not need to dictate the specific procedures or the specific information that would be provided through public notification; rather, indicate how the POTW treatment plant operators will establish and update, in consultation with appropriate local, county and/or State agencies, case-by-case notification procedures that would depend on the nature and duration of the diversion and the responsibilities of different local entities.

The framework should describe the criteria to be used to evaluate if a given bypass event may endanger health due to a likelihood of human exposure. The criteria would reflect the uses of potentially affected

waters as well as other relevant factors. The development of these criteria should be coordinated with the NPDES authority, local health officials, drinking water suppliers, and other key potentially affected entities.

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Appendix A: Peak Wet-Weather Flows Utility Analysis Completeness Checklist

The December 22, 2005, draft peak flows policy provides that permittees that are seeking approval of peak wet weather diversions as an anticipated bypass at a POTW treatment plant serving a sanitary sewer collection system should submit, along with their permit application, a comprehensive utility analysis (UA) to the NPDES authority. The UA, permit application and other information in the permit record is intended to support an authority's determination as to whether or not there is a feasible alternative to peak wet weather diversions at a POTW treatment plant serving a separate sanitary sewer collection system. This Checklist is to assist NPDES authorities in a completeness review of a UA to evaluate if the permittee has provided information in a format that is understandable and consistent with the December 22, 2005, draft peak flows policy. The goal of the checklists is to assess and document whether the permit and administrative record provide a complete, comprehensive, and transparent record of permit development. As such, the checklist responses are not intended to judge the "correctness" or "incorrectness" of permit limits and conditions. Rather, the checklists are intended to guide a comprehensive evaluation of the NPDES permit development process by a knowledgeable EPA or state NPDES permit reviewer.

Assessment criteria presented in this document are not binding; the permitting authority may consider other approaches consistent with the bypass regulation at 40 CFR 122.41(m). When an NPDES authority assesses the merits of a UA, it should make each assessment on a case-by-case basis and will be guided by the applicable requirements of the bypass regulations, taking into account information related to the particular situation. EPA may change the elements of this assessment in the future.

Permittee:

Permit Number:

Reviewer(s):

Documents Reviewed:

Date Review Completed:

	Evaluation Criteria	Yes	No	N/A	UA Page#	Comments
I. Existing Flow Information						
Flows at the Plant						
1A	Base Flows – Does section A.6 of Form 2A provide data on the annual average daily flow rate at the plant for the previous three years?					
1B	Does the utility analysis provide additional data to adequately characterize base flows at the plant?					
2A	Peak Flows - Does section A.6 of Form 2A provide the maximum daily flow rate received at the plant for the previous three years?					
2B	Peak Flows – Does the Utility Analysis provide additional data on peak flows received at the plant?					
2C	Does the peak flow data provided in Form 2A adequately describe peak flow conditions during sustained periods of wet weather?					
3	Does the Utility Analysis provide a summary of long-term rainfall records					
4	Does the permittee present sufficient data for an adequate range of storms and other conditions (such as the occurrence of wet weather SSOs in the collection system, antecedent soil conditions, etc.) to demonstrate an adequate understanding of the relationship between rainfall conditions and influent flow rates at the plant?					
5	Does the permitte identify all locations where diversions have occurred (e.g., prior to primary, around secondary, around tertiary) during the					

	Evaluation Criteria	Yes	No	N/A	UA Page#	Comments
	previous three years?					
6	Does the applicant provide information on the frequency and duration of diversions occurring in the previous three years?					
7	Does the applicant provide estimates of the volume of diversions at the plant occurring in the previous three years?					
Flows in the Collection System						
8	Does the Utility Analysis identify dates when wet weather induced SSOs occur in the collection system?					
9	Does the permittee present sufficient data for an adequate range of storms and other conditions to demonstrate an adequate understanding of the relationship between rainfall conditions and SSO volumes in the collection system?					
10	Does the permit applicant provide summaries of studies involving flow monitoring that have been conducted to evaluate rates and sources of I/I in the collection system?					
11	Has the applicant identified all municipal satellite collection systems in the collection system? (see section A.4 of Form 2A).					
12	Does the permit applicant provide flow monitoring data or data from pump stations to estimate the I/I levels contributed by each municipal satellite collection system?					
13	Does the applicant provide a summary of the results of past and on-going efforts to reduce I/I?					
14	Has the applicant adequately described its existing legal authority (or lack of authority)					

	Evaluation Criteria	Yes	No	N/A	UA Page#	Comments
	to reduce I/I from municipal satellite collection systems?					
15	Has the applicant adequately described its existing legal authority (or lack of authority) to reduce I/I from private building laterals?					
II. Information Regarding the Existing Treatment Plant						
16	Does the permittee provide a process flow diagram or other information that adequately describes the *treatment process for average daily flows* (those associated with during dry-weather conditions)?					
17	Are design capacities provided for each component of the treatment plant?					
	i. Preliminary treatment					
	ii. Storage					
	iii. Primary clarification					
	iv. Secondary treatment units					
	v. Secondary clarification					
	vi. Disinfection					
	vii. Outfall					
18 A	Did the applicant indicate that stress testing has been conducted to identify the maximum wet weather capacity of capacity limited treatment processes?					
18 B	Is a summary of the results of any stress testing for capacity-limited treatment process components provided?					
19	Does the permittee provide a process flow diagram or other information that adequately describes the treatment process used when wet weather diversions are occurring?					
18	Is a clear description provided of where in the process peak flow diversions occur, where they are routed and which					

	Evaluation Criteria	Yes	No	N/A	UA Page#	Comments
	treatment units are routed around?					
19	Is a clear description provided of the flow rate that triggers the onset of peak flow diversions?					
20	Is the treatment process for peak wet weather flows clearly defined?					
21	Does section A.8.d of Form 2A (or the Utility Analysis) indicate whether the treatment works discharge or transports treated or untreated wastewaters to another treatment works?					
III. Estimates of Future Diversions						
22	Does the UA provide estimates of future peak wet weather diversions?					
23	What information used to estimate future peak weather diversions is provided in the UA?					
	i. Population growth estimates					
	ii. Estimates of current wet weather SSOs (that may require additional flows to the treatment plant)					
	iii. Projected collection system changes (improvements or deterioration)					
	iv. Projected treatment plant improvements					
	v. Any projected reductions in treatment plant capacity					
	vi. Projected changes in weather patterns					
24	Is the model used to predict future diversions described in the UA?					
IV. Potential Measures to Reduce Diversions						
25	Attachment 1 provides a table that can be used to track potential measures discussed					

	Evaluation Criteria	Yes	No	N/A	UA Page#	Comments
	in the Utility Analysis and the type of information provided for each alternative.					
27	Does the Utility Analysis describe the process by which by which alternatives were developed?					
V. Ability to Pay / Financial Capability						
The Costs of Providing Potable Water						
28	Has the applicant provided information on current costs of providing potable water to the community, including annual operations and maintenance expenses and annual debt service?					
29	Has the applicant provided estimates of planned water expenditures that will significantly increase the cost of providing potable water to the community?					
Wastewater Costs						
30	Has the applicant provided information on current costs of providing wastewater collection and treatment to the community, including annual operations and maintenance expenses and annual debt service?					
31	Has the applicant provided estimates of planned wastewater expenditures other than those associated with reducing wet weather diversions that will significantly increase the cost of providing wastewater collection and treatment to the community?					
32	Has the applicant provided adequate estimates of the costs of implementing recommended measures to reduce wet weather diversions?					
33	Has the applicant provide adequate information on the					

Evaluation Criteria		Yes	No	N/A	UA Page#	Comments
	following financial indicators:					
	i Current annual sewer rates					
	ii Estimated costs per household of implemented recommended measures					
	iii Unemployment rate					
	iv Median household income					
	v Property tax revenue collection rate					
34	Has the applicant identified plans to increase wastewater rates and use other sources of revenue to fund the improvements recommended in the utility analysis?					
35	Has the applicant provided a description, including a schedule, of plans to increase wastewater rates or otherwise raise revenue to fund the improvements recommended in the UA?					
VI. Selection of Feasible Alternatives						
36	Does the Utility Analysis described the approach used to screen and narrow the list of alternatives and list the screening criteria?					
37	Does the Utility Analysis explain the reasons for selecting recommended alternatives?					
38	Does the Utility Analysis project the performance of the treatment plant and collection system after the recommended alternatives are implemented (e.g., improvements to the treatment plant effluent, projected average annual number of diversions, improvements in the collection system)?					
39	Does the proposed schedule for implementing feasible measures provide adequate					

	Evaluation Criteria	Yes	No	N/A	UA Page#	Comments
	detail and clarity?					
40	Does the applicant indicate how EPA's "CSO Guidance for Financial Capability Assessment and Schedule Development" was considered in the development of the proposed schedule?					
VII. Projected Effluent Quality						
41	Does the application provide data or other information that indicates that the blended effluent will meet permit limitations, including WQBELs, under *existing conditions?*					
42	Does the application provide data or other information that indicates that the blended effluent will meet permit limitations, including WQBELs, under *various alternatives?*					
VIII. Proposed Monitoring Protocol						
43	Has the applicant proposed a protocol for monitoring the recombined flow at least once daily during diversions for all parameters for which the POTW treatment plant has daily effluent limitations?					
44	Does the proposed monitoring protocol provide for appropriate representative monitoring for the total volume diverted and the duration of the diversion event?					

Attachment 1: Utility Alternatives Table

A = Potential Alternative	B	C	D	E	F	G
Changes in wet weather operations at the plant: reduced residence times at key unit operations						
Changes in wet weather operations at the plant: Changes in flow configuration						
Changes in wet weather operations at the plant: Other						
Increased structural capacity of individual treatment units						
Increasing capacity of existing storage units						
Providing additional storage units						
Flow reductions: I/I measures in portions of the collection system operated by the permittee						
Flow reductions: I/I measures in portions of the collection system operated by the municipal satellite collection systems						
Flow reductions: I/I measures in portions of the collection system operated by the permittee						
Flow reductions: I/I measures for building laterals						
Flow reductions: Control of slug loadings during wet weather						
Flow reductions: Routing flows to a different treatment plant.						
Sewer moratorium						
Treatment of diverted flows (e.g., supplemental biological treatment, physical chemical treatment, ballasted flocculation, deep bed filtration, membrane technology)						

A = Potential Alternative

B = Was this alternative identified in the UA?

C = Does the UA provide cost estimates for this alternative?

D = Does the UA propose a schedule for implementation?

E = Does the UA provide estimates of the reduction in the number and volume of diversions expected after the alternative is implemented?

F. Does the UA project the improvement in treatment plant effluent expected after the alternative is implemented?

G. Does the UA recommend this alternative as a 'feasible alternative'?

» Regulatory Alerts Archive

To: Members & Affiliates; Facility & Collection Systems Committee
From: National Office
Date: June 11, 2009
Subject: EPA BYPASS REGULATION AND PEAK FLOW BLENDING
Reference: RA 09-03

The U.S. Environmental Protection Agency (EPA or Agency) is reinterpreting how its decades-old bypass regulation applies to the blending of peak flows. This is causing serious problems for NACWA members in Region 7 and will soon impact other utilities across the country. NACWA is working with its affected members and has initiated a formal dialogue with EPA Office of Water officials to identify a solution.

This *Regulatory Alert* provides an overview of EPA's new interpretation, how it is being applied in the permitting context, and NACWA's efforts to change EPA's current approach.

EPA Applying a New, More Stringent Interpretation of 'Bypass'

EPA Headquarters is now directing its Regions to apply the existing bypass regulations (40 CFR § 122.41(m)) whenever wastewater treatment plant flows are not receiving full 'secondary treatment' (i.e., not meeting the 30-day average standards for total suspended solids, biochemical oxygen demand, and percent removal). To date, EPA is only applying this new interpretation to clean water utilities that blend peak wet weather flows, but it could have broader implications for utilities and other Clean Water Act-regulated entities. While EPA has not yet officially objected to a permit based on this new interpretation, it has indicated its intent to object to a permit in Region 7 if the permit is issued by the state as currently written. In that case, the utility has already installed a physical/chemical parallel treatment process (ballasted flocculation) to handle its peak flows. EPA has indicated that since the parallel treatment process cannot meet the full secondary treatment standards before recombination with the remaining treatment plant flows, the treatment process is considered a bypass.

Where EPA has made a determination that a utility is 'bypassing' peak wet weather flows, it is requiring the utility to conduct a no feasible alternatives analysis, based on the Agency's 2005 draft peak flows policy, before the wet weather treatment process can be authorized in the permit.

NACWA Working to Seek Clarification from EPA, Change to Permitting Approach

NACWA met May 28 with EPA Office of Wastewater Management officials to discuss the Agency's new interpretation and its current approach to addressing peak flow blending. NACWA's primary concern is that EPA has not notified state permitting agencies or utilities in writing of its new interpretation. Many utilities are planning the construction of these parallel treatment trains either at the direction of their permitting agency or via a consent decree, yet few if any states or utilities are aware that EPA now considers the discharges from treatment plants employing these processes to be illegal. NACWA emphasized during the meeting that many clean water agencies, lacking clear guidance from the federal government, did the 'right thing' and invested in treatment for their peak flows. To now penalize those agencies for putting into place technology that their states encouraged and that EPA itself has shown to be effective at treating peak flows simply does not make sense. NACWA is strongly urging EPA to put in writing its interpretation of the bypass and secondary treatment regulations, which will at least provide an opportunity for NACWA's members to react to and potentially work with EPA to find a mutually acceptable solution.

NACWA is already on the record with the EPA Administrator regarding this issue. In a May 1 letter to EPA Administrator Lisa Jackson, NACWA requested that EPA instruct its Headquarters and Regional Office staff to discontinue using the 2005 proposed peak flows policy for the purposes of issuing Clean Water Act permits. The proposed policy, based on the

negotiated agreement between NACWA and the Natural Resources Defense Council (NRDC), has yet to receive approval from the White House's budget office. The policy did not contemplate the definition of bypass or the status of physical/chemical treatment trains, but proposed a process for utilities to evaluate their options for handling wet weather flows. Facing increasing enforcement pressure, an anti-blending public relations campaign, and the growing congressional support for national legislation that would have banned the practice of blending, the negotiated agreement was critical to preserving blending as a management tool for peak flows. In December 2008, NACWA requested clarification of EPA's current position on blending in a letter to Benjamin Grumbles, then the EPA assistant administrator of water, but EPA has yet to respond directly to the letter. NACWA is working to set up a meeting with the likely incoming Assistant Administrator for Water Peter Silva to discuss the issue of blending. At a minimum, NACWA is seeking relief for those utilities that have already constructed these parallel treatment facilities and are now up for permit renewal.

NACWA Prepared to Take Legal Action if Necessary

NACWA has always maintained the position that blending is authorized by federal regulation. Previously, when certain EPA regions informally objected to the use of blending, NACWA consistently advocated its position in the courts. Most notably, in the case of *Pennsylvania Municipal Authorities Association, et al. v. EPA*, NACWA was part of a coalition that appealed this precise issue – whether blending is a bypass – to the United States Court of Appeals for the District of Columbia Circuit. In that case, NACWA and others argued that, when EPA promulgated the bypass regulation at 40 CFR § 122.41(m), the agency never indicated any intention to prohibit blending under the bypass rule. NACWA also argued that, if EPA tried to use the bypass regulation to eliminate blending, it would be doing so without properly establishing a regulation in accordance with the Administrative Procedure Act and in contravention of the Unfunded Mandates Reform Act. That case ended in September of 2004 when the Circuit Court for the District of Columbia upheld a District Court's decision that "until something more happens to them (e.g. permit denials or a national EPA guidance document ...), these municipalities cannot claim final agency action by EPA." Should EPA now take such final agency action or commence a related enforcement action in Region 7, NACWA is fully prepared to once again take the dispute back to court.

Peak Flows Policy and Potential for National SSO Policy

NACWA has been urging the Agency to develop a comprehensive national policy for sanitary sewer systems, similar to what was done for combined sewers in the 1990s, which would address the issue of blending but, perhaps more importantly, the critical issues of overflows, peak excess flow treatment facilities, collection system management, among others. Development of such a broad-based policy was not viable in the previous administration. NACWA understands that the Office of Water may again be considering work on a comprehensive national policy for sanitary sewer systems, which could address overflows, blending, and other wet weather-related issues. NACWA welcomes a meaningful dialogue with EPA and other stakeholders on all the issues surrounding sanitary sewer system management. Until a comprehensive national policy can be developed, NACWA will work with EPA and its members to find a workable solution for ensuring that blending can be authorized in a Clean Water Act permit.

APPENDIX D - PERMIT FOR DISCHARGES OF MERCURY TO SAN FRANCISCO BAY

January 24, 2010

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION

1515 Clay Street, Suite 1400, Oakland, CA 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

ORDER No. R2-2007-0077
NPDES No. CA0038849

WASTE DISCHARGE REQUIREMENTS FOR MUNICIPAL AND INDUSTRIAL WASTEWATER DISCHARGES OF MERCURY TO SAN FRANCISCO BAY

The following Dischargers are subject to waste discharge requirements as set forth in this Order, for the purpose of implementing the San Francisco Bay Mercury 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.	

Discharges from the discharge points identified below are subject to waste discharge requirements as set forth in this Order:

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:	**November 1, 2007**
This Order shall become effective on:	**January 1, 2008**[1]
This Order shall expire on:	**December 31, 2012**

[1] This Order becomes effective on the latter of this date or on the 1st (first) of the month after the TMDL for Mercury in San Francisco Bay becomes effective, except that if the San Francisco Bay Mercury TMDL is not approved by U.S. EPA or is approved in a form that is substantially different than was approved by the State Water Board on July 17, 2007, and implemented herein, this Order shall not become effective.

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
Contra Costa County Sanitation District No. 5, Port Costa	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; 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 (LAVWMA) Export and Storage Facilities		
	Dublin San Ramon Services District Wastewater Treatment Plant		
	City of Livermore Water Reclamation Plant		
East Bay Municipal Utilities District	East Bay Municipal Utility District, Special District No. 1 Wastewater Treatment Plant	2020 Wake Avenue Oakland, CA 94607 Alameda County	Major
	Point Isabel Wet Weather Facility	2755 Isabel Street Richmond, CA 94804 Alameda County	Minor
	San Antonio Creek Wet Weather Facility	225 5th Avenue Oakland, CA 94606 Alameda County	Minor

Discharger	Name of Facility	Facility Address	Minor/ Major
	Oakport Wet Weather Facility	5597 Oakport Street Oakland, CA 94621 Alameda County	Minor
East Brother Light Station, Inc.[1]	East Brother Light Station	117 Park Place Point Richmond, CA 94801 Contra Costa County	Minor
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	The Novato Treatment Plant, The Ignacio Treatment Plant	Novato Treatment Plant: 500 Davidson Street Novato, CA 94945 Ignacio Treatment Plant: 445 Bel Marin Keys Blvd. Novato, CA 94945 Both in Marin County	Major, 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	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	Name of Facility	Facility Address	Minor/ Major
San Jose/Santa Clara, Cities of	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
Seafirth Estates Company and Property Owners within the Seafirth Estates Subdivision[1]	Seafirth Estates Wastewater Treatment Plant	33 Seafirth Place Tiburon, CA 94920 Marin County	Minor
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 Naval Support Activity, Treasure Island	Wastewater Treatment Plant	681 Avenue M, Treasure island San Francisco, CA 94130-1807	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

[1] This Discharger serves domestic customers but is not a municipal government agency.

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	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
The Dow Chemical Company	The Dow Chemical Company	901 Loveridge Road Pittsburg, CA 94565 Contra Costa County	Major
General Chemical West, LLC[2]	Pittsburg Plant	501 Nichols Road Pittsburgh, CA 94565 Contra Costa County	Major
GWF Power Systems L. P., Site I	GWF -Site I (E. Third St.) Power Plant	895 East 3rd Street Pittsburg, CA 94565 Contra Costa County	Minor
GWF Power Systems L. P., Site V	GWF - Site V (Nichols Rd) Power Plant	555 Nichols Road Bay Point, CA 94565 Solano County	Minor
Pacific Gas and Electric Company (PG&E)	PG&E Shell Pond	½ Mile 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
San Francisco City and County of, San Francisco International Airport	Mel Leong Treatment Plant, Industrial Plant	676 McDonnell Road San Francisco, CA 94128 San Francisco County	Major
Mirant Delta, LLC	Pittsburg Power Plant	Mirant Delta LLC, Pittsburg Power Plant 696 W. 10th Street Pittsburg, CA 94565 Contra Costa County	Major
Mirant Potrero LLC	Potrero Power Plant	Mirant Potrero, LLC, Potrero Power Plant 1201-A Illinois Street San Francisco, CA 94107 San Francisco 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
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

Discharger	Name of Facility	Facility Address	Minor/ 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

[2] The Regional Water Board adopted Order R2-2007-0065 on August 8, 2007, terminating the individual discharge permit for General Chemical West LLC effective April 1, 2008. This Discharger will cease discharge no later than this date. The requirements of this Order do not apply to this Discharger if the effective date of this Order falls after the Discharger ceases to discharge.

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[(b)]	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
Contra Costa County Sanitation District No. 5, Port Costa	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 (LAVWMA), Dublin San Ramon Services District, and City of Livermore	001	37º 41' 40" N	122 º 17' 42" W	Lower San Francisco Bay
EBMUD – Main Wastewater Treatment Plant	E-001	37º 49' 2 " N	122º 20' 55" W	Central San Francisco Bay
EBMUD – Point Isabel Wet Weather Facility	E-001	37°53'43"N	122°19'24"W	Richmond Inner Harbor, part of Central San Francisco Bay
EBMUD – San Antonio Creek Wet Weather Facility	E-002	37°47'30"N	122°15'44"W	Oakland Inner Harbor, Part of Lower San Francisco Bay
East Bay Municipal Utilities District – Oakport Wet Weather Facility	E-003	37°45'39"N	122°12'52"W	Oakland Inner Harbor, part of lower San Francisco Bay
East Brother Light Station, Inc.[(a)]	E-001	37º 57' 48" N	122º 25' 55" W	San Pablo 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	An unnamed manmade channel, a tributary to Lower San Francisco Bay

Discharger	Discharge Point(s)	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
	E-002	37º 26' 30" N	122º 06' 45" W	Renzel Marsh Pond, a tributary to Matedero Creek
Petaluma, City of	E-001	38° 12' 33" N	122° 34' 22" W	Petaluma River
Pinole, City of	001	38° 03' 06" N	122° 14' 55" W	San Pablo Bay
	002	38° 00' 47" N	122° 17' 45" W	San Pablo Bay
Rodeo Sanitary District	001	38º 03' 06" N	122º 14' 55" 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, Sanitary	E-002[(b)]	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
San Jose/Santa Clara, Cities of	E-001	37° 26' 06"N	121° 57' 08" 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
Seafirth Estates Company and Property Owners within the Seafirth Estates Subdivision[1]	001	37º 45' 08" N	122º 28' 08" 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[(b)]	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 Naval Support Activity, 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)] This Discharger serves domestic customers but is not a municipal government agency.

[(b)] These Dischargers share the North Bayside System Unit outfall which serves as the 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	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
The Dow Chemical Company	E-001	38º 1' 48" N	121º 51' 7" W	New York Slough
General Chemical West, LLC©	E-001	38º 2' 48" N	121º 59' 10" W	Suisun Bay
GWF Power Systems L. P.	E-001	38º 2' 00" N	121º 52' 15" W	New York Slough
GWF Power Systems L. P.	E-001	38º 3' 15" N	121º 59' 15" W	New York Slough
Pacific Gas and Electric Company (PG&E)	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
San Francisco, City and County of, San Francisco International Airport, Industrial	E-002[(b)]	37º 39', 55" N	122º 21' 41" W	Lower San Francisco Bay
Mirant Delta, LLC	E-001[(a)]	38º 2' 29" N	121º 53' 25" W	Suisun Bay
Mirant Potrero LLC	E-001[(a)]	37º 45' 23" N	122º 22' 52" W	San Francisco 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
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.

(b) This Discharger shares the North Bayside System Unit outfall with the Dischargers indicated in footnote (b) of Table 2A. This outfall serves as the combined discharge point E-002 into San Francisco Bay for these Dischargers. 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.

(c) The Regional Water Board adopted Order R2-2007-0065 on August 8, 2007, terminating the individual discharge permit for General Chemical West LLC effective April 1, 2008. This Discharger will cease discharge from this outfall no later than this date. The requirements of this Order do not apply to this Discharger if the effective date of this Order falls after the Discharger ceases to discharge.

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Attachment C – Map Of Municipal And Industrial Dischargers C-1
Attachment D – Standard Provisions D-1
Attachment E – Monitoring and Reporting Program (MRP) E-1
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The following Documents are part of this Permit, but are not physically attached as Attachment G due to volume. They are available on the internet at www.waterboards.ca.gov/sanfranciscobay/

- Standard Provisions and Reporting Requirements, August 1993
- Self-Monitoring Program, Part A, August 1993

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	Robert C. Weil Public Works Director (707) 647-4550	300 Crawford Way American Canyon, CA 94503	Advanced Secondary	2.5
Benicia, City of	Jerry Gall Superintendent (707)-746-4336	Same as Facility Address	Secondary	4.5
Burlingame, City of	Phil Scott, Public Works Superintendent (650)-738-4663	501 Primrose Burlingame, CA 94010	Secondary	5.5
Calistoga, City of	Paul Wade Public Works Director (707) 942-2828 and Water Systems Super't (707) 942-2837or (707) 942-2847	414 Washington Street Calistoga, CA 94515	Secondary	0.84
Central Contra Costa Sanitary District	Douglas J. Craig Director of Operations (925) 228-9500	Same as Facility Address	Secondary	53.8
Central Marin Sanitation Agency	Robert Cole Environmental Services Manager (415) 459-1455	1301 Andersen Drive San Rafael, CA 94901	Secondary	10
Contra Costa County Sanitation District No. 5, Port Costa	Warren Lai (925) 313-2253 wlai@pw.co.contra-costa.ca.us	Contra Costa County Public Works 255 Glacier Drive Martinez, CA 94553	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 Hayward Water Pollution Control Facility	Charles V. Weir General Manager (510) 278-5910	2651 Grant Avenue San Lorenzo, CA 94580	Secondary	105.8

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (mgd)
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 Utilities District Main Wastewater Treatment Plant	Dave Williams Director of Wastewater (510) 287-1496	P.O. Box 24055 Oakland, CA 94623-1055	Secondary	120
Point Isabel WWF			Primary	100
San Antonio Creek WWF			Primary	51
Oakport WWF			Primary	158
East Brother Light Station, Inc.[1]	Tom Butt President of East Bros. Light Station Inc. (510)236-7435	117 Park Place Richmond, CA 94801	Secondary	0.00025
Fairfield-Suisun Sewer District	Larry Bahr Regulatory Program Director (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	Robert L. Lynch Interim District Manager (415) 435-1501	P.O. Box 227 Tiburon, CA 94920	Secondary	0.08
Marin County (Tiburon), Sanitary District No. 5 of	Robert L. Lynch Interim District Manager (415) 435-1501	P.O. Box 227 Tiburon, CA 94920	Secondary	0.98
Millbrae, City of	Khee Lim City Engineer (650) 259-2347	621 Magnolia Avenue Millbrae, CA 94030	Secondary	3
Mt. View Sanitary District	David R. Contreras District Manager (925) 228-5635 ext. 32	P. O. Box 2757 Martinez, CA 94553	Advanced Secondary	3.2
Napa Sanitation District	Mr. Tim Healy Assistant General Manager/District Engineer (707) 258-6000 x508	935 Hartle Court Napa, CA 94559	Secondary	15.4

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (mgd)
Novato Sanitary District	Beverly James General Manager (415) 892-1694 x111	500 Davidson Street Novato, CA 94945	Secondary	5.4
Palo Alto, City of	Phil Bobel Environmental Compliance Manager (650) 329-2285	2501 Embarcadero Way, Palo Alto, CA 94303	Advanced Secondary	39
Petaluma, City of	Michael J. Ban Director of Water Resources and Conservation (707) 778-4487	202 N. McDowell Blvd. Petaluma, CA 94954	Secondary	5.2
Pinole, City of	Julian Misra Plant Manager (510) 724-8963	1 Tennant Avenue, 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	Jonathon Goldman Director of Public Works (707) 968-2746	1480 Main Street St. Helena, CA 94574	Secondary	0.05
San Francisco, City and County of (Airport Commission)	Mark Costanzo Utilities Manager (650) 642-4798	676 McDonnell Road San Francisco, CA 94128	Secondary	2.2
San Francisco (Southeast Plant), City and County of	Thomas Franza Assistant General Manager of Wastewater (415) 554-2475	1155 Market St., 11th Floor San Francisco, CA 94103	Secondary	150
San Jose/Santa Clara, Cities of	Dale Ihrke Deputy Director (408)-945-5198	700 Los Esteros Road San Jose, CA 95134	Advanced Secondary	167
San Mateo, City of	Mark Von Aspern Plant Manager (650) 522-7385	Same as Facility Address	Secondary	15.7
Sausalito-Marin City Sanitary District	Robert Simmons General Manager (415) 331-4712	#1 East Road P.O. Box 39 Sausalito, CA 94966-0039	Secondary	1.8
Seafirth Estates Company and Property Owners within the Seafirth Estates Subdivision[1]	Bonner Buehler Plant Operator (415) 388-1345	Same as Facility Address	Secondary	0.0075
Sewerage Agency of Southern Marin	Steve Danehy Manager (415) 388-2402	26 Corte Madera Ave. Mill Valley, CA 94941	Secondary	3.6
Sonoma Valley County Sanitary District	Jim Zambenini Operations Coordinator (707)975-5616	Sonoma County Water Agency P.O. Box 11628 Santa Rosa, CA 95406	Secondary	3
South Bayside System Authority	Daniel Child Manager (650) 594-8411	Same as Facility Address	Secondary	29

Discharger	Facility Contact, Title, and Phone	Mailing Address	Effluent Description	Facility Design Flow (mgd)
South San Francisco and San Bruno, Cities of	Cassie Prudhel Technical Services Director (650) 829-3840	South San Francisco-San Bruno Water Pollution Control Plant 195 Belle Air Road South San Francisco, CA 94080	Secondary	13
Sunnyvale, City of	Lorrie Gervin Division Manager (408) 730-7268	Sunnyvale Water Pollution Control Plant P.O. Box 3707 Sunnyvale, CA 94088-3707	Advanced Secondary	29.5
US Naval Support Activity, 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	Barry Pomeroy Director of Operations and Maintenance (707) 644-8949	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	Myke Praul Director of Public Works (707) 944-8851	6550 Yount Street Yountville, CA 94599	Secondary	0.55

[1] This Discharger serves domestic customers but is not a municipal government agency.

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	Tanya Akkerman Environmental Compliance Manager (510) 787-4352	Same as Facility Address	Sugar Cane Crystalline Industry	0.93
Crockett Cogeneration, LP and Pacific Crockett Energy, Inc.	Christopher Sargent Environmental Coordinator (510) 787-4101	Same as Facility Address	Industrial – Electrical Generation, SIC Code 4931	0.243 (Daily Discharge Rate From 2000 to 2002)
The Dow Chemical Company	Greg Dubitsky General Manager (925) 432-5154	P.O. Box 1398, Pittsburg, CA 94565	Industrial - SIC Code 2811	0.5
General Chemical West, LLC	James Craig Director of Operations (925) 458-7363	Same as Facility Address	Industrial – Chemical and Allied Products, SIC Code 2811	0.31 (Long Term Average)
GWF Power Systems L. P.	Neftali Nevarez (925) 431-1445	4300 Railroad Ave. Pittsburg, CA 94565	Industrial - SIC Code 4911	0.045 (average)
GWF Power Systems L. P.	Neftali Nevarez (925) 431-1445	4300 Railroad Ave. Pittsburg, CA 94565	Industrial - SIC Code 4911	0.047 (average)
Pacific Gas and Electric Company (PG&E)	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) 313-8281	Same as Facility Address	Industrial – Chemical and Allied Products, SIC Code 2891	0.779 (Potential Maximum Daily Rate)
San Francisco, City and County of, San Francisco International Airport	Mark Costanzo Utility Manager (650) 821-7809	P.O. Box 8097 San Francisco, CA 94128	Industrial SIC Code 3721	1.7
Mirant Delta, LLC	Steve Bauman, Senior Environmental Engineer (925) 427-3381	Pittsburg Power Plant P.O. Box 192 Pittsburg, CA 94565	Electric Power generation	506
Mirant Potrero, LLC	Steve Bauman Senior Environmental Engineer (925) 427-3381	Mirant Potrero, LLC, Potrero Power Plant, 1201-A Illinois Street San Francisco, CA 94107	Electric Power generation	226
USS-Posco Industries	David Allen Regulations Manager (925) 439-6290	P.O. Box 471 Pittsburg, CA 94565	Industrial - SIC Code 3312	28

Discharger	Facility Contact, Title, and Phone	Mailing Address	Type of Facility	Facility Design Flow (mgd)
Industrial Wastewater Discharger (Petroleum Refinery):				
Chevron Products Company	Rich Sandman (510) 242-5017	Same as Facility Address	Industrial - Petroleum Refining	7.6
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	Steven D. Overman Senior Staff Engineer (925) 313-3281	Same as Facility Address	Industrial – Petroleum Refining	10
Tesoro Refining & Marketing Co.	Rose Pedregosa (925) 370-3625	Same as Facility Address	Industrial - Petroleum Refining	5.1
Valero Refining Company	Marcus Cole Senior Environmental Engineer (707) 745-7807	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. Background. The dischargers listed in this Order in Tables 1A and 1B (collectively, Dischargers; individually, Discharger) are currently discharging pursuant to the Order Nos. and National Pollutant Discharge Elimination System (NPDES) Permit Nos. as shown in Attachment B. This Order is the mercury watershed permit and implements the wasteload allocations and implementation requirements of the mercury TMDL and implementation plan adopted by the Regional Water Board on August 9, 2006, and supersedes mercury requirements in those permits.

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. Facility Description. The Dischargers listed in Table 1A (Municipal Dischargers) own and operate secondary and advanced secondary wastewater treatment facilities as described in their respective Orders. The Dischargers listed in Table 1B (Industrial Dischargers) own and operate wastewater treatment facilities as described in their respective Orders. Wastewater is discharged from the Discharge points indicated in Tables 2A and 2B 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.

C. 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 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).

D. 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 TMDL. The Fact Sheet (Attachment F), which contains background information and rationale for Order requirements, is hereby incorporated into this Order and constitutes part of the Findings for this Order. Attachments A through G are also incorporated into this Order.

E. 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 21100-21177.

G. Water Quality-Based Effluent Limitations. 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. This Order sets forth water quality-based effluent limitations for mercury,

which implement and are consistent with the assumptions and requirements of the mercurty TMDL wasteload allocations.

H. Water Quality Control Plans. The Regional Water Board adopted a Water Quality Control Plan for the San Francisco Bay Basin, *Water Quality Control 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 Resources Control Board (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 the San Francisco Bay are as follows:

Table 5. 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)

Requirements of this Order implement the Basin Plan.

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 new objectives and TMDL become effective after approval by the USEPA. Elevated mercury concentrations currently exist in the tissues of fish, and methylmercury, a highly toxic form of mercury, is a persistent bioaccumulative pollutant. The mercury TMDL calls for reduction of mercury mass loadings to San Francisco Bay. Additional details regarding mercury sources to San Francisco Bay, and technical information related to the San Francisco Bay Mercury TMDL, are provided in the Fact Sheet. The purpose of this Order is to implement the San Francisco Bay Mercury TMDL wasteload allocations for Dischargers listed in Tables 1A and 1B.

I. 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 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.

J. 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 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. As discussed in detail in the Fact Sheet, the permitted discharges are consistent with the antidegradation provision of 40 C.F.R. section 131.12 and State Water Board Resolution No. 68-16.

K. Anti-Backsliding Requirements. Sections 402(o)(2) and 303(d)(4) of the CWA and federal regulations at title 40, Code of Federal Regulations section 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. Because the water quality-based effluent limitations in this Order are based on a TMDL, there is no backsliding.

L. Monitoring and Reporting. 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 establishes monitoring and reporting requirements to implement federal and State requirements. This Monitoring and Reporting Program is provided in Attachment E.

M. Standard and Special 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. The Dischargers must comply with all standard provisions and with those additional conditions that are applicable under section 122.42. The Regional Water Board has also included in this Order special provisions applicable to the Dischargers. A rationale for the special provisions contained in this Order is provided in the attached Fact Sheet (Attachment F).

N. Provisions and Requirements Implementing State Law. Not applicable.

O. 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. Details of notification are provided in the Fact Sheet of this Order.

P. 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 all mercury requirements for Discharge Points listed in Table 2A and 2B that are regulated by the Order Nos. listed in Attachment B, except for applicable 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

The mass and concentration of mercury in the effluent at the Discharge Points indicated in Table 4A, with compliance measured at the Monitoring Location as described in the MRP (Attachment E) for each Discharger shall not exceed the limitations in Table 6.

Table 6. Municipal -- Individual Mercury Effluent Limitations

Discharger	Average Annual Effluent Limit[1,2,5] (kg/yr)	Effective in 10 years Average Annual Effluent Limit[1,2,5] (kg/yr)	Effective in 20 years Average Annual Effluent Limit[1,2,5] (kg/yr)	Average Monthly Effluent Limit[2](µg/L)	Average Weekly Effluent Limit[2] (µg/L)
American Canyon, City of	0.12	0.095	0.095	0.025	0.027
Benicia, City of	0.088	0.088	0.088	0.066	0.072
Burlingame, City of	0.089	0.089	0.089	0.066	0.072
Calistoga, City of	0.016	0.016	0.016	0.066	0.072
Central Contra Costa Sanitary District	2.23	1.8	1.3	0.066	0.072
Central Marin Sanitation Agency	0.18	0.15	0.11	0.066	0.072
Contra Costa County Sanitation District No. 5, Port Costa	0.00072	0.00072	0.00072	0.066	0.072
Delta Diablo Sanitation District	0.31	0.25	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 (LAVWMA), Dublin San Ramon Services District, and City of Livermore	3.6	2.9	2.2	0.066	0.072

Discharger	Average Annual Effluent Limit[1,2,5] (kg/yr)	Effective in 10 years Average Annual Effluent Limit[1,2,5] (kg/yr)	Effective in 20 years Average Annual Effluent Limit[1,2,5] (kg/yr)	Average Monthly Effluent Limit[2](µg/L)	Average Weekly Effluent Limit[2] (µg/L)
East Bay Municipal Utilities District, including its Wastewater Treatment Plant and Wet Weather Facilities	2.6	2.1	1.5	0.066	0.072
East Brother Light Station, Inc.[3]	0.00001	0.000012	0.000012	0.066	0.072
Fairfield-Suisun Sewer District	0.22	0.17	0.17	0.025	0.027
Las Gallinas Valley Sanitary District	0.17	0.13	0.10	0.066	0.072
Marin County (Paradise Cove), Sanitary District No. 5 of	0.00055	0.00055	0.00055	0.066	0.072
Marin County (Tiburon), Sanitary District No. 5 of	0.0099	0.0099	0.0099	0.066	0.072
Millbrae, City of	0.052	0.052	0.052	0.066	0.072
Mt. View Sanitary District	0.034	0.034	0.034	0.025	0.027
Napa Sanitation District	0.28	0.23	0.17	0.066	0.072
Novato Sanitary District	0.079	0.079	0.079	0.066	0.072
Palo Alto, City of	0.38	0.31	0.31	0.025	0.027
Petaluma, City of	0.063	0.063	0.063	0.066	0.072
Pinole, City of	0.055	0.055	0.055	0.066	0.072
Rodeo Sanitary District	0.060	0.060	0.060	0.066	0.072
Saint Helena, City of	0.047	0.047	0.047	0.066	0.072
San Francisco , City and County of, San Francisco International Airport, Sanitary	0.032	0.032	0.032	0.066	0.072
San Francisco (Southeast Plant), City and County of	2.7	2.1	1.6	0.066	0.072
San Jose/Santa Clara, Cities of	1.0	0.80	0.80	0.025	0.027
San Mateo, City of	0.32	0.26	0.19	0.066	0.072
Sausalito-Marin City Sanitary District	0.078	0.078	0.078	0.066	0.072
Seafirth Estates Company and Property Owners within the Seafirth Estates Subdivision[3]	0.00036	0.00036	0.00036	0.066	0.072
Sewerage Agency of Southern Marin	0.13	0.10	0.076	0.066	0.072
Sonoma Valley County Sanitary District	0.041	0.041	0.041	0.066	0.072
South Bayside System Authority	0.53	0.42	0.32	0.066	0.072
South San Francisco and San Bruno, Cities of	0.29	0.24	0.18	0.066	0.072

Discharger	Average Annual Effluent Limit[1,2,5] (kg/yr)	Effective in 10 years Average Annual Effluent Limit[1,2,5] (kg/yr)	Effective in 20 years Average Annual Effluent Limit[1,2,5] (kg/yr)	Average Monthly Effluent Limit[2](µg/L)	Average Weekly Effluent Limit[2] (µg/L)
Sunnyvale, City of	0.15	0.12	0.12	0.025	0.027
US Naval Support Activity[3] (Treasure Island)	0.026	0.026	0.026	0.066	0.072
Vallejo Sanitation and Flood Control District	0.57	0.46	0.34	0.066	0.072
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	0.38	0.30	0.23	0.066	0.072
Yountville, Town of	0.040	0.040	0.040	0.066	0.072
Aggregate Mass Emission Limit[1,4,5](kg/yr)	**17**	**14**	**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 17 kg/yr (or 14 kg/yr in 10 years, or 11 kg/yr in 20 years). If the sum of all individual Municipal Dischargers' mercury mass emission(s) is greater than 17 kg/yr (or 14 kg/yr in 10 years, or 11 kg/yr in 20 years), the Municipal Discharger(s) whose mercury mass emission(s) exceed(s) its (their) individual limitation(s) in Table 6, 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 17 kg/yr.

b. The annual average mass emission for each Discharger shall be computed for the period January 1 through December 31, annually. If this Order becomes effective on or after April 1st, no annual average mass emission calculation shall be necessary on this first partial calendar year. In this case, annual average mass emission calculation and compliance determination shall commence on the following full calendar year and all subsequent years.

c. The annual average mass emission for each Discharger listed in Table 6 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, or if this Order becomes effective after January 1st and prior to March 1st, 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.5 of this Order. The monthly effluent discharge adjustment mass shall be reported in each Self-Monitoring Report and in the Annual Mercury Information Reporting Form Part 2 of 3 under "Comments on Data."

(2) For compliance determination as defined in Section VI and Attachment A of this Order, the Discharger shall achieve the following, Minimum Level (ML).

Table 7. Minimum Levels

Constituent	Minimum Level	Units
Mercury	0.0005	µg/L

(3) This Discharger serves domestic customers but is not a municipal government agency. For the purpose of this Order, this Discharger is a "Municipal Discharger."

(4) Total differs slightly from the column sum due to rounding to the nearest kilogram.

(5) The first Annual Average Effluent Limits represent the San Francisco Bay Mercury TMDL's initial mass limits for Municipal Dischargers. In accordance with the TMDL and the compliance schedule provision that the Regional Water Board will submit to USEPA for approval, the Municipal Dischargers listed in this table have up to 10 years from the effective date of this Order to achieve the "Effective in 10 Years Annual Average Effluent Limits" and its respective Aggregate Annual Mass Emission Limit, and up to 20 years to achieve the "Effective in 20 Years Annual Average Effluent Limits" and its respective Aggregate Annual Mass Emission Limit listed in Table 6.

B. Industrial Discharger Effluent Limits

The mass and concentration of mercury in the effluent at the Discharge Points indicated in Table 4B for each Discharger shall not exceed the limitations in Table 8. Monitoring locations are described in Attachment E of this Order.

Table 8. Industrial -- Individual Mercury Effluent Limitations

Permitted Entity	Average Annual Effluent Limit[1,2] (kg/yr)	Average Monthly Effluent Limit[2] (µg/L)	Maximum Daily Effluent Limit[2]
Industrial Wastewater Discharger (Non-Petroleum Refinery):			
C&H Sugar Company Inc., and Crockett Community Services District	0.045	0.079	0.12
Crockett Cogeneration, LP and Pacific Crockett Energy, Inc.	0.0047	0.079	0.12
The 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
Mirant Delta, LLC	0.0078	0.079	0.12
Mirant Potrero LLC	0.0031	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[4](kg/yr)	**1.3[4]**	**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 1.3 kg/yr. If the sum of all individual Industrial Dischargers' mercury mass emission(s) is greater than 1.3 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 kilogram for comparison with the 1.3 kg/yr.

b. The annual average mass emission for each Industrial Discharger shall be computed for the period January 1 through December 31, annually. If this Order becomes effective on or after April 1st, no annual average mass emission calculation shall be necessary on this first partial calendar year. In this case, annual average mass emission calculation and compliance determination shall commence on the following full calendar year and all subsequent years.

c. The annual average mass emission for each Discharger listed in Table 8 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:

$$Annual\ Mass\ Emission, kg/year = \left(\frac{\sum MonthlyMassEmission, kg/mo}{NumberofMonthlyMassEmissionsCalculated} \right) * 12 mo/year$$

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. 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.5 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 the Annual Mercury Information Reporting Form Part 2 of 3 under “Comments on Data.”

(2) For compliance determination as defined in Section VI and Attachment A of this Order, the Discharger shall achieve the following, Minimum Level (ML).

Table 9. Minimum Levels

Constituent	Minimum Level	Units
Mercury	0.0005	µg/L

(3) N/A means that a concentration-based limit is not applicable at this time.

(4) Total differs slightly from the column sum due to rounding to two significant digits.

IV. RECEIVING WATER LIMITATIONS – Receiving water limitations are provided in each Discharger's individual NPDES Permits (see Attachment B).

V. PROVISIONS

A. Standard Provisions

The Dischargers shall comply with all Standard Provisions included in Attachment D of this Order, except for Standard Provisions V.D related to compliance schedules.

B. Monitoring and Reporting Program Requirements. The Dischargers shall comply with the Monitoring and Reporting Program (MRP), and future revisions thereto, in Attachment E of this Order. The Dischargers shall also comply with the requirements contained in Self-Monitoring Program, Part A (August 1993) (Attachment G), including any amendments thereto.

C. Special Provisions

1. Triggers for Additional Mercury Control

a. Each individual Discharger shall comply with C.1.c. of this Order if its discharge exceeds any of the applicable triggers described in Tables 10 and 11.

Table 10. Triggers for Municipal Dischargers

Type of Trigger	Average Monthly	Maximum Daily
Concentration for Secondary Treatment Plants	0.041 µg/L	0.065 µg/L
Concentration for Advanced Secondary Treatment Plants	0.011 µg/L	0.021 µg/L
Mass Emission	Individual annual mass emission limit, as depicted in Table 6, above, and computed as a 12-month running average, as shown in C.1.b., below.	

Table 11. Triggers for Industrial Dischargers

Type of Trigger	Average Monthly	Maximum Daily
Concentration	0.037 μg/L	0.062 μg/L
Mass Emission	Individual annual mass emission limit, as depicted in Table 8, above, and computed as a 12-month running average, as shown in C.1.b., below.	

b. The running 12-month average 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 listed in Table 10 or 11, above, shall comply with the following action requirements:

Table 12. Action Plan for Trigger Exceedance

Task	Deadline
i. *Accelerated Sampling.* As soon as the Discharger becomes aware of the exceedance, 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 ix, 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 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.	Within 130 days of the initial trigger exceedance

[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.*	
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 1st of each year until the Discharger demonstrates compliance with trigger levels for a continuous 3-month period of sampling.

2. Mercury Source Control Program for Municipal Dischargers

The Dischargers in Table 1A shall develop, implement, and document cost-effective pretreatment/pollution prevention reduction strategies for dental offices to manage and reduce the amount of mercury amalgam that is discharged from dental offices into the public wastewater collection systems in accordance with the following:

a. The target for this program is that 85% of dental offices that generate mercury amalgam waste in the region will be participating in an amalgam program within 5 years after the effective date of this Order. Within 2 years of the effective date of this Order, the municipal wastewater Dischargers (Table 1A) shall develop and begin to implement a dental amalgam program with the goal of achieving the target within five years.

b. The municipal wastewater Dischargers in Table 1A shall estimate the dental amalgam collected (and describe the basis for its estimation) and describe any other mercury pollution prevention programs that are implemented and maintained by individual municipal wastewater dischargers. The municipal wastewater Dischargers shall provide this information to the Regional Water Board no later than June 30, 2012. The municipal wastewater Dischargers may collaborate to provide this information in a single report to satisfy this requirement for the entire group.

3. Additional Special Studies for Adaptive Management

The Dischargers in Tables 1A and 1B, or their agent(s), shall submit a work plan within one year of the effective date of this Order, to include an implementation schedule for the following activities:

a. Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, the conditions under which mercury methylation occurs, and biological uptake in San Francisco Bay, its contiguous segments, and tidal areas; and

b. Conduct or cause to be conducted studies to evaluate the presence of, or potential for, local effects on fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges.

The work plan shall include annual progress reports, due April 1st to the Regional Water Board. This progress report shall be combined with any group compliance reporting required by IV.C. of the Monitoring and Reporting Program, Attachment E of this Order.

4. Risk Reduction Programs

The Dischargers shall develop and implement or participate in effective programs to reduce mercury-related risks to humans and quantify the resulting risk reductions from these activities. The activities may be performed by a third party if the Dischargers wish to provide funding for this purpose. This requirement may be satisfied by a combination of related efforts through the Regional Monitoring Program or other similar collaborative efforts.

The risk reduction activities shall include investigating ways to address public health impacts of mercury in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of health impacts to those people and communities most likely to be affected by mercury in San Francisco Bay-caught fish, such as subsistence fishers and their families. Such strategies should include public participation in developing effective programs in order to ensure their effectiveness. The Dischargers may include studies needed to establish effective exposure reduction activities and risk communication messages as part of their planning.

Within 1 year of the effective date of this Order, the Dischargers shall submit, or cause to be submitted, a progress report describing their efforts in developing risk management and reduction programs, with community participation and input.

Within 2 years of the effective date of this Order, the Dischargers shall submit, or cause to be submitted, a report describing the details of their risk management and reduction programs, the community participation process that was involved in developing such programs, any third parties involved in implementing the programs, and a plan for evaluating the programs' effectiveness. The report shall include an implementation schedule with implementation beginning within 3 years of the effective date of this Order. The Dischargers shall describe the progress of their efforts in the Annual Self-Monitoring Report required by IV.B.2.b. (or IV.C, Optional Group Compliance Reporting) in Attachment E of this Order.

5. Mercury Discharge Adjustment 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 an adjustment (hereinafter Adjustment) to its mercury mass emission or discharge concentration when determining compliance with its concentration and mass limits specified in III.B. of this Order.

The Adjustment shall be based on measured influent mercury 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. Influent sampling shall include measurement of daily flow volume for the entire duration that 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 Adjustment.

c. Calculation of Mercury 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 5.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)

<u>Mass 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 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 Emission Adjustment to be subtracted from monthly mass emission for that month)

d. If an Industrial Discharger opts to apply a Mass Emission 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.

6. Reopener Provision

This Order may be reopened for modification, or revocation and reissuance, as a result of the following:

a. if the State Water Board has not established a pollutant offset program that can be implemented within 20 years of the effective date of this Order; or

b. if there is modification of the San Francisco Bay Mercury 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	R2-2006-0036	6/14/06	6/30/11
Benicia, City of	CA0038091	01-096[2]	8/15/01	7/31/06
Burlingame, City of	CA0037788	R2-2002-0027[2]	2/27/02	1/31/07
Calistoga, City of	CA0037966	R2-2006-0066	10/11/06	2/28/10
Central Contra Costa Sanitary District	CA0037648	R2-2007-008	1/23/07	3/31/12
Central Marin Sanitation Agency	CA0038628	R2-2007-007	1/23/07	3/31/12
Contra Costa County Sanitation District No. 5, Port Costa	CA0037885	R2-2003-0009[2]	1/22/03	12/31/07
Delta Diablo Sanitation District	CA0038547	R2-2003-0114	12/03/03	1/01/09
East Bay Dischargers Authority	CA0037869	R2-2006-0053	8/09/06	9/30/11
Union S.D. Wet Weather Outfall	CA0038733	R2-2004-0002	1/21/04	2/28/09
Union S.D. Hayward Marsh	CA0038636	R2-2006-0031	5/10/06	5/09/11
Dublin San Ramon Services District	CA0037613	R2-2006-0054	8/09/06	9/30/11
City of Livermore	CA0038008	R2-2006-0055	8/09/06	9/30/11
LAVWMA Wet Weather Outfall	CA0038679	R2-2006-0026	4/12/06	6/08/11
East Bay Municipal Utilities Dist. WWTP	CA0037702	01-072[2]	6/20/01	5/31/06
EBMUD Wet Weather Facilities	CA0038440	R2-2005-0047	9/21/05	3/31/10
East Brother Light Station, Inc.	CA0038806	R2-2004-0079	9/15/04	11/30/09
Fairfield-Suisun Sewer District	CA0038024	R2-2003-0072	8/20/03	9/30/08
Las Gallinas Valley Sanitary District	CA0037851	R2-2003-0108	12/03/03	11/30/08
Marin County (Paradise Cove), Sanitary District No. 5 of	CA0037427	R2-2006-0037	6/14/06	6/30/11
Marin County (Tiburon), Sanitary District No. 5 of	CA0037753	R2-2002-0097[2]	9/18/02	10/31/07
Millbrae, City of	CA0037532	01-143	11/28/01	10/31/06
Mt. View Sanitary District	CA0037770	R2-2006-0063	9/13/06	5/17/10
Napa Sanitation District	CA0037575	R2-2005-0008	4/20/05	3/31/10
Novato Sanitary District	CA0037958	R2-2004-0093	11/17/04	12/31/09
Palo Alto, City of	CA0037834	R2-2003-0078	8/20/03	9/30/08
Petaluma, City of	CA0037810	R2-2005-0058	10/19/05	10/20/10
Pinole, City of	CA0037796	R2-2007-0024	3/14/07	5/31/12
Rodeo Sanitary District	CA0037826	R2-2006-0062	9/13/06	11/30/11
Saint Helena, City of	CA0038016	R2-2005-0025	6/15/05	4/27/10
San Francisco, City and County of, San Francisco International Airport, Sanitary	CA0038318	R2-2007-0058	8/8/07	9/30/12
San Francisco (Southeast Plant), City and County of	CA0037664	R2-2002-0073[2]	6/19/02	5/31/07
San Jose/Santa Clara, Cities of	CA0037842	R2-2003-0085	6/17/03	9/30/08
San Mateo, City of	CA0037541	01-071[2]	6/20/01	5/31/06
Sausalito-Marin City Sanitary District	CA0038067	R2-2007-0054	8/8/07	9/30/12
Seafirth Estates Company and Property Owners with the Seafirth Estates Subdivision	CA0038893	R2-2006-0082	12/13/06	2/29/12
Sewerage Agency of Southern Marin	CA0037711	R2-2007-0057	8/8/07	9/30/12
Sonoma Valley County Sanitary District	CA0037800	R2-2002-0046[2]	3/20/02	2/28/07
South Bayside System Authority	CA0038369	R2-2007-0006	1/23/07	3/31/12
South San Francisco and San Bruno, Cities of	CA0038130	R2-2003-0010	1/22/03	3/31/08
Sunnyvale, City of	CA0037621	R2-2003-0079	8/20/03	9/30/08

Discharger	NPDES Permit No.	Existing Order No.[1]	Existing Order Adoption Date	Existing Order Expiration Date
US Naval Support Activity, Treasure Island	CA0110116	R2-2004-0036	5/19/04	12/30/09
Vallejo Sanitation and Flood Control District	CA0037699	R2-2006-0056	8/09/06	9/30/11
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	CA0038539	01-144[2]	11/28/01	10/31/06
Yountville, Town of	CA0038121	R2-2004-0017	3/17/04	4/30/09

[1] The orders shown are for the primary permit reissuance and do not include permit amendments.

[2] The individual permits specified in these orders are scheduled for reissuance in 2007 and the first calendar quarter of 2008, prior to the effective date of this Order.

Industrial Dischargers:

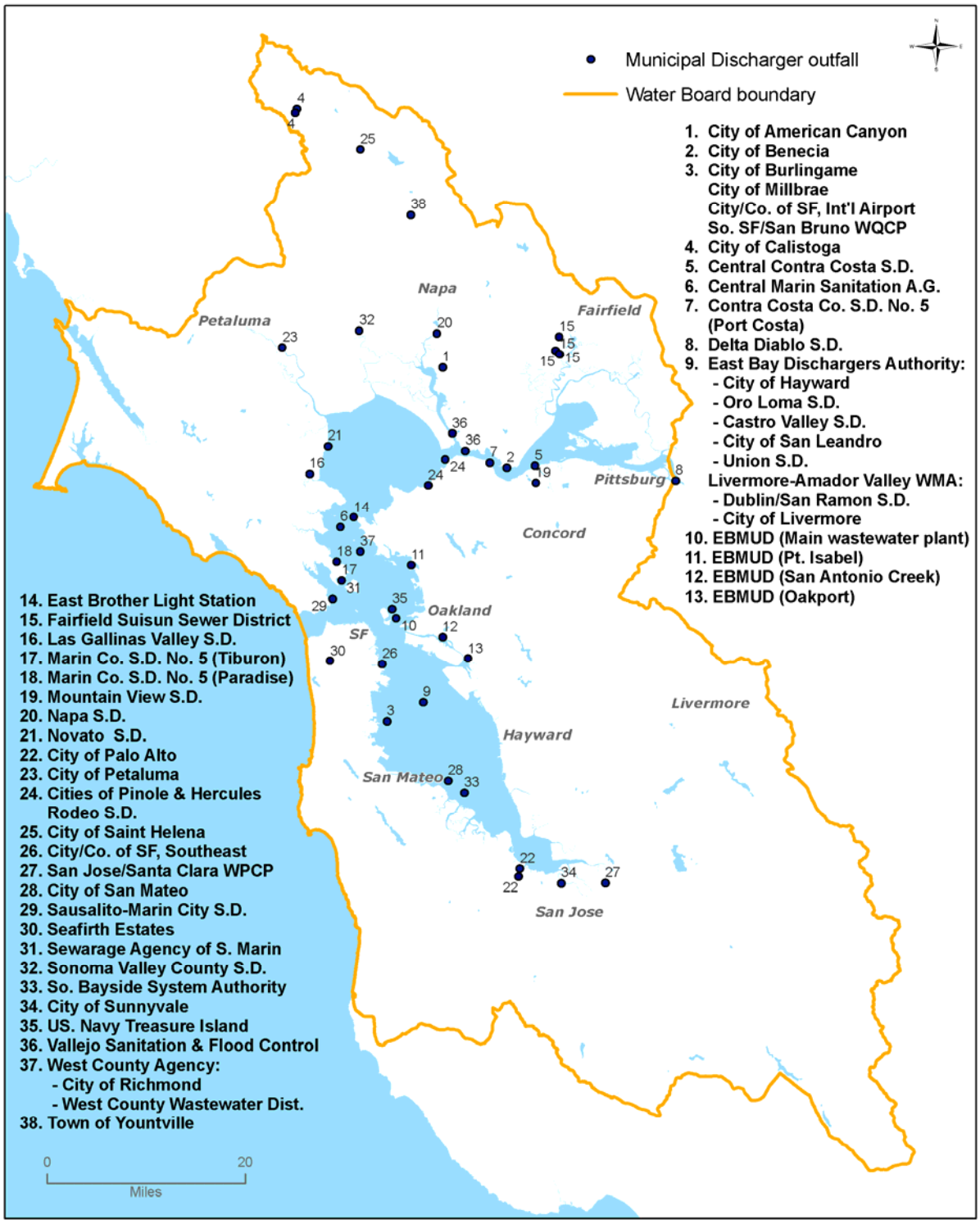
Discharger	NPDES Permit No.	Existing Order No.	Existing Order Adoption Date	Existing Order Expiration Date
Industrial Wastewater Discharger (Non-Petroleum Refinery):				
C&H Sugar and Crockett Community Services District	CA0005240	R2-2007-0032	4/11/07	5/31/2012
Crockett Cogeneration, LP and Pacific Crockett Energy, Inc.	CA0029904	R2-2004-0026	5/19/04	6/30/09
The Dow Chemical Company	CA0004910	01-142	11/28/01	10/31/06
General Chemical West, LLC	CA0004979	R2-2002-0071[3]	6/19/02	5/31/07
GWF Power Systems L. P. Site I	CA0029106	R2-2005-0018	5/18/05	4/19/10
GWF Power Systems L. P. Site V	CA0029122	R2-2005-0019	5/18/05	4/19/10
Pacific Gas and Electric Company (PG&E)	CA0030082	R2-2006-0010	2/8/06	3/31/11
Rhodia, Inc.	CA0006165	R2-2004-0042	6/16/04	7/31/09
San Francisco, City and County of, San Francisco International Airport, Industrial	CA0028070	R2 2007-0060	8/8/08	9/30/12
Mirant Delta, LLC	CA0004880	R2-2002-0072	6/19/02	5/31/07
Mirant Potrero LLC	CA0005657	R2-2006-0032	5/10/06	12/31/08
USS-Posco Industries	CA0005002	R2-2006-0029	5/10/06	6/30/11
Industrial Wastewater Discharger (Petroleum Refinery):				
Chevron Products Company	CA0005134	R2-2006-0035	6/14/06	6/13/11
ConocoPhillips	CA0005053	R2-2005-0030	6/15/05	8/31/10
Shell Oil Products US and Equilon Enterprises LLC	CA0005789	R2-2006-0070	10/11/06	10/31/11
Tesoro Refining & Marketing Co.	CA0004961	R2-2005-0041	9/21/05	11/30/10
Valero Refining Company	CA0005550	R2-2002-0112	10/16/02	11/30/07

[2] The individual permits specified in these orders are scheduled for reissuance in 2007 and the first calendar quarter of 2008, prior to the effective date of this Order.

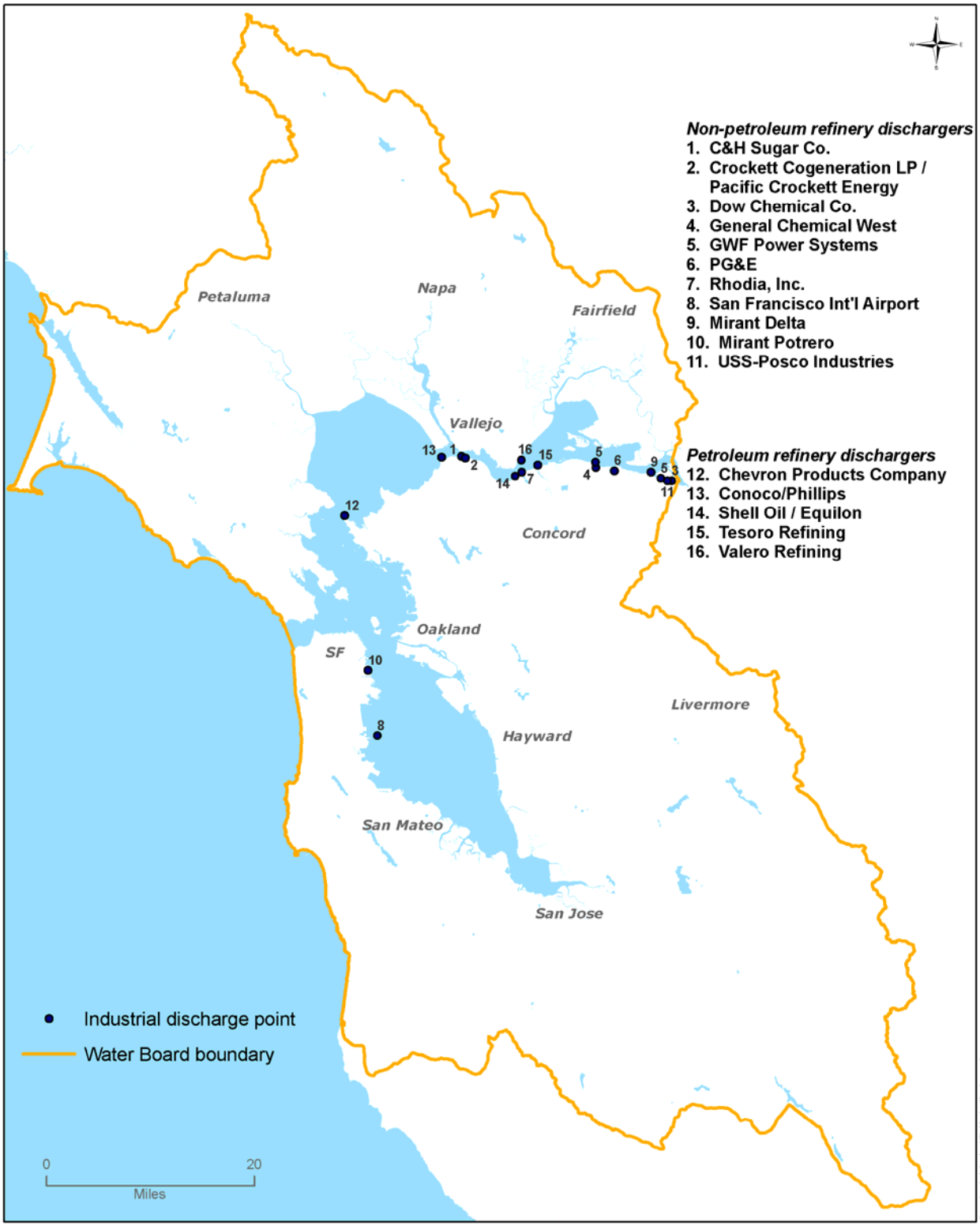
[3] The Regional Water Board adopted Order R2-2007-0065 on August 8, 2007, terminating the individual discharge permit for General Chemical West LLC effective April 1, 2008.

ATTACHMENT C – MAP OF MUNICIPAL AND INDUSTRIAL DISCHARGERS

Municipal Discharger outfall locations



Industrial Discharge Outfalls



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 C.F.R. § 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 C.F.R. § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

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

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 C.F.R. § 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 a Discharger only when necessary to achieve compliance with the conditions of this Order. (40 C.F.R. § 122.41(e).)

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 C.F.R. § 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 C.F.R. § 122.5(c).)

F. Inspection and Entry

The Dischargers shall allow the Regional Water Board, State Water Board, United States Environmental Protection Agency (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 C.F.R. § 122.41(i); Wat. Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 C.F.R. § 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 C.F.R. § 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 C.F.R. § 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 C.F.R. § 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 C.F.R. § 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 C.F.R. § 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 C.F.R. § 122.41(m)(2).)

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

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 C.F.R. § 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 C.F.R. § 122.41(m)(4)(i)(B)); and

   c. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 C.F.R. § 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 C.F.R. § 122.41(m)(4)(ii).)

5. Notice

   a. Anticipated bypass. If a Discharger 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 C.F.R. § 122.41(m)(3)(i).)

   b. Unanticipated bypass. A Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 C.F.R. § 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 Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 C.F.R. § 122.41(n)(1).)

1. 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 C.F.R. § 122.41(n)(2).).

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 C.F.R. § 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 C.F.R. § 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 C.F.R. § 122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 C.F.R. § 122.41(n)(3)(iii)); and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 C.F.R. § 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 C.F.R. § 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 a Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 C.F.R. § 122.41(f).)

B. Duty to Reapply

If the Dischargers wish 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 C.F.R. § 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 the Order to change the name of a Discharger and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 C.F.R. § 122.41(l)(3); § 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 C.F.R. § 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 C.F.R. § 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 a Discharger's 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 Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 C.F.R. § 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 C.F.R. § 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 C.F.R. § 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 C.F.R. § 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 C.F.R. § 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 C.F.R. § 122.41(j)(3)(v)); and

6. The results of such analyses. (40 C.F.R. § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 C.F.R. § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 C.F.R. § 122.7(b)(1)); and

2. Permit applications and attachments, permits and effluent data. (40 C.F.R. § 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 C.F.R. § 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 C.F.R. § 122.41(k).)

PLUS

For Industrial Dischargers that are corporations:

2. All permit applications shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 C.F.R. § 122.22(a)(1).)

For Industrial Dischargers that are partnerships or sole proprietorships:

2. All permit applications shall be signed by a general partner or the proprietor, respectively. (40 C.F.R. § 122.22(a)(2).)

For a municipality, State, federal, or other public agency:

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 C.F.R. § 122.22(a)(3).).

PLUS, for all Dischargers:

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 C.F.R. § 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 C.F.R. § 122.22(b)(2)); and

   c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 C.F.R. § 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 C.F.R. § 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 C.F.R. § 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 C.F.R. § 122.22(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 C.F.R. § 122.41(l)(4)(i).)

3. If a Discharger 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 C.F.R. § 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 C.F.R. § 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 C.F.R. § 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 a Discharger becomes 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 C.F.R. § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 C.F.R. § 122.41(l)(6)(ii)):

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 C.F.R. § 122.41(l)(6)(ii)(A).)

   b. Any upset that exceeds any effluent limitation in this Order. (40 C.F.R. § 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 C.F.R. § 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 C.F.R. § 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 C.F.R. § 122.41(l)(1)(i)); or

For Municipal Dischargers:

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 C.F.R. § 122.41(l)(1)(ii).)

For Industries:

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in this Order nor to notification requirements under section 122.42(a)(1) (see Additional Provisions—Notification Levels VII.A.1). (40 C.F.R. § 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Discharger's 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 C.F.R.§ 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 C.F.R. § 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 C.F.R. § 122.41(l)(7).)

I. Other Information

When a Discharger 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 Discharger shall promptly submit such facts or information. (40 C.F.R. § 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Regional Water Board is authorized to enforce the terms of this permit under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Non-Municipal Facilities

Existing manufacturing, commercial, mining, and silvicultural Dischargers shall notify the Regional Water Board as soon as they know or have reason to believe (40 C.F.R. § 122.42(a)):

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following "notification levels" (40 C.F.R. § 122.42(a)(1)):

    a. 100 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(1)(i));

    b. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4-dinitrophenol and 2-methyl-4,6-dinitrophenol; and 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(1)(ii));

    c. Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(1)(iii)); or

    d. The level established by the Regional Water Board in accordance with section 122.44(f). (40 C.F.R. § 122.42(a)(1)(iv).)

2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" (40 C.F.R. § 122.42(a)(2)):

a. 500 micrograms per liter (µg/L) (40 C.F.R. § 122.42(a)(2)(i));

b. 1 milligram per liter (mg/L) for antimony (40 C.F.R. § 122.42(a)(2)(ii));

c. Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 C.F.R. § 122.42(a)(2)(iii)); or

d. The level established by the Regional Water Board in accordance with section 122.44(f). (40 C.F.R. § 122.42(a)(2)(iv).)

B. Publicly-Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Regional Water Board of the following (40 C.F.R. § 122.42(b)):

1. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to sections 301 or 306 of the CWA if it were directly discharging those pollutants (40 C.F.R. § 122.42(b)(1)); and

2. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of the Order. (40 C.F.R. § 122.42(b)(2).)

3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 C.F.R. § 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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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 the Regional Water Quality Control Board (Regional Water Board) to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements which implement the federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. The Dischargers shall comply with the MRP for this Order as adopted by the Regional Water Board, and with all of the Self-Monitoring Program, Part A, adopted August 1993 (SMP, Attachment G of this Order). The MRP and SMP may be amended by the Executive Officer pursuant to US EPA regulations 40 CFR122.62, 122.63, and 124.5. If any discrepancies exist between the MRP and SMP, the MRP prevails.

B. Sampling is required during the entire year when discharging. All analyses shall be conducted using current US EPA methods, or that have been approved by the US EPA 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 approximately equal 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

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 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 M-002. For Mirant Delta, LLC, locations are E-001B through to and including E-001I. For Mirant Potrero, LLC, location is E-001C. For San Francisco International Airport, location is EFF-001A for both its Sanitary and Industrial Plants (or at the Discharger's option, the locations are at EFF-001-Ind for the Industrial Plant and EFF-001-San for the Sanitary Plant for monitoring compliance with the different concentration based limits for each facilitiy). Discharge flow rates shall be at location EFF-001-Ind for the Industrial Plant, and EFF-001-San for the Sanitary Plant.	As described in individual NPDES permits for mercury or other toxic pollutants

III. EFFLUENT MONITORING REQUIREMENTS

The Dischargers shall monitor mercury in effluent as shown in Table E-2 below and reported on the form included in the next section:

Table E-2. Mercury 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 East Brothers Light Station Inc. Marin County Sanitary District No. 5, Paradise Cove Seafirth Estates Company and Property Owners
Methylmercury[7]	µg/L	C-24 or Grab	Quarterly for Dischargers with Average Annual Mass Limits greater than or equal to 0.08 kg/yr
			Semi-annually for Dischargers with Average Annual Mass Limits between 0.08 and 0.04 kg/yr
			Annually for Dischargers with Average Annual Mass Limits less than or equal to 0.04 kg/yr

(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 1669), and ultra-clean analytical methods (USEPA 1631) for total mercury monitoring.

(6) Grab Samples shall be collected coincident with composite samples collected for the analysis of other regulated parameters.

(7) Methylmercury: These Dischargers shall use ultra-clean sampling (USEPA 1669) to collect unfiltered methylmercury samples, and ultraclean analytical methods (USEPA 1630/1631, Revision E) with a method detection limit of 0.02 ng/L.

IV. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Dischargers shall comply with all Standard Provisions (Attachments D and G) related to monitoring, reporting, and recordkeeping.

B. Individual Reporting in Self Monitoring Reports (SMRs)

1. Compliance with CIWQS

At any time during the term of this permit, the State or Regional Water Board may notify the Dischargers to electronically submit Self-Monitoring Reports (SMRs) using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). Until such notification is given, the Dischargers shall submit hard copy SMRs. The CIWQS Web site will provide additional directions for SMR submittal in the event there will be service interruption for electronic submittal.

2. Due Dates and Information Required for SMRs

a. Report Data with Routine SMR

The Dischargers shall submit mercury data collected as part of this Order in the regular monthly or quarterly Self Monitoring Reports (SMR) required in each Discharger's individual permit. As required in each Discharger's individual permit, for those Dischargers required to report monthly, monthly reports shall be due no later than 30 days after the end of each calendar month. For those Dischargers required to report quarterly in its individual permit, quarterly reports are due 30 days after the end of each calendar quarter.

(i) For Industrial Dischargers claiming an effluent credit for recvcled water use pursuant to Provision V.C.5, 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 mercury 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 and Required Forms**
Annual SMRs are due February 1 following each calendar year. Each Discharger shall provide its mercury information on the forms shown at the end of this section (pages E-9 through E-13) as an attachment to the cover letter for the Discharger's annual SMR required by its individual permit. Furthermore, by February 1, each Discharger shall send an additional copy of its completed forms to the Regional Water Board by email (in PDF), mail, or fax. This duplicate reporting is necessary to facilitate the Regional Water Board's compilation of the data for compliance determination with the group annual average limitation from all affected Dischargers. Dischargers not required by their individual permits to submit annual SMRs shall still submit annual SMRs for mercury as described in this subsection. The reporting required in this subsection "b." is waived only if the Discharge participates in the Group Compliance Reporting described in IV.C, below.

3. **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

4. **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.

   For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

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.

5. **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. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Dischargers shall electronically submit the data in a tabular format as an attachment.

6. **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; discuss corrective actions taken or planned; and the proposed time schedule for corrective actions. Identified violations must include a description of the requirement that was violated and a description of the violation or trigger level exceedance.

7. **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), 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

8. **Optional Electronic Reporting System**
The Dischargers have the option to submit all monitoring results in an electronic reporting format approved by the Executive Officer. The Electronic Reporting System (ERS) format includes, but is not limited to, a transmittal letter, summary of violation details and corrective actions, and transmittal receipt.

C. Optional Group Compliance Reporting

As an alternative to IV.B.2.b. above, each Discharger at its option, may submit its annual mercury discharge forms to a regional entity, such as the

- Bay Area Clean Water Agencies (BACWA) for Dischargers listed in Table 4A, and non-petroleum refinery Industrial Dischargers listed in Table 4B (provided these Industrial Dischargers have made prior arrangement with BACWA to report on their behalf), of the Order, at
  BACWA
  P.O. Box 24055, MS 702
  Oakland, CA 94623
  ATTN: SF Bay Mercury Watershed Wastewater Permit Compliance Reporting

or

- Western State Petroleum Association (WSPA) for Petroleum Refinery Industrial Dischargers listed in Table 4B of the Order, at
  WSPA
  1415 L Street, Suite 600
  Sacramento, CA 95814
  ATTN: SF Bay Mercury Watershed Wastewater Permit Compliance Reporting

If the Discharger chooses this alternative, it shall indicate in the cover letter of its annual report due to the Regional Water Board on February 1st of its intent and commitment to report with a group by February 15th. **Each Discharger shall provide its mercury information on the form shown at the end of this section** by February 15th so as to allow the respective regional entity to provide compiled information to the Regional Water Board as indicated below. If the Discharger fails to meet its commitment, it will be subject to enforcement action by the Regional Water Board for failure to meet the February 1st reporting deadline and requirement.

1. Compliance Report of Mercury Discharge Levels

By April 1st of each year, the Dischargers' group will submit a report describing the group's mercury discharges for the preceding calendar year. The report will contain the following:

- Summary tables depicting each Discharger's annual and monthly flows, mercury concentrations, and mercury mass loads, calculated as described

in Effluent Limitations III.A. and B. of the Order, and the sum of all the individual Dischargers' annual mass loads (if the Dischargers' group did not receive completed forms from the each group member, the sum should be left blank along with blank rows or columns left in the summary tables those group members);

- An analysis of the effluent data, including discussion of all statistical methods used;
- A discussion of apparent trends in mercury loading of each Discharger; and
- An electronic file containing all the data, in a format compatible with the Regional Water Board's Electronic Reporting System or California Integrated Water Quality System.
- Copies of the completed forms from each Discharger who provided forms.

2. Report on Mercury Reduction Efforts

By April 1st of each year, the Dischargers' group will submit a report describing their mercury reduction efforts. This report will contain the following:

a. A discussion of events that may have affected mercury loading for the preceding calendar year; and

b. A description of mercury source control projects, planned or under way, including where applicable, but not limited to:

   i. descriptions of project activities; and

   ii. implementation schedules for planned source control projects; and

   iii. estimates of mercury mass loads that can be avoided through program activities unrelated to normal treatment, including recycled water delivered, summarized by activity if appropriate.

San Francisco Bay Regional Water Quality Control Board

Annual Mercury Information Reporting Form
Part 1 of 3 – Basic Information

Complete and return all 3 parts of this form to the Regional Water Board no later than February 1st in your Annual Self Monitoring Report, to report on the previous calendar year. You must also mail, fax, or email PDF file of a second copy of this completed form to the address below. In lieu of this dual reporting to the Regional Water Board, you may complete one set of these forms and report through a group in accordance with MRP Section IV.C. (see page E-6).

San Francisco Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612
Attention: SF Bay Mercury Watershed Wastewater Permit Compliance Reporting
Email: MercuryWasteWaterShed@waterboards.ca.gov
Fax: (510) 622-2460

Name of Discharger: _____

Individual NPDES Permit Number(s): _____

Discharger Contact Person: _____

Contact Person Phone Number: _____

Contact Person Email: _____

Calendar Year Reporting: _____ (Example: for data collected in 2009, enter "2009")

Certification:

I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed 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.

_____ _____
Signature of Responsible Discharger Representative Date

_____
Print Name and Title

San Francisco Bay Regional Water Quality Control Board

Annual Mercury Information Reporting Form
Part 2 of 3 – Mercury Data

Discharger: _____

Calendar Year Reporting: _____ Monitoring Station: _____

Use separate Part 2 sheets for multiple monitoring stations

☐ A Discharger reporting data to the optional Electronic Report System (ERS), may check and initial this box to certify that its **mercury data in ERS are complete and correct**, if it wishes to skip this part (Part 2) of the Annual Mercury Information Reporting Form requirement. Any recycled water adjustments must still be shown on this sheet.

Month	Sample Date	Effluent Flow (mgd) Enter the effluent flow for only the days when mercury was sampled.	Mercury Concentration (µg/L)	Average Monthly Mass Load (kg/mo)
			Only fill in boxes for month(s) sampled. Indicate "no data" for month(s) not sampled. Only provide total mass load if sampled every month.	
Jan				
Feb				
Mar				
Apr				
May				
Jun				
Jul				
Aug				
Sep				
Oct				
Nov				
Dec				
Total				
Average				

Note: if more than one sample in a month at the same station, report flows and concentrations for all sample days above, and calculate average monthly mass load in accordance with the methodology described in Effluent Limitations III of this Order.

Comments on data (if any):

For Dischargers claiming an effluent credit for recycled wastewater use pursuant to Provision V.C.5 of the Order, please indicate the credit(s) that will be applied to the mass loads listed above, and show on the back of this sheet the credit calculation and basis (use additional sheets if necessary). For Dischargers who provide or use recycled wastewater tor industrial supply pursuant to Provision V.C.5 of the Order, please indicate any adjustments that have been applied to the mass loads listed above.

San Francisco Bay Regional Water Quality Control Board

Annual Mercury Information Reporting Form
Part 3 of 3 – Source Control Information

Discharger: _____

Calendar Year Reporting: _____

1. Discussion of any events that affected mercury loading for the calendar year:

2. Description of mercury source control projects underway or planned. Each project shall include: (1) description of project activities; (2) implementation schedule(s); and (3) estimates of mercury mass loads that can be avoided through program activities unrelated to normal treatment, summarized by activity if appropriate.

    a. Projects completed or underway during the reporting year:

    b. Projects planned for the near future (include information about expected schedule):

D. Discharge Monitoring Reports (DMRs)

1. As described in Section X.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 self-monitoring reports. Until such notification is given, major Dischargers (See Tables 1A and 1B in cover section of permit) shall submit mercury results as part of their discharge monitoring reports (DMRs) in accordance with the requirements described below.

2. DMRs must be signed and certified as required by the standard provisions (Attachment D). Each Discharger shall submit the original DMR and one copy of the DMR to the address 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 US EPA 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

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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.

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.
Threat to Water Quality	**See Tables F-1A and F-1B below.**
Complexity	
Pretreatment Program	
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)	Threat to Water Quality	Complexity	Pretreatment Program	Receiving Water Type
American Canyon, City of	Robert C. Weil, Public Works Director (707) 647-4550 Also Peter Lee	Same as mailing address	1	A	Y	Estuarine
Benicia, City of	Jerry Gall Superintendent (707) 746-4336	Same as mailing address	2	A	Y	Estuarine
Burlingame, City of	Same as contact	Same as mailing address	2	A	Y	Marine
Calistoga, City of	Paul Wade Public Works Director (707) 746-4336	Same as mailing address	2	B	N	Freshwater
Central Contra Costa Sanitary District	Same as contact	Same as mailing address	1	A	Y	Estuarine
Central Marin Sanitation Agency	Robert Cole Environmental Services Manager (415) 459-1455 ext. 142	Same as mailing address	2	A	Y	Estuarine
Contra Costa County Sanitation District No. 5, Port Costa	Same as contact	Same as mailing address	3	B	N	Estuarine
Delta Diablo Sanitation District	Same as contact	Same as mailing address	1	A	Y	Estuarine
East Bay Dischargers Authority	Charles V. Weir General Manager (510) 278-5910	Same as mailing address	1	A	Y	Marine
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 (LAVWMA) Export and Storage Facilities						
Dublin San Ramon Services District Wastewater Treatment Plant						
City of Livermore Water Reclamation Plant						

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Threat to Water Quality	Complexity	Pretreatment Program	Receiving Water Type
East Bay Municipal Utilities District	Same as contact	EBMUD Accounts Payable P.O. Box 23060 Oakland, CA 94623-2306	1	A	Y	Marine
EBMUD – Wet Weather Facilities	Same as contact	EBMUD Accounts Payable P.O. Box 23060 Oakland, CA 94623-2306	2	A	N	
East Brother Light Station, Inc.[1]	Same as contact	Same as mailing address	3	B	N	Estuarine
Fairfield-Suisun Sewer District	Same as contact	Same as mailing address	1	A	Y	Estuarine
Las Gallinas Valley Sanitary District	Same as contact	Same as mailing address	2	A	N	Estuarine
Marin County (Paradise Cove), Sanitary District No. 5 of	Tim O'Day Wastewater Facility Manager (415) 435-1501	Same as mailing address	3	B	N	Marine
Marin County (Tiburon), Sanitary District No. 5 of	Tim O'Day Wastewater Facility Manager (415) 435-1501	Same as mailing address	2	A	N	Marine
Millbrae, City of	Same as contact	Same as mailing address	2	A	N	Marine
Mt. View Sanitary District	David R. Contreras District Manager (925) 228-5635 ext. 32	Same as mailing address	2	A	N	Estuarine
Napa Sanitation District	Same as contact	Same as mailing address	1	A	Y	Estuarine
Novato Sanitary District	Same as contact	Same as mailing address	2	A	Y	Estuarine
Palo Alto, City of	Same as contact	Same as mailing address	1	A	Y	Estuarine
Petaluma, City of	Same as contact	Same as mailing address	2	A	Y	Estuarine
Pinole, City of	Same as contact	Same as mailing address	3	A	N	Marine
Rodeo Sanitary District	Steven S. Beall Engineer-Manager (510) 799-2970	Same as mailing address	3	A	N	Estuarine
Saint Helena, City of	Same as contact	Same as mailing address	2	B	N	Freshwater
San Francisco, City and County of, San Francisco International Airport, Sanitary	Ernie Eavis	676 McDonnell Road San Francisco, CA 94128	3	B	Y	Marine
San Francisco (Southeast Plant), City and County of	Gregory Mayer Operations Superintendent	Same as mailing address	1	A	Y	Marine

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Threat to Water Quality	Complexity	Pretreatment Program	Receiving Water Type
San Jose/Santa Clara, Cities of	Same as contact	Same as mailing address	1	A	Y	Estuarine
San Mateo, City of	Same as contact	Same as mailing address	1	A	Y	Marine
Sausalito-Marin City Sanitary District	Same as contact	Same as mailing address	2	A	N	Marine
Seafirth Estates Company and Property Owners within the Seafirth Estates Subdivision[1]	Bonner Buehler Plant Operator (415) 388-1345	Same as mailing address	3	B	N	Marine
Sewerage Agency of Southern Marin	Same as contact	Same as mailing address	2	A	N	Marine
Sonoma Valley County Sanitary District	Same as contact	Same as mailing address	2	A	N	Estuarine
South Bayside System Authority	Same as contact	Same as mailing address	1	A	Y	Marine
South San Francisco and San Bruno, Cities of	Same as contact	Same as mailing address	1	A	Y	Marine
Sunnyvale, City of	Same as contact	Same as mailing address	1	A	Y	Estuarine
US Naval Support Activity, Treasure Island	Patricia McFadden Brac Field Team Leader OR Michael Mentink Environmental Coordinator	Same as mailing address	2	A	N	Marine
Vallejo Sanitation and Flood Control District	Ronald J. Matheson District Manager (707) 644-8949	Same as mailing address	1	A	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	2	A	Y	Estuarine
Yountville, Town of	Don Moore Wastewater Assistant System Supervisor (707) 944-2988	Same as mailing address	2	B	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)	Threat to Water Quality	Complexity	Pretreatment Program	Receiving Water Type
Industrial Wastewater Discharger (Non-Petroleum Refinery):						
C&H Sugar and Crockett Community Services District	Elizabeth M. Crowley Environmental Compliance Manager	Same as mailing address	2	A	N	Enclosed Bay
Crockett Cogeneration, LP and Pacific Crockett Energy, Inc.	Don Burkard Plant Manager (510) 787-4155	Same as mailing address	2	B	N	Enclosed Bay
The Dow Chemical Company	Greg Dubitsky General Manager (925) 432-5154	Same as mailing address	2	A	N	Enclosed Bay
General Chemical West, LLC	Brad Klock General Manager (925) 458-7359	Same as mailing address	2	B	N	Enclosed Bay
GWF Power Systems L. P., Site I	Neftali Nevarez (925) 431-1445	Same as mailing address	3	C	N	Enclosed Bay
GWF Power Systems L. P., Site V	Neftali Nevarez (925) 431-1445	Same as mailing address	3	C	N	Enclosed Bay
Pacific Gas and Electric Company (PG&E)	David Harnish Site Remediation Manager (925) 866-5882	Same as mailing address	3	B	N	Enclosed Bay
Rhodia, Inc.	Peter Jurichko Plant Manager	Same as mailing address	1	A	N	Enclosed Bay
San Francisco, City and County of, San Francisco International Airport, Industrial	Ernie Eavis Deputy Airport Director	P.O. Box 8097, San Francisco, CA, 94128	1	A	N	Enclosed Bay
Mirant Delta, LLC	James P. Garlick, Sr. Vice President, Operations	Pittsburg Power Plant P.O. Box 192 Pittsburg, CA 94565	1	A	N	Estuary
Mirant Potrero LLC	James P. Garlick, Sr. Vice President, Operations	Mirant Potrero, LLC, Potrero Power Plant, 1201-A Illinois Street San Francisco, CA 94107	2	A	N	Enclosed Bay

Discharger	Authorized Person to Sign and Submit Reports	Billing Address (if different from mailing address)	Threat to Water Quality	Complexity	Pretreatment Program	Receiving Water Type
USS-Posco Industries	David Allen Regulations Manager (925) 439-6290	Same as mailing address	1	A	N	Enclosed Bay
Industrial Wastewater Discharger (Petroleum Refinery):						
Chevron Products Company	J.G. Whiteside General Manager (510) 242-4400	Same as mailing address	1	A	N	Enclosed Bay
ConocoPhillips	J.M. Kenney Manager, San Francisco Refinery (510) 245-4415	Same as mailing address	1	A	N	Enclosed Bay
Shell Oil Products US and Equilon Enterprises LLC	Aamir Farid Refinery Manager (925) 313-3000	Same as mailing address	1	A	N	Enclosed Bay
Tesoro Refining & Marketing Co.	Alan Savage Environmental Manager (925) 335-3490	Same as mailing address	1	A	N	Enclosed Bay
Valero Refining Company	Marcus Cole Senior Environmental Engineer (707) 745-7807	Same as mailing address	1	A	N	Enclosed Bay

A. The Dischargers listed in this Order are currently discharging pursuant to the Order Nos. and National Pollutant Discharge Elimination System (NPDES) Permit Nos. as shown in Attachment B. This Mercury Watershed Permit implements the San Francisco Bay mercury Total Maximum Daily Load (TMDL) adopted by the Regional Water Board on December 13, 2006. The TMDL will be effective once USEPA approves it. Upon this Order's effective date, it will supersede mercury requirements in the Orders listed in Attachment B, or in the Orders that will be adopted by the Regional Water Board in reissuing the expired or expiring NPDES permits prior to the effective date of this 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. The Dischargers listed in Table 1A of the Order own and operate secondary and advanced secondary wastewater treatment facilities as described in their respective Orders. The Dischargers listed in Table 1B of the Order own and operate wastewater treatment facilities as described in their respective Orders. 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 settling, filtration, and biological treatment. Some plants also provide advanced treatment, which removes additional solids. Removing additional solids removes additional pollutants, like mercury, that adhere to particles. Municipal wastewater treatment plants generally remove over 90% of the mercury in their influent. While the removed mercury is 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.

Industrial Dischargers include petroleum refineries, chemical plants, and other large industrial facilities. The mercury loads depend on the types of activities in which these Dischargers engage. The wastewater treatment facilities also vary depending on the 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

Effective effluent limitations contained in current individual permits for the Dischargers subject to this Order are shown in the table below. Information for each Discharger is available in the individual permit and monitoring reports for that Discharger. All limits are specified in ug/l.

Table F-2. Current Individual Permit Mercury Effluent Limits for Municipal Dischargers

Discharger	Average Monthly	Maximum Daily
American Canyon, City of	0.021	0.039
Benicia, City of	0.087	
Burlingame, City of	0.087	
Calistoga, City of	0.020	0.042
Central Contra Costa Sanitary District	0.087	1.0
Central Marin Sanitation Agency	0.087	
Contra Costa County Sanitation District No. 5, Port Costa	No limit because no reasonable potential	
Delta Diablo Sanitation District	0.084	
East Bay Dischargers Authority – Combined Outfall	0.087	
Union S.D. Wet Weather Outfall		0.087
Union S.D. Hayward Marsh	0.087	
LAVWMA Wet Weather Outfall	No limit because no reasonable potential	
East Bay Municipal Utilities Dist. – Main WWTP	0.087	
EBMUD – Point Isabel WWF		0.40
EBMUD – San Antonio Creek WWF		1.0
EBMUD – Oakport WWF		0.25
East Brother Light Station, Inc.	No limit because no reasonable potential	
Fairfield-Suisun Sewer District	0.023	
Las Gallinas Valley Sanitary District	0.087	
Marin County (Paradise Cove), Sanitary District No. 5 of	No limit because no reasonable potential	
Marin County (Tiburon), Sanitary District No. 5 of	0.087	
Millbrae, City of	0.087	
Mt. View Sanitary District	0.021	0.038
Napa Sanitation District	0.087	
Novato Sanitary District	0.087	
Palo Alto, City of	0.023	
Petaluma, City of	0.021	0.04
Pinole, City of	0.087	
Rodeo Sanitary District	0.021	0.041
Saint Helena, City of	0.08	
San Francisco, City and County of, SF International Airport, Sanitary	0.087	1.0

Discharger	Average Monthly	Maximum Daily
San Francisco (Southeast Plant), City and County of	0.087	
San Jose/Santa Clara, Cities of	0.012	2.1
San Mateo, City of	0.087 winter 0.023 summer	
Sausalito-Marin City Sanitary District	0.2	1
Seafirth Estates Company and Property Owners with the Seafirth Estates Subdivision	No limit because no reasonable potential	
Sewerage Agency of Southern Marin	0.087	1
Sonoma Valley County Sanitary District	0.087	1
South Bayside System Authority	0.023	0.034
South San Francisco and San Bruno, Cities of	0.087	
Sunnyvale, City of	0.012	2.1
US Naval Support Activity, Treasure Island	0.087	
Vallejo Sanitation and Flood Control District	0.087	
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	0.087	
Yountville, Town of	0.084	

Table F-3. Current Individual Permit Mercury Effluent Limits for Industries

Discharger	Average Monthly, µg/L	Maximum Daily, µg/L
Industrial Wastewater Discharger (Non-Petroleum Refinery):		
C&H Sugar - 002	0.21	1.0
Crockett Cogeneration, LP and Pacific Crockett Energy, Inc.	No limit because no reasonable potential	
The Dow Chemical Company	0.084	1
General Chemical West, LLC		1
GWF Power Systems L. P., Site I		0.134
GWF Power Systems L. P., Site V		0.071
Pacific Gas and Electric Company (PG&E)	0.02	0.041
Rhodia, Inc.		0.32
San Francisco, City and County of, SF International Airport, Industrial	0.087	1
Mirant Delta, LLC	0.165	
Mirant Potrero LLC	0.032	
USS-Posco Industries	No limit because no reasonable potential	
Industrial Wastewater Discharger (Petroleum Refinery):		
Chevron Products Company	0.075	
ConocoPhillips	0.075	
Shell Oil Products US and Equilon Enterprises LLC	0.075	
Tesoro Refining & Marketing Co.	0.019	0.044
Valero Refining Company	0.075	

D. Compliance Summary

There have been no serious exceedances of mercury effluent limitations for the Dischargers in recent years.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements contained in the proposed 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 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 Resources Control Board (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-4. 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)

Requirements of this Order implement the Basin Plan.

The Regional Water Board adopted a Basin Plan Amendment on December 13, 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 new objectives and TMDL become effective after approval by the State Water Board and USEPA. Elevated mercury concentrations currently exist in the tissues of fish, and methylmercury, a highly toxic form of mercury, is a persistent bioaccumulative pollutant. The mercury TMDL calls for reduction of mercury mass loadings to San Francisco Bay. Additional details regarding mercury sources to San Francisco Bay, and technical information related to the San Francisco Bay Mercury TMDL, are provided in the Fact Sheet. The purpose of this Order is to implement the San Francisco Bay Mercury TMDL wasteload allocations for Dischargers listed in Tables 1A and 1B.

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

On June 6, 2003, 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 Section 303(d) of the Federal CWA requiring 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. The SIP requires final effluent limitations 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 because mercury contamination is adversely affecting existing beneficial uses, including sport fishing, preservation of rare and endangered species, and wildlife habitat. Mercury 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.

The San Francisco Bay mercury TMDL was adopted by the Regional Water Board on August 9, 2006. The numeric targets, allocations, and associated implementation plan will ensure that all San Francisco Bay segments attain applicable water quality standards, including new mercury water quality objectives indicated in section IV.A.2. to protect and support beneficial uses.

The TMDL allocations and implementation plan focus on controlling the amount of mercury that reaches the Bay and identifying and implementing actions to minimize mercury bioavailability. The organic form of mercury (methylmercury) is toxic and bioavailable, but information on ways of controlling methylmercury production is limited. However, this is an area of active research and strategies for controlling this process are forthcoming. The effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to mercury will be periodically reviewed and the TMDL may be adapted as warranted.

The mercury TMDL implementation plan has four objectives: (1) reduce mercury loads to achieve load and wasteload allocations, (2) reduce methylmercury production and consequent risk to humans and wildlife exposed to methylmercury, (3) conduct monitoring and focused studies to track progress and improve the scientific

[1] All further statutory references are to title 40 of the Code of Federal Regulations unless otherwise indicated.

understanding of the system, and (4) encourage actions that address multiple pollutants. The plan establishes requirements for Dischargers to reduce or control mercury loads and identifies actions necessary to better understand and control methylmercury production. In addition, it addresses potential mercury sources and describes actions necessary to manage risks to Bay fish consumers. The adaptive implementation section describes the method and schedule for evaluating and adapting the TMDL and implementation plan as needed to assure water quality standards are attained.

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 TMDL.

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 proposed 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. Effluent limitations, and provisions contained in this Order are designed to

implement the new objectives in accordance with the implementation provisions of the San Francisco Bay Mercury TMDL, based on available information.

3. Determining the Need for WQBELs

This Order contains WQBELs for mercury. As required by section 122.44(d)(1)(vii), the Regional Water Board is including WQBELs for mercury in this Order that are consistent with the assumptions and requirements of the San Francisco Bay Mercury TMDL wasteload allocation. Based on the water quality monitoring done at the time of the TMDL adoption, which set the wasteload allocation at the level necessary to attain water quality standards, the Regional Water Board has determined that the WQBEL is consistent with the assumptions of the TMDL. Similarly, compliance with the effluent limitations will satisfy the requirements of the TMDL.

The Regional Water Board has developed water quality-based effluent limitations for mercury 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

There are two sets of WQBELs in this Order: mass-based and concentration-based.

Mass-based WQBELs

The mass-based WQBEL's are based on the established aggregate wasteload allocations for municipal Dischargers and industrial Dischargers which 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-5 below. Also shown are the interim aggregate load limit and associated individual load limits applicable in 10 years, and final wasteloads allocations that apply in 20 years.

The Order implements the 10 and 20 year timeframe for compliance with the interim and final aggregate load limits of the TMDL's wasteload allocations. These timeframes are appropriate to allow Municipal Dischargers time to implement additional measures to reduce their contribution of mercury discharge to San Francisco Bay. The timeframes are as soon as possible because of the high level of uncertainty in pollution prevention methods and other measures envisioned in the TMDL for reducing mercury discharge concentrations from municipalities. As indicated in the TMDL, the other measures that would be necessary include wastewater re-use, pollutant trading, offsets and/or system improvements. The

uncertainties inherent in developing a pollutant trading and offset program warrant this long timeframe as state policies for these programs are still in their initial stages. The development and design of plans for the infrastructure and funding required for significantly increasing wastewater re-use, and system improvements by public agencies also warrant such a timeframe.

Table F-5. TMDL Mass Limits and Wasteload Allocations for Municipal Wastewater Dischargers

Permitted Entity	NPDES Permit	2000–2003 Initial Load Limit (kg/yr)	Interim Load Limit (kg/yr)	Final Allocation (kg/yr)
American Canyon, City of	**CA0038768**	**0.12**	**0.095**	**0.095**
California Department of Parks and Recreation Angel Island State Park	CA0037401	0.013	0.013	0.013
Benicia, City of	CA0038091	0.088	0.088	0.088
Burlingame, City of	CA0037788	0.089	0.089	0.089
Calistoga, City of	CA0037966	0.016	0.016	0.016
Central Contra Costa Sanitary District	CA0037648	2.23	1.8	1.3
Central Marin Sanitation Agency	CA0038628	0.18	0.15	0.11
Delta Diablo Sanitation District	CA0038547	0.31	0.25	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	2.9	2.2
East Bay Municipal Utilities District	CA0037702	2.6[a]	2.1	1.5
East Brother Light Station	CA0038806	0.001	0.000012	0.000012
Fairfield-Suisun Sewer District	**CA0038024**	**0.22**	**0.17**	**0.17**
Las Gallinas Valley Sanitary District	CA0037851	0.17	0.13	0.10
Marin County Sanitary District, Paradise Cove	CA0037427	0.00055	0.00055	0.00055
Marin County Sanitary District, Tiburon	CA0037753	0.0099	0.0099	0.0099
Millbrae, City of	CA0037532	0.052	0.052	0.052
Mountain View Sanitary District	**CA0037770**	**0.034**	**0.034**	**0.034**
Napa Sanitation District	CA0037575	0.28	0.23	0.17
Novato Sanitary District	CA0037958	0.079	0.079	0.079
Palo Alto, City of	**CA0037834**	**0.38**	**0.31**	**0.31**
Petaluma, City of	CA0037810	0.063	0.063	0.063
Pinole, City of	CA0037796	0.055	0.055	0.055
Contra Costa County, Port Costa WWTP	CA0037885	0.00072	0.00072	0.00072
Rodeo Sanitary District	CA0037826	0.060	0.060	0.060
Saint Helena, City of	CA0038016	0.047	0.047	0.047
San Francisco, City and County of, San Francisco Airport	CA0038318	0.032	0.032	0.032
San Francisco, City and County of, Southeast Plant	CA0037664	2.7	2.1	1.6
San Jose/Santa Clara WPCP	**CA0037842**	**1.0**	**0.80**	**0.80**
San Mateo, City of	CA0037541	0.32	0.26	0.19
Sausalito-Marin City Sanitary District	CA0038067	0.078	0.078	0.078
Seafirth Estates	CA0038893	0.00036	0.00036	0.00036
Sewerage Agency of Southern Marin	CA0037711	0.13	0.10	0.076
Sonoma Valley County Sanitary District	CA0037800	0.041	0.041	0.041
South Bayside System Authority	CA0038369	0.53	0.42	0.32
South San Francisco/San Bruno WQCP	CA0038130	0.29	0.24	0.18
Sunnyvale, City of	**CA0037621**	**0.15**	**0.12**	**0.12**
US Naval Support Activity, Treasure Island WWTP	CA0110116	0.026	0.026	0.026

Permitted Entity	NPDES Permit	2000–2003 Initial Load Limit (kg/yr)	Interim Load Limit (kg/yr)	Final Allocation (kg/yr)
Vallejo Sanitation & Flood Control District	CA0037699	0.57	0.46	0.34
West County Agency, Combined Outfall	CA0038539	0.38	0.30	0.23
Yountville, Town of	CA0038121	0.040	0.040	0.04
Total		***17*** [b]	***14*** [b]	***11*** [b]

Notes to Table F-5:

Bold text indicates advanced secondary treatment.

[a] This allocation includes wastewater treatment and all wet weather facilities.

[b] 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-6 and F-7 below.

Table F-6. TMDL Wasteload Allocations for Industrial (Non-Petroleum Refinery) Wastewater Discharges

Permitted Entity	NPDES Permit	Allocation (kg/yr)
C&H Sugar Co.[b]	CA0005240	0.045
Crockett Cogeneration	CA0029904	0.0047
The 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
Southern Energy California, 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-7. TMDL Wasteload Allocations for Petroleum Refinery Wastewater Discharges

Permitted Entity	NPDES Permit	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-6 and F-7:

[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. The combined mercury load for all municipal wastewater discharges to San Francisco Bay and its tributaries is about 17 kg/yr. The combined load of the industrial Dischargers and petroleum refineries is about 1.3 kg/yr. Together, these wastewater discharges 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. "

This Order does not contain requirements for the California Department of Parks and Recreation, Angel Island State Park, the PG&E Hunters Point facility, or the US Navy Point Molate facility, because the wastewater discharges from these facilties have ceased and the Regional Water Board has rescinded their NPDES permits. This Order also does not contain requirements for the three Hanson Aggregates facilities which currently are covered or will soon be covered in general NPDES permits. These facilities comprise a very small portion of the total wastewater mercury load to San Francisco Bay, although mercury TMDL wasteload allocations may be implemented for these facilities in the future through separate actions.

Concentration-based WQBELs

In addition to the 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 whcih 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, Regional Water Board staff 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. These data were obtained from data reported by the Dischargers to the Regional Water Board's Electronic Reporting System (ERS), or entered into ERS by Regional Water Board staff from the Dischargers' self-monitoring reports. 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 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.

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-8 and F-9 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-8. Municipal -- Individual Mercury Effluent Limitations

Permitted Entity	Average Annual Effluent Limit[1,2] (kg/yr)	Effective in 10 years Average Annual Effluent Limit[(1,2,5)] (kg/yr)	Effective in 20 years Average Annual Effluent Limit[(1,2,5)] (kg/yr)	Average Monthly Effluent Limit[2] (µg/L)	Average Weekly Effluent Limit[2] (µg/L)
American Canyon, City of	0.12	0.095	0.095	0.025	0.027
Benicia, City of	0.088	0.088	0.088	0.066	0.072
Burlingame, City of	0.089	0.089	0.089	0.066	0.072
Calistoga, City of	0.016	0.016	0.016	0.066	0.072
Central Contra Costa Sanitary District	2.23	1.8	1.3	0.066	0.072
Central Marin Sanitation Agency	0.18	0.15	0.11	0.066	0.072
Delta Diablo Sanitation District	0.31	0.25	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 (LAVWMA), Dublin San Ramon Services District, and City of Livermore	3.6	2.9	2.2	0.066	0.072
East Bay Municipal Utilities District, including Wastewater Treatment Plant and Wet Weather Facilities	2.6	2.1	1.5	0.066	0.072
East Brother Light Station, Inc.[3]	0.00001	0.000012	0.000012	0.066	0.072
Fairfield-Suisun Sewer District	0.22	0.17	0.17	0.025	0.027
Las Gallinas Valley Sanitary District	0.17	0.13	0.10	0.066	0.072
Marin County (Paradise Cove), Sanitary District No. 5 of	0.00055	0.00055	0.00055	0.066	0.072
Marin County (Tiburon), Sanitary District No. 5 of	0.0099	0.0099	0.0099	0.066	0.072
Millbrae, City of	0.052	0.052	0.052	0.066	0.072
Mt. View Sanitary District	0.034	0.034	0.034	0.025	0.027
Napa Sanitation District	0.28	0.23	0.17	0.066	0.072
Novato Sanitary District	0.079	0.079	0.079	0.066	0.072
Palo Alto, City of	0.38	0.31	0.31	0.025	0.027
Petaluma, City of	0.063	0.063	0.063	0.066	0.072

Permitted Entity	Average Annual Effluent Limit[1,2] (kg/yr)	Effective in 10 years Average Annual Effluent Limit[(1,2,5)] (kg/yr)	Effective in 20 years Average Annual Effluent Limit[(1,2,5)] (kg/yr)	Average Monthly Effluent Limit[2] (µg/L)	Average Weekly Effluent Limit[2] (µg/L)
Pinole, City of	0.055	0.055	0.055	0.066	0.072
Contra Costa County Sanitation District No. 5, Port Costa	0.00072	0.00072	0.00072	0.066	0.072
Rodeo Sanitary District	0.060	0.060	0.060	0.066	0.072
Saint Helena, City of	0.047	0.047	0.047	0.066	0.072
San Francisco, City and County of, San Francisco International Airport, Sanitary	0.032	0.032	0.032	0.066	0.072
San Francisco (Southeast Plant), City and County of	2.7	2.1	1.6	0.066	0.072
San Jose/Santa Clara, Cities of	1.0	0.80	0.80	0.025	0.027
San Mateo, City of	0.32	0.26	0.19	0.066	0.072
Sausalito-Marin City Sanitary District	0.078	0.078	0.078	0.066	0.072
Seafirth Estates Company and Property Owners within the Seafirth Estates Subdivision[3]	0.00036	0.00036	0.00036	0.066	0.072
Sewerage Agency of Southern Marin	0.13	0.10	0.076	0.066	0.072
Sonoma Valley County Sanitary District	0.041	0.041	0.041	0.066	0.072
South Bayside System Authority	0.53	0.42	0.32	0.066	0.072
South San Francisco and San Bruno, Cities of	0.29	0.24	0.18	0.066	0.072
Sunnyvale, City of	0.15	0.12	0.12	0.025	0.072
US Naval Support Activity, Treasure Island	0.026	0.026	0.026	0.066	0.072
Vallejo Sanitation and Flood Control District	0.57	0.46	0.34	0.066	0.072
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	0.38	0.30	0.23	0.066	0.072
Yountville, Town of	0.040	0.040	0.040	0.066	0.072
Aggregate Mass Emission Limit (kg/yr)	17[4]	**14**	**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 the individual Municipal Dischargers' mercury mass emissions, calculated as described below, is not greater than the Aggregate Mass

Emission Limit of 17 kg/yr (or 14 kg/yr in 10 year, or 11 kg/yr in 20 years). If the sum of all individual Municipal Dischargers' mercury mass emission(s) is greater than 17 kg/yr (or 14 kg/yr in 10 year, or 11 kg/yr in 20 years), the Municipal Discharger(s) whose mercury mass emission(s) exceed(s) its (their) individual limitation(s) in Table 6, 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. If there are delays in USEPA's approval of the TMDL such that this Order does not become effective until well into a calendar year, say one calendar quarter, it is appropriate to delay compliance determination with the annual limit until the next full calendar year so as to not bias the annual mass emission calculation with data from just the remainder of the calendar year.

c. The annual average mass emission for each Discharger listed in Table F-8 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) This Order requires the Dischargers to achieve an analytical minimum level based on that specified in USEPA Method 1613.

Minimum Levels

Constituent	Minimum Level	Units
Mercury	0.0005	µg/L

(3) This Discharger serves domestic customers but is not a municipal government agency.

(4) Total differs slightly from the column sum due to rounding to the nearest kilogram.

(5) The first Annual Average Effluent Limits represent the San Francisco Bay Mercury TMDL's initial mass limits for Municipal Dischargers. In accordance with the TMDL and the compliance schedule provision that the Regional Water Board will submit to USEPA for approval, the Municipal Dischargers listed in this table have up to 10 years from the effective date of this Order to achieve the "Effective in 10 Years Annual Average Effluent Limits" and its respective Aggregate Annual Mass Emission Limit, and up to 20 years to achieve the "Effective in 20 Years Annual Average Effluent Limits" and its respective Aggregate Annual Mass Emission Limit listed in Table 6.

Table F-9. Industrial -- Individual Mercury Effluent Limitations

Permitted Entity	Annual Average Effluent Limit[1,2] (kg/yr)	Monthly Average Effluent Limit[2] (µg/L)	Daily Maximum Effluent Limit[2] (µg/L)
Industrial Wastewater Discharger (Non-Petroleum Refinery):			
C&H Sugar and Crockett Community Services District	0.045	0.079	0.12
Crockett Cogeneration, LP and Pacific Crockett Energy, Inc.	0.0047	0.079	0.12
The 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, City and County of, SF International Airport, Industrial	0.051	0.079	0.12
Mirant Delta, LLC	0.0078	0.079	0.12
Mirant Potrero LLC	0.0031	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[3] (kg/yr)	**1.3**	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 1.3 kg/yr. If the sum of the individual Industrial Dischargers' mercury mass emission(s) is greater than 1.3 kg/yr, the Industrial Discharger(s) whose mercury mass emission(s) exceed(s) its (their) individual limitation(s) in Table 6, 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 kilogram for comparison with the 1.3 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. If there are delays in USEPA's approval of the TMDL such that this Order does not become effective until well into a calendar year, say one calendar quarter, it is appropriate to delay compliance determination with the annual limit until the next full calendar year so as to not bias the annual mass emission calculation with data from just the remainder of the calendar year.

c. The annual average mass emission for each Discharger listed in Table F-9 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) This Order requires the Dischargers to achieve an analytical minimum level based on that specified in USEPA Method 1613.

Minimum Levels

Constituent	Minimum Level	Units
Mercury	0.0005	µg/L

(3) Total differs slightly from the column sum due to rounding, and from several industrial dischargers discontinuing their discharges.

5. Satisfaction of Anti-Backsliding Requirements

Effluent limits based on a TMDL are afforded certain latitude in terms of anti-backsliding. As outlined in the State Water Board's Office of Chief Counsel memorandum pertaining to offsets, pollutant trading, and market programs, dated November 22, 2006, when a TMDL is in place, the Clean Water Act and the Porter-Cologne Water Quality Control Act give latitude to develop means of achieving compliance with water quality standards, subject to certain limitations. Water quality based objectives may be adjusted upwards or downwards to be consistent with the TMDL. While the Clean Water Act's anti-backsliding provisions generally prohibit allowing less stringent effluent limitations, section 402(o) contains an express exception applicable when a TMDL is in place. It allows relaxation consistent with the TMDL if "the cumulative effect of all such revised effluent limitations based on such total maximum daily load or waste load allocation will assure attainment of such water quality standards. . . ." 33 U.S.C. § 1313(d)(4)(A)(i). Federal regulations bolster this and require WQBELs to be "consistent with the assumptions and requirements of any available wasteload allocations." 40 CFR 122.44(d)(1)(vii)(B). As set forth in the above-mentioned memorandum, "…as long as the cumulative effect of all WQBELs for NPDES-permitted discharges to a water is consistent with the assumptions and requirements of an applicable TMDL, the regional water board may adjust WQBELs using a variety of mechanisms that are designed to achieve the attainment of water quality standards."

Additionally, under the State Board Order WQ 2001-06 (Tosco Order[2]), the State Water Board held that a "limit that implements or is consistent with the wasteload allocations in a TMDL complies with the exception in Section 303(d)(4)."

It is important to keep the above principles in mind when implementing a TMDL. In any event, in this specific case, anti-backsliding is not even applicable. Anti-backsliding prevents backsliding from comparable limits (Tosco Order). All of the proposed limits in the proposed permit are either equal to or consistent with the assumption and requirements of the TMDL. The previous limits were not. Therefore, they are not comparable.

Even if anti-backsliding did apply here, for the current individual permits that specify water quality based mass effluent limits for mercury, Section 303(d)(4) allows relaxation of those limits because the annual average mass limits in this Order are based on the wasteload allocations in the San Francisco Bay mercury TMDL, and the implementation of this TMDL will assure attainment of the water quality standard for mercury.

Similarly, section 303(d)(4) also allows backsliding for the ten Municipal Dischargers and eight Industrial Dischargers whose monthly concentration limits are less stringent than their current (water quality based) individual permits. The newly calculated concentration limits are based on the dataset used to derive the wasteload allocations of the TMDL. They also reflect the levels that, as determined by the TMDL, will attain the water quality objective for mercury. Therefore, they are consistent with the assumptions and requirements of the mercury TMDL and will assure attainment of water quality standards, consistent with section 303(d)(4) and 40 CFR 122.44(d)(1)(vii)(B).

Section 402(o)(2)(B)(i) further provides justification for relaxing the ten Municipal and two Industrial (PG&E and Tesoro) Dischargers' concentration limits. This section allows backsliding if new information (other than revised regulations, guidance, or test methods) is available that justifies less stringent limits. The new information is that the basis for these previous limits is not a scientifically reliable indicator for protecting water quality and beneficial uses from mercury. Specifically, the previous permit limits were based directly, or carried over from limits based directly, on the scientifically outdated mercury objective of 0.025 μg/L (or the equally outdated and illegal footnoted criterion of 0.012 μg/L) of the Basin Plan. Further, as a policy matter, anti-backsliding requirements should not canonize bad science or illegally derived limits. Limits based on a TMDL reflect the latest science and will assure attainment of water quality objectives in a coherent and consistent manner that takes into account all loading inputs to a waterbody and which does not penalize good performing dischargers.

[2] The Tosco Order has been upheld in two Court of Appeal decisions, *CBE et al. v. State Water Resources Control Board et al*., 109 Cal.App.4th 1089 (2003) and 132 Cal.App.4th 1313 (2005).

6. Satisfaction of Antidegradation Policy

The Order's mercury effluent limitations, which implement wasteload allocations, have been computed to satisfy the total maximum daily load that will allow the San Francisco Bay to come into attainment with water quality objectives. This Order includes requirements that are part of an overall comprehensive plan to restore mercury levels in San Francisco Bay. Because the TMDL is 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.

The mercury TMDL contains a requirement to "prepare an annual report that documents mercury loads from each facility, mercury and methylmercury effluent concentrations, and ongoing source control activities, including mercury loads avoided through control actions." Dischargers are therefore required by this Order to report mercury discharge levels and trends, and mercury reduction measurements in Self-Monitoring Reports to facilitate the adaptive management process for implementation of the San Francisco Bay mercury TMDL. A special form is provided for use in compiling information for determining compliance with the group mass limit. Duplicate reporting using the form is required which the Regional Water Board believes is not burdensome for the Dischargers, but will facilitate the Regional Water Board's timely determination of compliance with the group mass limit. Incentive is provided for the optional group reporting by eliminating the duplicative reporting requirement, and allowing the Dischargers a little more time to provide the data. This optional group reporting facilitates adaptive management, and also consolidates the information in one place for ease of access by the public.

The monitoring frequencies specified in the MRP are dependent on each Discharger's contribution of mercury, and its resources to conduct the monitoring. For example, those with higher mercury limits and/or are major dischargers are required to monitor more frequently.

Also, pursuant to USEPA guidance (Technical Support Document, March 1991) the following factors were considered in selecting the frequencies. (The data referenced below are summarized in Appendix F-3.):

- Effluent variability – The individual discharge concentrations are generally not highly variable with the coefficient of variation for a representative set of Dischargers at a median of 0.5 (full range is from about 0.3 up to 2).

- Type of treatment process including retention times – the majority of the treatment processes involves biological processes with a few of the smaller industrial facilities relying upon physical/chemical treatment. For the most part, these systems have long retention times on the order of days up to a week for some systems.

- Compliance history – All Dischargers have complied with their applicable effluent limits for mercury in the past 5 years with very few exceptions. Pursuant to USEPA "Interim Guidance for Performance-Based Reductions of NPDES Permit Monitoring Frequencies," dated April 19, 1996, lower frequencies than those proposed in this Order may be appropriate. However, in consideration of the other factors listed here, those Dischargers are required by this Order to monitor at least once per month.

- Cost of monitoring relative to the Discharger's capabilities – Mercury and methylmercury sampling requires use of ultra-clean low detection techniques requiring at least two personnel to properly perform. The analysis is also specialized and costs more for this reason. As indicated in the paragraph above, the monitoring frequency was staggered based on each Discharger's resources to conduct the monitoring.

- Number of monthly samples used in developing the permit limit – previous individual permits have for the most part required monthly monitoring with a few permits requiring weekly or biweekly monitoring and others at quarterly or annual frequencies. Some Dischargers monitored more frequently than required. All these data were used in calculating the wasteload allocations that formed the effluent limits in this Order.

- Environmental significance and nature of the pollutant – Mercury is a pollutant of great concern in San Francisco Bay because it is bioaccumulative and is an impairment to beneficial uses. The Dischargers covered by this Order make up close to 2 percent of the total mercury load to the Bay.

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.

VII. RATIONALE FOR PROVISIONS

A. 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. The Dischargers must comply with all standard provisions and with those additional conditions that are applicable under section 122.42. Standard Provisions section V.D does not apply in this Order because it pertains to compliance schedule which is not required in this Order.

Section 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. If incorporated by reference, a specific citation to the regulations must be included in the Order. Section 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. In accordance with section 123.25, this Order omits federal conditions that address enforcement authority specified in sections 122.41(j)(5) and (k)(2) because the enforcement authority under the Water Code is more stringent. In lieu of these conditions, this Order incorporates by reference Water Code section 13387(e).

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 Source Control Program for Municipal Dischargers

The mercury TMDL includes a requirement to “develop and implement effective programs that include but are not limited to pollution prevention to control mercury sources and loading, a plan and schedule of actions and effectiveness measures

applicable for the term of the permit, based on identification of the largest and most controllable sources and an updated assessment of source control measures and wastewater treatment technologies (the level of effort shall be commensurate with the mercury load and performance of the facility) and quantify the mercury load avoided or reduced…" Therefore, this Order contains requirements for source control. Dischargers are responsible for investigating the sources and strategies for controlling those sources. However, a major source of mercury to wastewater treatment plants is from dental offices, and efforts are already underway by municipal wastewater facilities to manage and reduce the amount of mercury amalgam that is discharged from dental offices into the public collection systems. The target for this program is that 85 percent of dental offices in the region will be participating in an amalgam program five years after full adoption of the TMDL.

3. Additional Special Studies for Adaptive Management

The potential availability of wastewater mercury for methylation and biological uptake, and possible local effects of such discharges, is not well understood. Consistent with the TMDL, this Order requires Dischargers to undertake or otherwise support studies to evaluate local impacts and bioavailability. If evidence of local effects from wastewater effluent is discovered, or if municipal wastewater facilities significantly contribute to mercury concentrations in the food web, the Regional Water Board may impose discharge restrictions aimed at minimizing or avoiding adverse impacts.

Due to the uncertainties in assessing the nature of sources and impacts of mercury, the TMDL was designed with an adaptive management approach. In particular, the TMDL implementation plan specifies requirements for Dischargers to:

- Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, the conditions under which mercury methylation occurs, and biological uptake in San Francisco Bay and tidal areas, and
- Conduct or cause to be conducted studies to evaluate the presence or potential for local effects on fish, wildlife, and rare and endangered species in the vicinity of wastewater discharges

Consistent with the adaptive management approach, after the activities in the initial years of the permit for evaluating group mercury discharges, collecting methylmercury data of wastewater effluent, conducting source control programs, and engaging in risk management, this Order requires the development of a work plan by Dischargers within the permit term to conduct or participate in management studies. It is intended that information gathered to date will be used to begin the process of evaluating sources and impacts of mercury to identify next steps to control mercury in San Francisco Bay.

These studies may be undertaken by BACWA or WSPA on the Dischargers' behalf, or by such other agents (e.g., CEP, Regional Monitoring Program) as may exist or come into existence for this purpose. The Dischargers are collectively and individually responsible for undertaking such studies. It is the intent of the Regional

Water Board to maximize the use of existing programs and resources for monitoring and research efforts.

4. Risk Reduction Programs

The TMDL requires municipal and industrial wastewater Dischargers to "develop and implement effective programs to reduce mercury-related risks to humans and wildlife and quantify risk reductions resulting from these activities." This provision is based on this requirement. We envision a multi-phase process to develop a regional risk management strategy. The Order requires Dischargers to include public participation in the development process as this could make the programs more effective. The first phase should focus on identifying specific risk-management needs, the appropriate measures to address those needs, and the associated costs and mechanisms to implement the measures. This could reasonably take one to two years to develop. Another year is a reasonable timeframe for municipal entities to secure resources and identify the appropriate mechanisms to start implementing the risk reduction programs.

As indicated in the TMDL, 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-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.

5. 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 also similar to an existing provision in the individual permits for the petroleum refineries.

The Adjustment is only applicable if the mercury 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 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 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. Furthermore, this Order's Provision V.C.3 requires Additional Special Studies that will look for the "presence of, or potential for, local effects in the vicinity of wastewater discharges." If any local impacts are determined, the Regional Water Board will require appropriate corrective measures.

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 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 some time 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 exists 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. Chevron currently uses about 4 million gallons per day of recycled wastewater. A new reuse project is scheduled to go on line in 2009 that will bring the amount to approximately 7-8 million gallons per day. West County Wastewater District (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 discharge to the Bay under this Order would be the sum of the WCWD and Chevron individual mass limits that were based on the wasteload allocations in the TMDL. Only if the sum of WCWD's and Chevron's 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 mass limits, and the adjusted mass discharge from Municipal Dischargers as a group exceeds the aggregate mass limit for the Municipal Dischargers.

6. Reopener Provision

Two reopener conditions are provided in the Order. These are based on the TMDL's adaptive implementation provisions as they relate to the final waste load allocations for municipal dischargers. The TMDL implementation plan states at page BPA 26,

> "the final wasteload allocations are expected to be attained through wastewater treatment system improvements and/or implementation of a pollutant offset program. Approximately 10 years after the effective date of the TMDL or any time thereafter, the [Regional] Water Board will consider modifying the schedule for achievement of the wasteload allocations or revisions to wasteload allocations if:
>
> - The State [Water] Board has not established a pollutant offset program that can be implemented within the 20 years required to achieve final wasteload allocations…"

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 requirements in existing National Pollutant Discharge Elimination System (NPDES) permits. As a step in the WDR adoption process, the Regional Water Board staff has developed this tentative WDR. 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) paper copies of this Order were relayed to the Dischargers and other interested parties, and (b) the San Francisco Chronicle published a notice that this item would appear before the Regional Water Board in March 2007.

The Regional Water Board received comments on the March 2007 draft requirements. On July 17, 2007, the State Water Board adopted a resolution approving the San Francisco Bay Mercury TMDL (as corrected). This resolution called on the Regional Water Board to include specific limits in the waste discharge requirements implementing the TMDL. The Regional Water Board revised the draft waste discharge requirements in response to the resolution and comments received on the March 2007, draft.

The Regional Water Board has notified the Dischargers and interested agencies and persons of its intent to prescribe the requirements as revised and has provided them with an opportunity to submit their written comments and recommendations on the revisions. This Notification was provided through the following: (a) Dischargers received

paper copies of this Order, (b) interested agencies and persons received notification by email, and (c) the San Francisco Chronicle published a notice in August 2007 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 **Lila Tang** 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, September 13, 2007.**

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:	**November 1, 2007**
Time:	9:00 am
Location:	Elihu Harris State Office Building 1515 Clay Street, 1st Floor Auditorium Oakland, CA 94612
Contact:	Lila Tang, (510)622-2425, ltang@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 Resources Control 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 TMDL, 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 **Lila Tang** at **(510)622-2425, or by email at ltang@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 EFFLUENT 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.

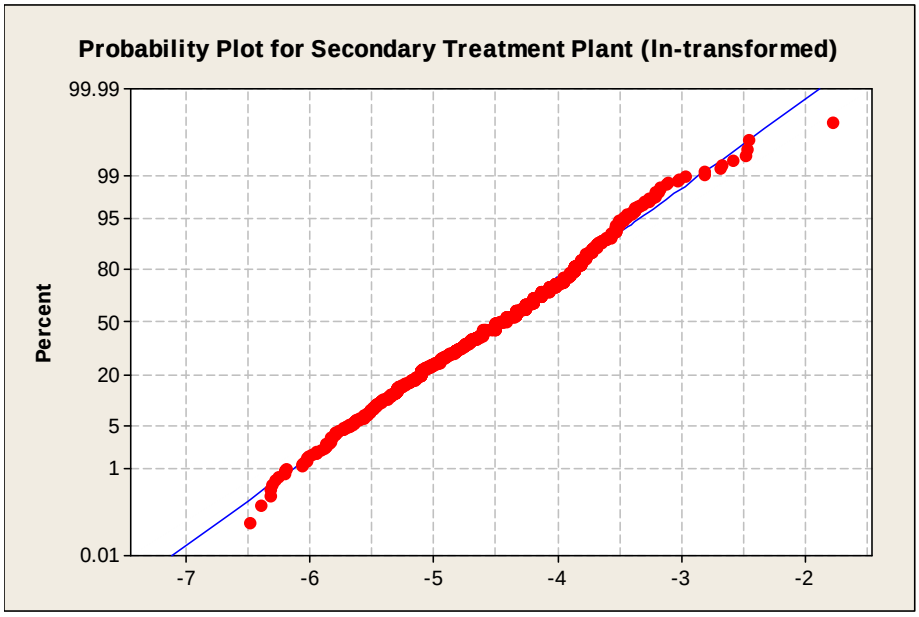
Data Analysis of Municipal Treatment Facilties

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).

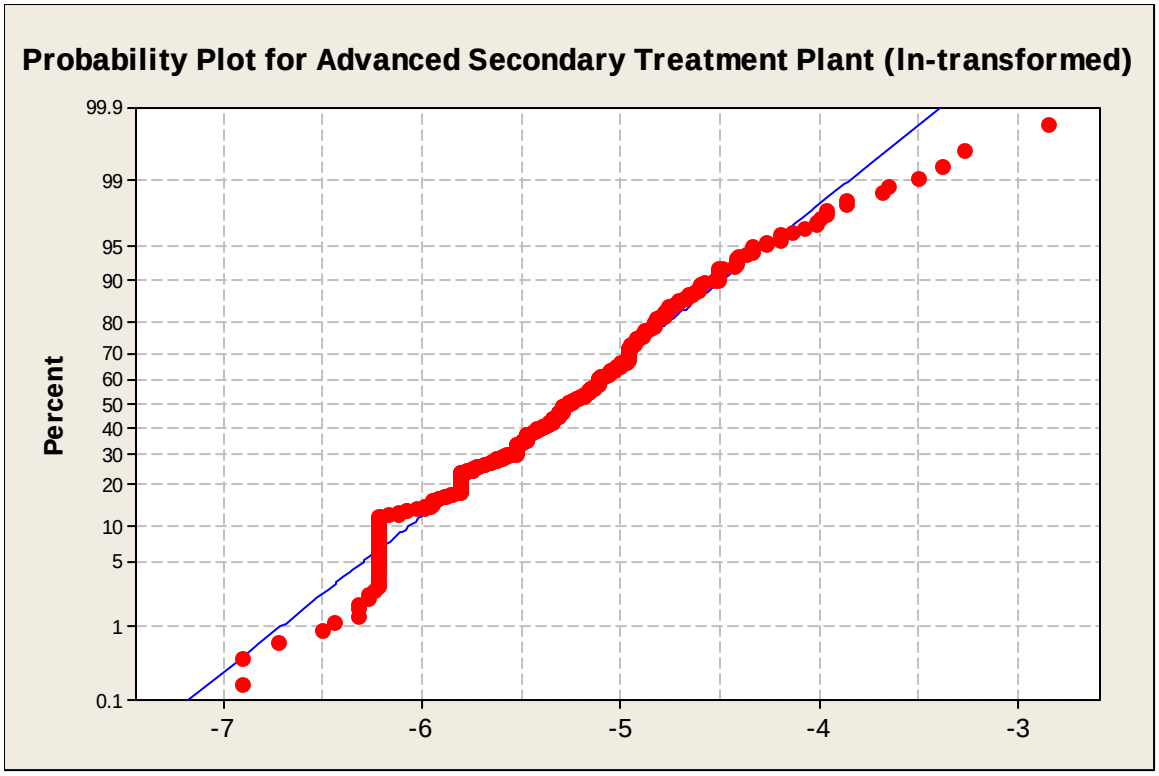
Table 1: Mercury Limits for Secondary Treatment Plants

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

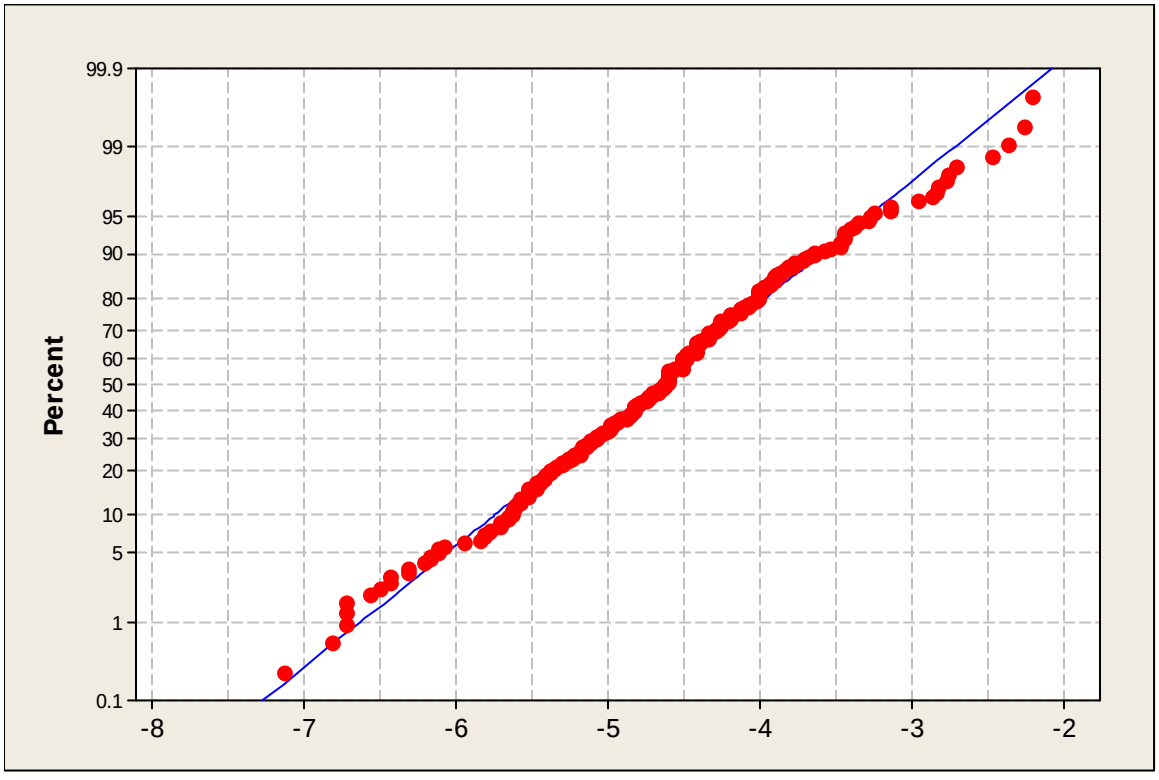
Percentile	Averaging Period	Mercury Limit (ng/L)
99.87th	Daily	35
99.57th	Weekly	27
99.38th	Monthly	25

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 DISCHARGE CHARACTERISTICS IN CONSIDERATION OF MONITORING FREQUENCIES

Discharger	Coefficient of Variation	Baseline Hg Sampling Frequency	2000-2003 Long Term Average (LTA), ug/l	Proposed AMEL (ug/l)	Ratio of LTA to AMEL	USEPA Performance-Based Frequency(1)
Mt. View Sanitary District	0.78	1/month	0.0092	0.025	0.37	1/Q
Petaluma Permit	0.50	1/month	0.0066	0.025	0.26	1/Q
Palo Alto	0.57	1/month	0.0058	0.025	0.23	2/yr
Sunnyvale	0.49	1/month	0.0036	0.025	0.14	2/yr
Fairfield-Suisun Sewer District	0.64	2/month	0.0050	0.025	0.20	1/Q
San Jose & Santa Clara	0.28	1/month	0.0024	0.025	0.10	2/yr
S.F.City & County Southeast, North Point & Bayside	1.22	4/month	0.0136	0.066	0.21	6/yr
Millbrae	0.48	1/month	0.0128	0.066	0.19	2/yr
EBMUD	0.62	1/month	0.0119	0.066	0.18	2/yr
EBDA	0.46	1/month	0.0201	0.066	0.30	1/Q
Delta Diablo Sanitation District	0.33	2/month	0.0131	0.066	0.20	1/Q
Central Marin Sanitation Agency	0.49	1/month	0.0067	0.066	0.10	2/yr
Central Contra Costa	0.27	1/month	0.0265	0.066	0.40	1/Q
Burlingame	0.49	1/month	0.0068	0.066	0.10	2/yr
Benicia, City of	0.71	1/month	0.0129	0.066	0.20	2/yr
Pinole-Hercules	0.95	1/month	0.0092	0.066	0.14	2/yr
San Mateo City, Winter	0.97	1/month	0.0128	0.066	0.19	2/yr
Sausalito-Marin Sanitary District Permit	0.27	1/month	0.0241	0.066	0.36	1/Q
Sewerage Agency of Southern Marin Permit	0.26	1/month	0.0196	0.066	0.30	1/Q
Sonoma Valley Permit	1.41	4/month	0.0062	0.066	0.09	6/yr
South San Francisco & San Bruno	0.49	1/month	0.0138	0.066	0.21	2/yr
Vallejo San & Flood Control District	0.29	1/month	0.0178	0.066	0.27	1/Q
S.F. Airport, Water Quality Control Plant	0.84	1/month	0.0196	0.066	0.30	1/Q
Chevron Richmond Refinery	2.38	1/month	0.0313	0.079	0.40	1/Q
ConocoPhillips (at Rodeo)	2.41	1/month	0.0299	0.079	0.38	1/Q
Martinez Refining Company	2.09	1/month	0.0302	0.079	0.38	1/Q
Tesoro Golden Eagle Refinery	0.92	1/month	0.0063	0.079	0.08	2/yr
Valero Benicia Refinery	0.52	1/month	0.0133	0.079	0.17	2/yr

(1) Interim Guidance for Performance-Based Reductions of NPDES Permit Monitoring Frequencies, USEPA, April 19, 1996.

APPENDIX E - CONDITION ASSESSMENT PHOTOGRAPHS

Corroded Handrails in Headworks

Corroded HVAC Fan in Headworks

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Corroded Plumbing in Influent Pump Station Wet Well

Corroded HVAC Duct in Influent Pump Station Wet Well

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

North End of Grit Basin (note wooden kick plates)

Severe Concrete Corrosion in Grit Basin Influent Well
(Note plywood plate used as isolation device because gates are not functional.)

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Severe Concrete H_2S Corrosion in Grit Basin Wet Well due

Corroded Gates at South End of Grit Basin

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Primary Scum Skimmers Collecting Trash

Primary Scum Skimmer Trash

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Primary Sludge Pump MCC (circa 1960)

Primary Sludge Pump MCC (circa 1960)

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Exposed 4000 Amp Bus from PG&E Transformer to Main Switchgear

Corroded RAS Piping and Valves

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Corroded Clarifier Mechanism Bridge

Secondary Process Control Building
(Note heavy cantilevered parapet and lack of shear walls.)

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Corroded WAS Pump

Corroded WAS Piping and Valve

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

WAS Pump VFDs and Transformers

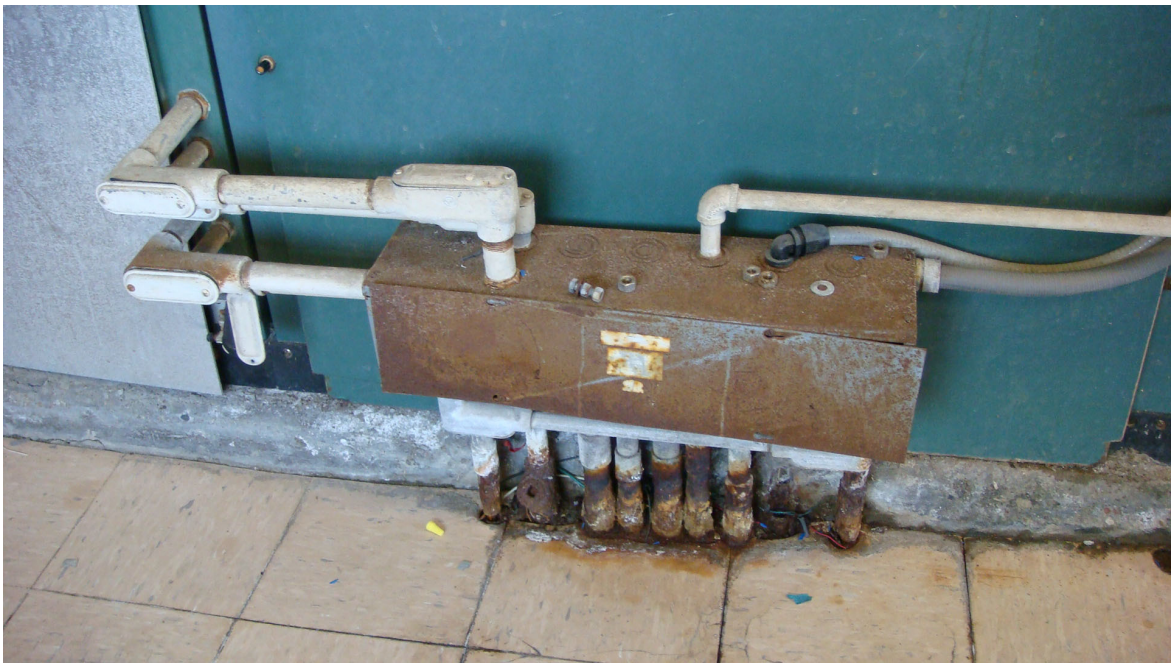
Secondary Process MCC #2

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

Corroded WAS Pump

Suspended Solids in Chlorine Contact Basin

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER



Corroded Electrical Connections in Disinfection Building

DAFT No. 1 MCC

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

DAFT No. 2 MCC

DAFT No. 2 Electrical Panel

Appendix E
CONDITION ASSESSMENT PHOTOS
WASTEWATER TREATMENT MASTER PLAN
CITY OF RICHMOND AND VEOLIA WATER

APPENDIX F - EQUIPMENT LIST

Richmond WWTP Equipment List (w/o solids)

Start Year	2008
Master Plan Horizon	2040
Cost Escalation	3%

Condition Ranking Legend	
1	Excellent
2	Good
3	Fair
4	Poor
5	Inoperable

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	55	25	0	$50,000	Extensive Corrosion on plumbing in wetwell
HVAC	1	5	1953	55	25	0	$250,000	Extensive Corrosion on Fans and Ducts
Motorized Gate Pump No. 1	1	1	2009	0	25	25	$25,000	
Motorized Gate Pump No. 2	1	1	2009	0	25	25	$25,000	
Motorized Gate Pump No. 3	1	1	2009	0	25	25	$25,000	
Motorized Gate Pump No. 4	1	1	2009	0	25	25	$25,000	
East Wetwell Inlet Gate	1	1	2009	0	25	25	$25,000	Could not see condition but is functional
West Wetwell Inlet Gate	1	1	2009	0	25	25	$25,000	Could not see condition but is functional
Influent Pump No. 1 Check Valve	1	3	1953	55	25	0	$17,500	
Influent Pump No. 2 Check Valve	1	3	1953	55	25	0	$17,500	
Influent Pump No. 3 Check Valve	1	3	1953	55	25	0	$17,500	
Influent Pump No. 4 Check Valve	1	3	1953	55	25	0	$17,500	
Skimming Pump No. 1	1	3	1953	55	25	0	$20,000	Skimming Influent pipe is too low
Skimming Pump No. 2	1	3	1953	55	25	0	$20,000	Skimming Influent pipe is too low
Influent Pump No. 1	1	1	2009	0	25	25	$35,000	To be replaced in 2009
Influent Pump No. 2	1	1	2009	0	25	25	$35,000	To be replaced in 2009
Influent Pump No. 3	1	1	2009	0	25	25	$35,000	To be replaced in 2009
Influent Pump No. 4	1	1	2009	0	25	25	$35,000	To be replaced in 2009
Influent Barscreen	1	2	2002	6	25	19	$200,000	
Bar Screen Auger	1	2	2002	6	25	19	$20,000	
Bar Screen Compactor - Cog Rake	1	2	2002	6	25	19	$20,000	
Bar Screen Washing Screw Compactor	1	1	2009	0	25	25	$20,000	
Headworks MCC	2	1	1967	41	20	0	$200,000	Rust and dust. Disconnect at SW mount on front.
Headworks Ductbanks	2	3	1967	41	20	0	$400,000	Condition Unknown
VFD -Influent Pump No. 1	2	1	2009	0	20	20	$50,000	---
VFD -Influent Pump No. 2	2	1	2009	0	20	20	$50,000	---
VFD -Influent Pump No. 3	2	1	2009	0	20	20	$50,000	
VFD -Influent Pump No. 4	2	1	2009	0	20	20	$50,000	
Influent Pump Station Grating/Handrails	3	5	1953	55	40	0	$25,000	Heavy corrosion. Evidence of concrete stair repair
Influent Pump Station Building	3	2	1953	55	60	5	$3,000,000	heavy corrosion - Pipe hanger condition 5.
Pump Hoist	4	3	1953	55	40	0	$25,000	
Influent Pump Station Piping	4	3	1953	55	40	0	$150,000	no flexibility
Bar Screen Crane Hoist-Monorail	4	3	2002	6	40	34	$25,000	
Composite Sampler	6	2	2002	6	15	9	$5,000	
Pre-Bar Screen Level Transmitter	6	2	2002	6	15	9	$5,000	Install date estimated
Post-Bar Screen Level Transmitter	6	2	2002	6	15	9	$5,000	Install date estimated
Headworks PLC	6	2	2009	0	15	15	$25,000	Install date estimated
East Wetwell Level Sensor	6	2	2002	6	15	9	$1,000	Install date estimated
West Wetwell Level Sensor	6	2	2002	6	15	9	$1,000	Install date estimated
						0		
Grit Removal						0		
Gate - Grit Influent (east)	1	5	2010	0	25	25	$25,000	Not Functional
Gate - Grit Influent (west)	1	5	2010	0	25	25	$25,000	Not Functional
Gate - Grit Influent (center/east)	1	5	2010	0	25	25	$25,000	Not Functional (dagger board is used instead)
Gate - Grit Influent (west/center)	1	5	2010	0	25	25	$25,000	Not Functional
Gate - Grit Influent (center)	1	4	2010	0	25	25	$25,000	Functional
Grit Screw Drive (east)	1	3	2010	0	25	25	$10,000	Corroded. Used 4 times per day for 15 minutes
Grit Screw Dive (center)	1	3	2010	0	25	25	$10,000	Corroded. Used 4 times per day for 15 minutes
Grit Screw Drive (west)	1	3	2010	0	25	25	$10,000	Corroded. Used 4 times per day for 15 minutes
Grit Collector (east)	1	3	2010	0	25	25	$20,000	Poor Condition - Large amount of ragging
Grit Collector (center)	1	3	2010	0	25	25	$20,000	Not used - center basin is covered
Grit Collector (west)	1	3	2010	0	25	25	$20,000	Poor Condition - Large amount of ragging
Gate - Grit Effluent (east)	1	4	2010	0	25	25	$25,000	Covered - condition could not be observed
Gate - Grit Effluent (center)	1	4	2010	0	25	25	$25,000	Covered - condition could not be observed
Gate - Grit Effluent (west)	1	4	2010	0	25	25	$25,000	Covered - condition could not be observed
Effluent Splitter Gate	1	4	2010	0	25	25	$25,000	Extensive Corrosion
Gate - Effluent Grit to Primary 1	1	4	2010	0	25	25	$25,000	Extensive Corrosion
Gate - Effluent Grit to Primary 2	1	4	2010	0	25	25	$25,000	Extensive Corrosion
Grit Cross Collector	1	3	2010	0	25	25	$25,000	Covered - condition could not be observed
Grit Removal Ductbanks	2	3	1953	55	20	0	$50,000	Condition Unknown
Grit Removal Structure	3	4	2010	0	40	40	$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	0	40	40	$50,000	---
Grit Piping Group	4	3	2010	0	40	40	$25,000	
Parshall Flume (east)	6	3	2010	0	15	15	$0	Not functional - no LIT
Parshall Flume (center)	6	3	2010	0	15	15	$0	Not functional - no LIT
Parshall Flume (west)	6	3	2010	0	15	15	$0	Not functional - no LIT
HVAC	1	4	2010	0	25	25	$0	Not Observed
						0		
Primary Treatment						0		
Sludge Cross Collector (North)	1	3	2002	6	25	19	$50,000	
Sludge Cross Collector (South)	1	3	2002	6	25	19	$50,000	
Bypass Channel Gate	1	3	1990	18	25	7	$50,000	Superficial Corrosion. Install date estimated
Bypass Channel CI1 Flash Mixer	1	3	1990	18	25	7	$15,000	Install date estimated - Not functional
Primary Sludge Collector (North)	1	3	2002	6	25	19	$150,000	Corrosion on Drive - plywood chain guard
Primary Sludge Collector (South)	1	3	2002	6	25	19	$150,000	Corrosion on Drive - plywood chain guard
Primary Scum Pump (North)	1	2	2002	6	25	19	$20,000	
Primary Scum Pump (South)	1	2	2002	6	25	19	$20,000	
Helical Augur Scum Skimmer (North)	1	2	2002	6	25	19	$20,000	Scum routed to digestors not hopper. Scum consists primarily of trash
Helical Augur Scum Skimmer (South)	1	2	2002	6	25	19	$20,000	Good Condition but poor performance
Primary Scum Collector (North)	1	2	2002	6	25	19	$20,000	
Primary Scum Collector (South)	1	2	2002	6	25	19	$20,000	Good Condition but poor performance
Primary Clarifier MCC	2	2	2002	6	20	14	$135,000	
Primary Treatment Ductbanks	2	3	2002	6	20	14	$110,000	Condition Unknown
Primary Clarifier Grating/Handrails	3	4	2002	6	40	34	$100,000	Grating in condition 4. Guard rain in condition 2.
Primary Clarifier Structure	3	2	1953	55	65	10	$5,000,000	Scum removal box condition 4. H2S damange in scum box - condition 3.
Scum Piping Group	4	3	1967	41	40	0	$40,000	one pinhole leak has been clamped off
Scum Valve Group	4	3	1967	41	40	0	$20,000	
Bypass Channel Flow/Level Sensor	6	2	2005	3	15	12	$1,000	
Primary Scum Level Sensor (North)	6	2	2002	6	15	9	$1,000	
Primary Scum Level Sensor (South)	6	2	2002	6	15	9	$1,000	
Level Sensor in Exit Flume	6	2	2002	6	15	9	$1,000	Install date estimated

Richmond WWTP Equipment List (w/o solids)

Start Year	2008
Master Plan Horizon	2040
Cost Escalation	3%

Condition Ranking Legend	
1	Excellent
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Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
						0		
Aeration Basins						0		
Aerator No. 3A	1	5	1967	41	25	0	$0	Not Functional - No Power
Aerator No. 3B	1	5	1967	41	25	0	$0	Not Functional - No Power
Aerator No. 3C	1	5	1967	41	25	0	$0	Not Functional - No Power
Channel Aeration - Under Grating West of Ba	1	4	1967	41	25	0	$0	Not Functional - Condition Estimated
Channel Aeration - Under Grating btw Basin	1	4	1967	41	25	0	$0	Not Functional - Condition Estimated
Channel Aeration - Under Grating btw Basin	1	4	1967	41	25	0	$0	Not Functional - Condition Estimated
Channel Aeration - Under Grating btw Basin	1	4	1967	41	25	0	$0	Not Functional - Condition Estimated
Distribution Gate 1A	1	5	1967	41	25	0	$15,000	Not Functional
Distribution Gate 1B	1	5	1967	41	25	0	$15,000	Not Functional
Distribution Gate 1C	1	5	1967	41	25	0	$15,000	Not Functional
Distribution Gate 2A	1	5	1967	41	25	0	$15,000	Not Functional
Distribution Gate 2B	1	5	1967	41	25	0	$15,000	Not Functional
Distribution Gate 2C	1	5	1967	41	25	0	$15,000	Not Functional
Distribution Gate 3A	1	5	1967	41	25	0	$0	Not used
Distribution Gate 3B	1	5	1967	41	25	0	$0	Not used
Distribution Gate 3C	1	5	1967	41	25	0	$0	Not used
Distribution Gate 4A	1	5	1967	41	25	0	$0	Not used
Distribution Gate 4B	1	5	1967	41	25	0	$0	Not used
Distribution Gate 4C	1	5	1967	41	25	0	$0	Not used
Effluent Shear Gate 1C	1	3	1967	41	25	0	$25,000	Condition Unknown
Effluent Sheer Gate 2C	1	3	1967	41	25	0	$25,000	Condition Unknown
Effluent Sheet Gate 3C	1	3	1967	41	25	0	$25,000	Condition Unknown
Effluent Sheet Gate 4C	1	3	1967	41	25	0	$25,000	Condition Unknown
Gate between 3/4	1	2	1990	18	25	7	$75,000	Installation Date Unknown
Aerator No. 1A	1	2	2002	6	25	19	$50,000	
Aerator No. 1 B	1	2	2002	6	25	19	$50,000	
Aerator No. 1C	1	2	2002	6	25	19	$50,000	
Aerator No. 2A	1	2	2002	6	25	19	$50,000	
Aerator No. 2B	1	2	2002	6	25	19	$50,000	
Aerator No. 2C	1	2	2002	6	25	19	$50,000	
Aeration Basin Ductbanks	2	3	1967	41	20	0	$50,000	Condition Unknown
Aeration Basins Grating/Handrails	3	3	1967	41	40	0	$100,000	Condition 2 for the grating and SST guardrail. Condition 3 for the galvanized steel grating.
Aeration Basin Structure No. 1	3	2	1967	41	50	9	$1,500,000	Corroded stell pipe support. Mixer platform seismic strength is questionable.
Aeration Basin Structure No. 2	3	2	1967	41	50	9	$1,500,000	Major crack in wall on pipe channel between A and B.
Aeration Basin Structure No. 3	3	2	1967	41	50	9	$1,500,000	Severe corrosion in all tanks.
Aeration Basin Structure No. 4	3	2	1967	41	50	9	$1,500,000	---
RAS Piping - Under/above Grating btw Basir	4	4	1967	41	40	0	$100,000	
RAS Piping - Under/above Grating btw Basir	4	4	1967	41	40	0	$100,000	
RAS Valving - Under/above Grating btw Bas	4	4	1967	41	40	0	$100,000	
RAS Valving - Under/above Grating btw Bas	4	4	1967	41	40	0	$100,000	
DO Probe - Aerator No. 1 B	6	1	2008	0	15	15	$2,500	
DO Probe - Aerator No. 1C	6	1	2008	0	15	15	$2,500	
DO Probe - Aerator No. 2B	6	1	2008	0	15	15	$2,500	
DO Probe - Aerator No. 2C	6	1	2008	0	15	15	$2,500	
						0		
Secondary Clarification						0		
SC1 Influent Channel and Walkway	1	5	1967	41	25	0	$75,000	Extensive Corrosion
SC1 Scum Skimmer	1	3	1967	41	25	0	$25,000	Not working
SC1 Launders	1	3	1967	41	25	0	$50,000	
SC1 Structure	3	2	1967	41	50	9	$1,500,000	Consider mechanism anchorage for guardrail.
SC1 Collector Mechanism	4	4	2003	5	40	35	$200,000	collector mechanism upgraded in 2003
SC1 Piping	4	3	1967	41	40	0	$25,000	
SC2 Influent Channel and Walkway	1	5	1967	41	25	0	$75,000	Extensive Corrosion
SC2 Scum Skimmer	1	3	1967	41	25	0	$25,000	Not working
SC2 Launders	1	3	1967	41	25	0	$50,000	
SC2 Structure	3	2	1967	41	50	9	$1,500,000	Consider mechanism anchorage for guardrail.
SC2 Collector Mechanism	4	4	2003	5	40	35	$200,000	collector mechanism upgraded in 2003
SC2 Piping	4	3	1967	41	40	0	$25,000	
SC3 Scum Skimmer	1	3	1993	15	25	10	$75,000	Corrosion on skimmer
SC3 Launders	1	2	1993	15	25	10	$25,000	
SC3 Influent Channel and Walkway	1	2	1993	15	25	10	$50,000	
SC3 Structure	3	2	1991	17	40	23	$1,500,000	No movement between Abasin and Clarifier 3.
SC3 Collector Mechanism	4	3	1991	17	40	23	$200,000	
SC3 Piping	4	3	1991	17	40	23	$25,000	
						0		
Secondary Process Control Building						0		
RAS Pump No. 1 VFD	2	3	2004	4	20	16	$15,000	
RAS Pump NO. 2 VFD	2	3	2004	4	20	16	$15,000	
RAS Pump NO. 3 VFD	2	3	2004	4	20	16	$15,000	
RAS Pump NO. 4 VFD	2	3	2004	4	20	16	$15,000	
RAS Pump NO. 5 VFD	2	3	2004	4	20	16	$15,000	
RAS Pump NO. 6 VFD	2	3	2004	4	20	16	$15,000	
Aerator 1A VFD	2	2	2004	4	20	16	$15,000	Insufficient light. No ESP and control. No D.S. Install date unknown
Aerator 1B VFD	2	2	2004	4	20	16	$15,000	
Aerator 1C VFD	2	2	2004	4	20	16	$15,000	
Aerator 2A VFD	2	2	2004	4	20	16	$15,000	
Aerator 2B VFD	2	2	2004	4	20	16	$15,000	
Aerator 2C VFD	2	2	2004	4	20	16	$15,000	
Ductbanks	2	3	1967	41	20	0	$250,000	Condition Unknown
Secondary Control Building	3	3	1967	41	40	0	$250,000	Siginificant seismic risk w/ concrete roof. No shear capacity.
Secondary Treatment PLC	6	2	2002	6	15	9	$25,000	Install date estimated
						0		
Secondary Treatment Gallery						0		
Channel Air Blower No. 1	1	5	1967	41	25	0	$0	Not functional
Channel Air Blower No. 2	1	5	1967	41	25	0	$0	Not functional
WAS Pump No. 1	1	4	1967	41	25	0	$20,000	Extensive corrosion on pump exterior
WAS Pump No. 2	1	4	1967	41	25	0	$20,000	Extensive corrosion on pump exterior
WAS Pump No. 3	1	4	1967	41	25	0	$20,000	Extensive corrosion on pump exterior
WAS Pump No. 4	1	4	1992	16	25	9	$20,000	Extensive corrosion on pump exterior
WAS Pump No. 5	1	4	1992	16	25	9	$20,000	Extensive corrosion on pump exterior

Richmond WWTP Equipment List (w/o solids)

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Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
RAS Pump No. 5 (Clarifier 3)	1	3	1992	16	25	9	$25,000	Submersible - Condition Unknown
RAS Pump No. 6 (Clarifier 3)	1	3	1992	16	25	9	$25,000	Submersible - Condition Unknown
RAS Pump No. 1 (Clarifier 1)	1	3	2003	5	25	20	$25,000	Submersible - Condition Unknown
RAS Pump No. 2 (Clarifier 1)	1	3	2003	5	25	20	$25,000	Submersible - Condition Unknown
RAS Pump No. 3 (Clarifier 2)	1	3	2003	5	25	20	$25,000	Submersible - Condition Unknown
RAS Pump No. 4 (Clarifier 2)	1	3	2003	5	25	20	$25,000	Submersible - Condition Unknown
WAS MCC No. 1	2	4	1967	41	20	0	$250,000	Excessive corrosion on bolt cover.
WAS MCC No. 2	2	4	1967	41	20	0	$250,000	
WAS MCC No. 3	2	4	1967	41	20	0	$0	Never installed
WAS Pump No. 1 VFD	2	3	2006	2	20	18	$15,000	Pump vent clogged with oil.
WAS Pump No. 2 VFD	2	3	2006	2	20	18	$15,000	Pump vent clogged with oil.
WAS Pump No. 3 VFD	2	3	2006	2	20	18	$15,000	Install date unknown
WAS Pump No. 4 VFD	2	3	2006	2	20	18	$15,000	Pull box rusted. No bolt cover.
WAS Pump No. 5 VFD	2	3	2006	2	20	18	$15,000	Install date unknown
Transformer	2	3	1990	18	20	2	$0	Install date unknown
Transformer	2	3	1990	18	20	2	$0	Install date unknown
Transformer	2	3	1990	18	20	2	$0	Install date unknown
Transformer	2	3	1990	18	20	2	$0	Install date unknown
Ductbanks	2	3	1967	41	20	0	$400,000	Condition Unknown
RAS Piping - Clarifier 1	4	4	1967	41	40	0	$25,000	
RAS Valves - Clarifier 1	4	4	1967	41	40	0	$25,000	
RAS Piping - Clarifier 2	4	4	1967	41	40	0	$25,000	
RAS Valves - Clarifier 2	4	4	1967	41	40	0	$25,000	
WAS Piping	4	4	1967	41	40	0	$50,000	extensive corrosion
WAS Valves	4	4	1967	41	40	0	$50,000	extensive corrosion
RAS Piping - Clarifier 3	4	3	1991	17	40	23	$25,000	
RAS Valves - Clarifier 3	4	3	1991	17	40	23	$25,000	
RAS Flow Meter - Pumps 1/2	6	3	2002	6	15	9	$5,000	Install date estimated
RAS Flow Meter - Pumps 3/4	6	3	2002	6	15	9	$5,000	Install date estimated
RAS Flow Meter - Pumps 5/6	6	3	1990	18	15	0	$5,000	Install date estimated
WAS Mag Meter No. 1	6	4	1990	18	15	0	$5,000	Install date estimated
						0		
Chlorine Contact Basin						0		
Mixer No. 1	1	3	1978	30	25	0	$10,000	Not used
Mixer No. 2	1	3	1978	30	25	0	$10,000	Not used
Gate 1	1	3	1978	30	25	0	$25,000	
Gate 2	1	3	1978	30	25	0	$25,000	
Gate 3	1	3	1978	30	25	0	$25,000	
Gate 4	1	3	1978	30	25	0	$25,000	
Gate 5	1	3	1978	30	25	0	$25,000	
Gate 6	1	3	1978	30	25	0	$25,000	
Gate 7	1	3	1978	30	25	0	$25,000	
Gate 8	1	3	1978	30	25	0	$25,000	
Gate 9	1	3	1978	30	25	0	$25,000	
Gate 10	1	3	1978	30	25	0	$25,000	
Gate 11	1	3	1978	30	25	0	$25,000	
Gate 12	1	3	1978	30	25	0	$25,000	
Gate 13	1	3	1978	30	25	0	$25,000	
Gate 14	1	3	1978	30	25	0	$25,000	
Gate 15	1	3	1978	30	25	0	$25,000	
Gate 16	1	3	1978	30	25	0	$25,000	
Gate 17	1	3	1978	30	25	0	$25,000	
Bisulfite Mixer	1	3	1978	30	25	0	$0	Not used
Bisulfite Injector	1	3	1978	30	25	0	$10,000	Not Observed
CCB Grating/Handrails	3	3	1978	30	40	10	$100,000	---
Structure - Basin 1	3	2	1978	30	40	10	$1,000,000	---
Structure - Basin 2	3	2	1991	17	40	23	$1,000,000	---
Parshall Flume No. 1	6	4	1978	30	15	0	$1,000	Bubbler System
Parshall Flume No. 2	6	4	1978	30	15	0	$1,000	Bubbler System
Effluent SO3 Analyzer	6	2	2006	2	15	13	$1,000	Install date estimated
						0		
Confluence Structure						0		
Outfall gate	1	4	1978	30	25	0	$0	Not Functional and not used
WCC gate	1	4	1978	30	25	0	$0	Not Functional and not used
Confluence Structure	3	2	1978	30	40	10	$750,000	---
Confluence Structure Grating/Handrails	3	2	1978	30	40	10	$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	30	40	10	$0	not used - no flexibility
Reverse Flow Valves	4	3	1978	30	40	10	$0	not used - no flexibility
Chlorine Analyzer - WCCSD	6	2	2006	2	15	13	$5,000	Install date estimated
Chlorine Analyzer - Combined	6	2	2006	2	15	13	$5,000	Install date estimated
SO2 Analyzer	6	2	2006	2	15	13	$5,000	Install date estimated
						0		
Chemical Tank Farm						0		
Bisulfite Pump No. 1	1	2	2004	4	25	21	$10,000	Install date estimated
Bisulfite Pump No. 2	1	2	2004	4	25	21	$10,000	Install date estimated
Bisulfite Piping	1	2	2004	4	25	21	$10,000	Install date estimated
Bisulfite valves	1	2	2004	4	25	21	$10,000	Install date estimated
Containment Structure	3	2	1990	18	40	22	$100,000	Install date unknown (15-20 years)
Hypo Tank 1	4	3	1992	16	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
Hypo Tank 2	4	3	1992	16	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
Hypo Tank 3	4	3	1992	16	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
Hypo Tank 4	4	3	1992	16	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	16	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	16	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	16	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems

Richmond WWTP Equipment List (w/o solids)

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Master Plan Horizon	2040
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Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
Bisulfite Tank 2	4	3	1992	16	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	16	15	0	$20,000	install date undetermined (15-20 years old) - 3 tanks out of service due to structural problems
						0		
Disinfection Building						0		
Disinfection Building HVAC	1	3	1978	30	25	0	$75,000	Not Observed
Plant Effluent Bubbler - Basin 1	1	3	1978	30	25	0	$1,000	Not Observed
Plant Effluent Bubbler - Basin 2	1	3	1978	30	25	0	$1,000	Not Observed
Hypo Pump No. 1	1	2	2004	4	25	21	$10,000	Install date estimated
Hypo Pump No. 2	1	2	2004	4	25	21	$10,000	Install date estimated
MCC	2	3	1978	30	20	0	$150,000	Excessive panel corrosion. Missing lights and cover. No conduit body cover.
Ductbanks	2	3	1978	30	20	0	$475,000	Condition Unknown
Disinfection Building Structure	3	3	1978	30	40	10	$1,000,000	Potential sesmic risk with precast roof diaphragm.
Chlorine Analyzer-WCCSD	6	2	2006	2	15	13	$1,000	Install date estimated
Turbidity Meter	6	2	2006	2	15	13	$5,000	Install date estimated
Chlorine Analyzer - Pre-CCB	6	2	2006	2	15	13	$1,000	Install date estimated
Chlorine Analyzer - Post-CCB	6	2	2006	2	15	13	$1,000	Install date estimated
Chlorine Analyzer - Final - Richmond	6	2	2006	2	15	13	$1,000	Install date estimated
Final Effluent Sampler - Richmond	6	1	2006	2	15	13	$5,000	
PLC	6	2	2002	6	15	9	$25,000	Install date estimated
						0		
Primary Sludge Pumping						0		
Primary Sludge Pump No. 1	1	3	2007	1	25	24	$15,000	
Primary Sludge Pump No. 2	1	3	2007	1	25	24	$15,000	
Primary Sludge Pump (Spare)	1	3	2007	1	25	24	$15,000	Waiting Rebuild
Primary Sludge MCC	2	4	1953	55	20	0	$150,000	Rust and dust. No cover plate. Excessive corrosion.
Ductbanks	2	3	1953	55	20	0	$200,000	Condition Unknown
Primary Sludge Pump Building	3	3	1953	55	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	55	40	0	$25,000	
Primary Sludge Valve Group	4	4	1953	55	40	0	$50,000	
Primary Sludge Pressure Transmitter	6	3	2002	6	15	9	$1,000	Install date estimated
Primary Sludge Flow Meter	6	3	2002	6	15	9	$5,000	Install date estimated
PLC/Wireless Equipment	6	3	2002	6	15	9	$25,000	Install date estimated
						0		
Sludge Thickening						0		
DAFT #1 Sludge Thickened Sludge Pump #1	1	5	1967	41	25	0	$0	Not used
DAFT #1 Sludge Thickened Sludge Pump #2	1	5	1967	41	25	0	$0	Not used
DAFT #1 Sludge Rake	1	5	1967	41	25	0	$0	Not used
DAFT #1 Recirc Pump No. 1	1	5	1967	41	25	0	$0	Not used
DAFT #1 Recirc Pump No. 2	1	5	1967	41	25	0	$0	Not used
DAFT #1 Air compressor	1	5	1967	41	25	0	$0	Not used
DAFT #1 Skimmer	1	5	1967	41	25	0	$0	Not used
DAFT #1 MCC	2	5	1967	41	20	0	$0	Not operational
DAFT #1 Structure (North)	3	3	1967	41	40	0	$0	Canopy metal roof deck w/ condition 5.
DAFT #1 Grating/Handrails	3	3	1967	41	40	0	$0	---
DAFT #1 Valves	4	5	1967	41	40	0	$0	not in service
DAFT #1 Pressurization Tank	4	5	1967	41	40	0	$0	not in service
DAFT #1 Piping	4	5	1967	41	40	0	$0	not in service
DAFT #1 Level Sensor	6	3	1967	41	15	0	$0	Install date estimated
DAFT #2 Polymer System	1	5	1978	30	25	0	$0	Not used
DAFT #2 Sludge Rake	1	4	1978	30	25	0	$0	only daft in service for last 3 years
DAFT #2 Sludge Thickened Sludge Pump #3	1	3	1978	30	25	0	$0	only daft in service for last 3 years
DAFT #2 Sludge Thickened Sludge Pump #4	1	3	1978	30	25	0	$0	only daft in service for last 3 years
DAFT #2 Recirc Pump No. 1	1	3	1978	30	25	0	$0	only daft in service for last 3 years
DAFT #2 Recirc Pump No. 2	1	3	1978	30	25	0	$0	only daft in service for last 3 years
DAFT #2 Air compressor	1	3	1978	30	25	0	$0	only daft in service for last 3 years
DAFT #2 Recirc Pump No. 2	1	3	1978	30	25	0	$0	only daft in service for last 3 years
DAFT #2 Air compressor	1	3	1978	30	25	0	$0	only daft in service for last 3 years
DAFT #2 Skimmer	1	3	1978	30	25	0	$0	only daft in service for last 3 years
DAFT #2 MCC	2	4	1978	30	20	0	$0	Heavy Corrosion.
DAFT #2 Grating/Handrails	3	5	1978	30	40	10	$0	Steel deck on canopy corrosion w/ Condition 5.Pump base cracked w/ condition 5.
DAFT #2 Structure (South)	3	3	1978	30	40	10	$0	Cracks and spalling at guardrail top.
DAFT #2 Piping	4	3	1978	30	40	10	$0	
DAFT #2 Valves	4	3	1978	30	40	10	$0	
DAFT #2 Pressurization Tank	4	3	1978	30	40	10	$0	
DAFT #2 Level Sensor	6	3	1978	30	15	0	$0	Install date estimated
						0		
Electrical Substation						0		
HVAC	1	3	1967	41	25	0	$25,000	not observed
Automatic Transfer Switch	2	4	1988	20	20	0	$65,000	
Switchgear	2	3	1967	41	20	0	$1,250,000	Bolt cover missing. Some paint removal on front. Minor corrosion.
Bus Duct	2	5	1967	41	20	0	$100,000	Exposed bus - safety hazard
Ductbanks	2	3	1967	41	20	0	$0	Accounted for in other areas
Electrical Substation Building	3	2	1967	41	40	0	$250,000	---
Switchgear	2		1953	55	20	0	$0	Not in service
Old Electrical Substation Building	3	2	1953	55	40	0	$100,000	SW Corner Elec. box hutch deformed. Corrosion of hatch door/deck.
						0		
Standby Generator						0		
Standby Generator HVAC	1	3	1991	17	25	8	$0	not observed
Underground Fuel Tank	1	3	1991	17	25	8	$50,000	not observed
Standby Generator	2	2	1988	20	30	10	$825,000	
Standby Generator Loadbank	2	2	1988	20	30	10	$60,000	not observed
Standby Generator Building	3	2	1988	20	40	20	$250,000	South wall has large openings.
						0		
Bioassay Building						0		
Bioassay HVAC	1	3	1991	17	25	8	$50,000	not observed
Air Compressor	1	3	1991	17	25	8	$0	not used
Bioassay Building	3	3	1953	55	40	0	$500,000	East wall minimal shear capacity. Seismic irregularity.
						0		

Richmond WWTP Equipment List (w/o solids)

Start Year	2008
Master Plan Horizon	2040
Cost Escalation	3%

Condition Ranking Legend	
1	Excellent
2	Good
3	Fair
4	Poor
5	Inoperable

Equipment	Discipline Code	Condition Ranking	Installation Year	Age	Useful Life (years)	Remaining Useful Life (years)	Estimated Replacement Cost	Notes
Admin. and Maintenance Buildings						0		
Admin Building HVAC	1	3	1990	18	25	7	$200,000	Poor performance - Installation data unknow
Admin Building Structure	3	2	1953	55	75	20	$1,500,000	multiple renovations/add-ons
Ductbanks	2	3	1967	41	20	0	$50,000	Condition Unknown
Maintenance Building HVAC (Locker/Lunch I	1	3	1967	41	25	0	$50,000	not observed
Maintenance Building HVAC (Shop)	1	3	1967	41	25	0	$50,000	not observed
Ductbanks	2	3	1967	41	20	0	$50,000	Condition Unknown
Maintenance Building Structure (Locker/Lunc	3	3	1967	41	40	0	$750,000	---
Maintenance Building Structure (Shop)	3	3	1967	41	40	0	$750,000	Shear walls look small for roof size (seismic deficiency)
						0		
Potable Water System						0		
Hydro-Tank	1	3	1995	13	25	12	$20,000	Installation Date Unknown
Air Gap Tank	1	3	1995	13	25	12	$10,000	Installation Date Unknown
Water Booster Pump No. 1	1	3	1995	13	25	12	$20,000	Installation Date Unknown
Water Booster Pump No. 2	1	3	1995	13	25	12	$20,000	Installation Date Unknown
Meter	6	3	1995	13	15	2	$5,000	Install date estimated
Hydro-Tank	1	3	1995	13	25	12	$0	Not Used
Water Booster Pump No. 1	1	3	1995	13	25	12	$0	Not Used
Water Booster Pump No. 2	1	3	1995	13	25	12	$0	Not Used
Ductbanks	2	3	1995	13	20	7	$50,000	condition unknown
Structure	3	3	1995	13	40	27	$100,000	
Meter	6	3	1995	13	15	2	$0	Not used
						0		
3W System						0		
Pump No. 2	1	3	1978	30	25	0	$30,000	Motors are old. Pump seal life is poor.
piping/valves	1	3	1978	30	25	0	$50,000	
Pump No. 1	1	3	2003	5	25	20	$30,000	Motors are old. Pump seal life is poor.
Pump No. 1 VFD	2	2	1988	20	20	0	$15,000	in bioassay building
Pump No. 2 VFD	2	2	1988	20	20	0	$15,000	in bioassay building
3W MCC	2	2	1988	20	20	0	$80,000	in bioassay building
Ductbanks	2	3	1988	20	20	0	$240,000	Condition Unknown
3W Pump Station Structure	3	4	1967	41	40	0	$50,000	Steel frame condition 4.
pH analyzer	6	3	2002	6	15	9	$1,000	Install date estimated
Sampler - Effluent	6	1	2008	0	15	15	$1,000	
Sampler - Combined Effluent	6	1	2008	0	15	15	$1,000	
						0		
Miscellaneous						0		
Fencing	1	4	1978	30	25	0	$100,000	Various - some areas need renovation Install date estimated

APPENDIX G - LISTS OF INDIVIDUAL R&R PROJECTS BY PRIORITY CLASS

R&R Summary - List of Priority 1 Equipment
Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Process	Equipment	Replacement Cost
Headworks	Replace Headworks MCC	$ 200,000
Headworks	Replace Headworks Ductbanks	$ 400,000
Headworks	**Replace HVAC**	**$ 250,000**
Headworks	Replace Influent Pump No. 1 Check Valve	$ 17,500
Headworks	Replace Influent Pump No. 2 Check Valve	$ 17,500
Headworks	Replace Influent Pump No. 3 Check Valve	$ 17,500
Headworks	Replace Influent Pump No. 4 Check Valve	$ 17,500
Headworks	Replace Influent Pump Station Piping	$ 150,000
Headworks	Replace Influent Pump Station Misc Valves	$ 50,000
Aeration Basins	Replace Aeration Basin Ductbanks	$ 50,000
Secondary Clarifier No. 1	Replace SC1 Influent Channel and Walkway	$ 75,000
Secondary Clarifier No. 1	Replace SC1 Piping	$ 25,000
Secondary Clarifier No. 2	Rehabilitate SC2 Influent Channel and Walkway	$ 75,000
Secondary Clarifier No. 2	Replace SC2 Piping	$ 25,000
Secondary Control Building	**Replace Ductbanks**	**$ 250,000**
Secondary Treatment Gallery	**Replace WAS MCC No. 1**	**$ 250,000**
Secondary Treatment Gallery	**Replace WAS MCC No. 2**	**$ 250,000**
Secondary Treatment Gallery	**Replace Ductbanks**	**$ 400,000**
Secondary Treatment Gallery	**Replace MCC**	**$ 150,000**
Disinfection Building	Replace Ductbanks	$ 475,000
Disinfection Building	Replace Disinfection Building HVAC	$ 75,000
Disinfection Building	Replace Plant Effluent Bubbler - Basin 1	$ 1,000
Disinfection Building	Replace Plant Effluent Bubbler - Basin 2	$ 1,000
Primary Sludge Pumping	**Replace Primary Sludge MCC**	**$ 150,000**
Primary Sludge Pumping	**Replace Ductbanks**	**$ 200,000**
Chlorine Contact Basin	Replace Mixer No. 1	$ 10,000
Chlorine Contact Basin	Replace Mixer No. 2	$ 10,000
Chlorine Contact Basin	Replace Bisulfite Injector	$ 10,000
Electrical Substation	Replace HVAC	$ 25,000
Electrical Substation	Replace Automatic Transfer Switch	$ 65,000
Electrical Substation	Replace Switchgear	$ 1,250,000
Electrical Substation	**Replace Bus Duct**	**$ 100,000**
3W Pump Station	Replace Pump No. 1 VFD	$ 15,000
3W Pump Station	Replace Pump No. 2 VFD	$ 15,000
3W Pump Station	Replace 3W MCC	$ 80,000
3W Pump Station	Replace Ductbanks	$ 240,000
3W Pump Station	Replace 3W Pump Station Structure	$ 50,000
3W Pump Station	Replace Pump No. 2	$ 30,000
3W Pump Station	Replace piping/valves	$ 50,000
Administration Building	Replace Ductbanks	$ 50,000

R&R Summary - List of Priority 2 Equipment
Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Process	Equipment	Replacement Cost
Aeration Basins	Distribution Gate 1A	$ 15,000
Aeration Basins	Distribution Gate 1B	$ 15,000
Aeration Basins	Distribution Gate 1C	$ 15,000
Aeration Basins	Distribution Gate 2A	$ 15,000
Aeration Basins	Distribution Gate 2B	$ 15,000
Aeration Basins	Distribution Gate 2C	$ 15,000
Aeration Basins	Effluent Shear Gate 1C	$ 25,000
Aeration Basins	Effluent Sheer Gate 2C	$ 25,000
Aeration Basins	Effluent Sheet Gate 3C	$ 25,000
Aeration Basins	Effluent Sheet Gate 4C	$ 25,000
Aeration Basins	RAS Piping - Under/above Grating btw Basin 1/2	$ 100,000
Aeration Basins	RAS Piping - Under/above Grating btw Basin 3/4	$ 100,000
Aeration Basins	RAS Valving - Under/above Grating btw Basin 1/2	$ 100,000
Aeration Basins	RAS Valving - Under/above Grating btw Basin 3/4	$ 100,000
Aeration Basins	SC1 Scum Skimmer	$ 25,000
Secondary Clarifier No. 1	SC1 Launders	$ 50,000
Secondary Clarifier No. 2	SC2 Scum Skimmer	$ 25,000
Secondary Clarifier No. 2	SC2 Launders	$ 50,000
Secondary Control Building	Secondary Control Building	$ 250,000
Secondary Treatment Gallery	WAS Pump No. 1	$ 20,000
Secondary Treatment Gallery	WAS Pump No. 2	$ 20,000
Secondary Treatment Gallery	WAS Pump No. 3	$ 20,000
Secondary Treatment Gallery	RAS Flow Meter - Pumps 5/6	$ 5,000
Secondary Treatment Gallery	WAS Mag Meter No. 1	$ 5,000
Secondary Treatment Gallery	RAS Piping - Clarifier 1	$ 25,000
Secondary Treatment Gallery	RAS Valves - Clarifier 1	$ 25,000
Secondary Treatment Gallery	RAS Piping - Clarifier 2	$ 25,000
Secondary Treatment Gallery	RAS Valves - Clarifier 2	$ 25,000
Secondary Treatment Gallery	WAS Piping	$ 50,000
Secondary Treatment Gallery	WAS Valves	$ 50,000
Chemical Tank Farm	Hypo Tank 1	$ 20,000
Chemical Tank Farm	Hypo Tank 2	$ 20,000
Chemical Tank Farm	Hypo Tank 3	$ 20,000
Chemical Tank Farm	Hypo Tank 4	$ 20,000
Chemical Tank Farm	Hypo Tank 5	$ 20,000
Chemical Tank Farm	Hypo Tank 6	$ 20,000
Chemical Tank Farm	Bisulfite Tank 1	$ 20,000
Chemical Tank Farm	Bisulfite Tank 2	$ 20,000
Chemical Tank Farm	Bisulfite Tank 3	$ 20,000
Primary Sludge Pumping	Primary Sludge Pump Building	$ 500,000
Primary Sludge Pumping	Primary Sludge Piping	$ 25,000
3W Pump Station	3W Pump Station Structure	$ 50,000
Civil	Fencing	$ 100,000

R&R Summary - List of Priority 3 Equipment
Wastewater Treatment Master Plan
City of Richmond and Veolia Water

Process	Equipment	Replacement Cost
Headworks	Skimming Pump No. 1	$ 20,000
Headworks	Skimming Pump No. 2	$ 20,000
Headworks	Influent Pump Station Grating/Handrails	$ 25,000
Headworks	Influent Pump Station Building	$ 3,000,000
Headworks	Pump Hoist	$ 25,000
Grit Removal	Grit Removal Ductbanks	$ 50,000
Primary Treatment	Scum Piping Group	$ 40,000
Primary Treatment	Scum Valve Group	$ 20,000
Aeration Basins	Aeration Basins Grating/Handrails	$ 100,000
Chlorine Contact Basin	Gate 1	$ 25,000
Chlorine Contact Basin	Gate 2	$ 25,000
Chlorine Contact Basin	Gate 3	$ 25,000
Chlorine Contact Basin	Gate 4	$ 25,000
Chlorine Contact Basin	Gate 5	$ 25,000
Chlorine Contact Basin	Gate 6	$ 25,000
Chlorine Contact Basin	Gate 7	$ 25,000
Chlorine Contact Basin	Gate 8	$ 25,000
Chlorine Contact Basin	Gate 9	$ 25,000
Chlorine Contact Basin	Gate 10	$ 25,000
Chlorine Contact Basin	Gate 11	$ 25,000
Chlorine Contact Basin	Gate 12	$ 25,000
Chlorine Contact Basin	Gate 13	$ 25,000
Chlorine Contact Basin	Gate 14	$ 25,000
Chlorine Contact Basin	Gate 15	$ 25,000
Chlorine Contact Basin	Gate 16	$ 25,000
Chlorine Contact Basin	Gate 17	$ 25,000
Electrical Substation	Electrical Substation Building	$ 250,000
Old Electrical Substation	Old Electrical Substation Building	$ 100,000
1W - EBMUD	Meter	$ 5,000
Bioassay Building	Bioassay Building	$ 500,000
Maintenance Building	Maintenance Building HVAC (Locker/Lunch Rooms)	$ 50,000
Maintenance Building	Maintenance Building HVAC (Shop)	$ 50,000
Maintenance Building	Ductbanks	$ 50,000
Maintenance Building	Maintenance Building Structure (Locker/Lunch Rooms)	$ 750,000
Maintenance Building	Maintenance Building Structure (Shop)	$ 750,000

APPENDIX H - RICHMOND WPCP BAAQMD PERMIT

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, 2009

This document does not permit the holder to violate any District regulation or other law.

John Whitfield
City of Richmond Water Pollution Control
601 Canal Boulevard
Richmond, CA 94804

RECEIVED
APR 07 2008
Marie G Hernandez

Location: 601 Canal Boulevard
Richmond, CA 94804

S#	DESCRIPTION	[Schedule]	PAID
8	STANDBY, Reciprocating Engine, Elect Gen, 3067 in3 displ Standby Generator Emissions at: P2 Stack	[B]	163
9	STANDBY, Coml/Inst Reciprocating Engine, 239 in3 displ, 99 hp Diesel Standby Generator Emissions at: P1 Stack	[B, 263 days]	117
100	CHEM> Sewage, Wastewater treatment plant, Municipal sewage Municipal Wastewater Treatment Plant	[F]	219
110	CHEM> Sewage, Preliminary treatment, Municipal sewage Preliminary Treatment	[G1]	826
120	CHEM> Sewage, Primary treatment, Municipal sewage Primary Treatment	[G1]	826
130	CHEM> Sewage, Secondary treatment, Municipal sewage Secondary Treatment	[F]	199
140	CHEM> Sewage, Secondary clarifiers, Municipal sewage Secondary Clarifiers	[F]	199
150	CHEM> Sewage, Disinfection, Municipal sewage Disinfection	[F]	199

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: 2 Expires: APR 1, 2009

This document does not permit the holder to violate any District regulation or other law.

S#	DESCRIPTION	[Schedule]	PAID
151	CHEM> Sewage, Primary treatment, Municipal sewage		826
	Secondary Treatment - Additional Clarifier	[G1]	
160	CHEM> Sewage, Sludge handling processes, Municipal sewage		826
	Sludge Handling	[G1]	
170	CHEM> Sewage, Digesters, Municipal sewage		826
	Anaerobic Digestors	[G1]	

11 Permit Sources, 0 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

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# 9 subject to Condition ID# 22850
Source# 170 subject to Condition ID# 19952

*** PERMIT CONDITIONS ***

CONDITION ID #19952

S-170: Anaerobic Sludge Digesters

1. All collected digester gas from the Sludge Digesters S-170 shall be combusted at the properly maintained, properly operating Waste Gas Burner A-1. Under no circumstances shall untreated digester gas be vented to the atmosphere. (basis: Regulation 2-1-403)

CONDITION ID #22820

1. The owner/operator shall not exceed 20 hours per year per engine for reliability-related testing. [Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection(e)(4)(G)(1)]

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

*** PERMIT CONDITIONS ***

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(I), (or, Regulation 2-6-501)]

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 unimproved school property.

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(1)] or (e)(2)(B)(2)]

*** PERMIT CONDITIONS ***

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End of Conditions

CONDITION ID #22850

1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing. [Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection(e)(4)(G)(1)]

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).

*** PERMIT CONDITIONS ***

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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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(I), (or, Regulation 2-6-501)]

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, playground, athletic field, or other areas of school property but does not include unimproved school property.

[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(1)] or (e)(2)(B)(2)]

End of Conditions

~~~~~~~~~~ END OF CONDITIONS ~~~~~~~~~~
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Bay Area Air Quality Management District

** SOURCE EMISSIONS **

PLANT # 2482
Apr 3, 2008

S#	Source Description	Annual Average lbs/day PART	ORG	NOx	SO2	CO
8	Standby Generator	.01	0	.19	-	.04
9	Diesel Standby Generator	-	-	.17	-	.01
100	Municipal Wastewater Treatment Plant	-	10	-	-	-
110	Preliminary Treatment	-	-	-	-	-
120	Primary Treatment	-	-	-	-	-
130	Secondary Treatment	-	-	-	-	-
140	Secondary Clarifiers	-	-	-	-	-
150	Disinfection	-	-	-	-	-
151	Secondary Treatment - Additional Clarifier	-	-	-	-	-
160	Sludge Handling	-	-	-	-	-
170	Anaerobic Digestors	-	-	-	-	-
	T O T A L S	.02	10	.36		.05

** PLANT TOTALS FOR EACH EMITTED TOXIC POLLUTANT **

Pollutant Name	Emissions lbs/day
Perchloroethylene	.15
Toluene	.61
Trichloroethylene	.04
Xylene	.37
Chloroform	.80
Methylene chloride	1.36
Dichlorobenzene	.04
Diesel Engine Exhaust Particulate Matter	.02

APPENDIX I - RWQCB STAFF SUMMARY REPORT

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

STAFF SUMMARY REPORT (CS)
MEETING DATE: January 30, 2008

ITEM: 8

SUBJECT: **City of Richmond, Contra Costa County** - Hearing to Consider Mandatory Minimum Penalty for Discharge in Violation of Effluent Limitations

CHRONOLOGY: Mandatory Minimum Penalty Complaint issued September 2004

DISCUSSION: The City violated its NPDES permit's effluent limits sixteen times from December 2005, to August 2007. Fourteen of these violations are subject to an MMP. In November 2007, we issued a complaint to the City assessing $42,000 in mandatory minimum penalties.

The majority of the violations covered by this complaint happened before or during plant upgrades, while others were isolated events.

The minimum penalty is appropriate for these violations, because in each event, the City investigated the causes, made needed plant improvements and modified procedures.

The City signed a waiver to a hearing (see Appendix B), and it has submitted a concept proposal (see Appendix C) for a Supplemental Environmental Project. The project would contribute towards two existing programs (Watershed Project and Kids for the Bay) that educate elementary school students about nonpoint source pollution through workshops, hands-on projects and fieldtrips.

RECOMMEND-ATION: No action is necessary

File Number: 2119.1037 (CS)

Appendices: A. Complaint No. R2-2007-0071
B. Signed Waiver
C. SEP Concept Proposal

APPENDIX A

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

Complaint No. R2-2007-0071

Mandatory Minimum Penalty
In the Matter of
City of Richmond
Richmond, Contra Costa County

Overview

This complaint assesses $42,000 in Mandatory Minimum Penalties (MMPs) to the City of Richmond (hereafter Discharger). The complaint is based on a finding of the Discharger's violations of Waste Discharge Requirements Order No. 01-144 (NPDES No. CA 0038539) from January 2005 to August 2007.

This MMP complaint is issued pursuant to Water Code Sections 13385(h)(1-2), 13385(i) and 13385(l). For a general overview of how MMPs are calculated, please see Attachment 4.

A. Permit at the time of violations

On November 28, 2001, the California Regional Water Quality Control Board (Water Board) adopted Order No. 01-144 for the Discharger, to regulate discharges of waste from its waste water treatment plant.

B. Effluent Limitations

Order No. 01-144 specified the following effluent limitations:

Parameter	Effluent Limit
5-day biochemical oxygen demand (weekly avg)	45 mg/L
Total suspended solids (weekly avg)	45 mg/L
Total suspended solids (monthly avg)	30 mg/L
Oil and grease (daily max)	20 mg/L
Oil and grease (monthly avg)	10 mg/L
Settleable matter (daily max)	0.2 ml/l-hr
Settleable matter (monthly avg)	0.1 ml/l-hr
Total chlorine residual (instantaneous max)	0.0 mg/L
Acute toxicity (11-sample 90th percentile value of not less than 70 percent survival)	$\geq$70

C. Summary of Effluent Limit Violations

During the period between December 3, 2005, and August 27, 2007, the Discharger had sixteen violations of its effluent discharge limits, as detailed in Table 1. These violations were

- One 5-day biochemical oxygen demand weekly average violation
- Three total suspended solids weekly average violations
- Three total suspended solids monthly average violations
- One oil and grease daily maximum violation

- One oil and grease monthly average violation
- Three settleable matter daily maximum violations
- Two settleable matter monthly average violations
- One total chlorine residual instantaneous maximum violation
- One whole effluent acute toxicity violation

D. Water Board Staff's Consideration of Violations

Since June 17, 2002, under contract with the Discharger, Veolia Water Systems has operated the Discharger's wastewater treatment plant. When Veolia took charge of the wastewater treatment plant, most treatment units were in disrepair, ineffective, and in poor operating condition. This caused repeated violations of technology-based effluent limits. Starting in 2002, the Discharger has steadily improved the staffing, supervision, financing, operation, and maintenance of its wastewater treatment plant, investing over $7 million in the purchase and rehabilitation of plant equipment. This is confirmed by USEPA contractor inspections of the treatment plant over the years, with the most recent one in October 15, 2007, during which Water Board Staff was present.

During this inspection, we found the Discharger's wastewater treatment plant to be in good condition. Compared to the findings of the 2001 inspection report, it is clear that the Discharger is steadily improving its plant and operations, and returning to compliance. The Discharger's records and computer program for scheduling repairs were also up to date. The Water Board will continue to keep track of the Discharger's compliance with technology-based limits to determine whether plant capacity issues need to be addressed in the future.

This Complaint covers the sixteen violations from December 2005 to August 2007. Many of the violations happened before or during plant upgrades, while others were isolated events, or events caused by operator errors. Additional details on Water Board Staff's consideration of these violations are in the section that follow. In all, the Discharger took reasonable steps in reaction to each violation and is moving towards compliance. For those reasons, and because of the satisfactory inspection, the minimum penalty is adequate at this time.

2005 Violations

On December 3, 2005, unusual circumstances caused the weekly total suspended solids violation. During that week, the Discharger blended due to high flows, and at the same time, a repaired secondary clarifier was placed on line on its scheduled day—December 1, 2005. This combination hydraulically overloaded the secondary process. The problem was compounded by the receipt of landfill leachate, which at that time, traveled through the same line used for return digester sludge. Because the line was temporarily being used for the leachate, it could not transport the sludge to alleviate the problem until the following day. However, the delay caused a significant amount of total suspended solids in the secondary effluent, causing the violation. After discovering this shortcoming, to prevent reoccurrence, the Discharger installed a new return activated sludge line, and automated the landfill leachate transport system.

On December 24, 2005, and December 31, 2005, two solids violations were caused by a single operator error. Though the sludge level in one clarifier was reaching critical levels, the operator on shift failed to route waste water flows to another clarifier in time to avoid a

slug of solids overflowing from the first clarifier with the treated wastewater. The resulting total suspended solids levels discharged that day were high enough to cause both a weekly average violation and a monthly average violation. To prevent this problem from reoccurring, the Discharger re-trained its operators on wet weather clarifier sludge balance requirements.

2006 Violations

In February 2006, during a heavy rain event, the Discharger discharged oil and grease at a high enough level to violate both the daily maximum and monthly average limits. The heavy rains had likely dislodged a slug of oil and grease, previously stuck in the collection system, and flushed it into the wastewater treatment plant. In response, the Discharger instituted a Fats, Oils, and Grease (FOG) Ordinance to educate its customers on proper FOG disposal practices. The Discharger has not repeated this violation since.

In March 2006, the Discharger collected a grab sample, and discovered that the total settleable solids limit violated its technology-based effluent limits—daily, and monthly. In response, the Discharger ran daily samples of settleable solids throughout the rest of the month. However, no detectable settleable solids were detected in the rest of the samples, and the Discharger could not find an explanation for the two settleable solids violations. This appears to be an isolated event, and for this reason the minimum penalty is appropriate.

Also in March 2006, the Discharger violated the chlorine residual limit. The tank holding the de-chlorinating agent ran dry because the operator failed to check the volume in the tank. The Discharger's Operations and Maintenance Manual requires operators to check the tank at the beginning of each shift. In response, the Discharger re-trained its operators on chemical tank check procedures and has not had another chlorine residual violation since.

In July 2006, the Discharger surmised that a toxic load entered the plant, which slightly impaired the beneficial microorganisms in the secondary aeration basins. This likely caused the low magnitude total suspended solids and 5-day biochemical oxygen demand violations on July 1, 2006.

Then later in August and September 2006, unbeknownst to the Discharger at the time, the microorganism population in the activated sludge still had not returned to normal. In that time period, the Discharger had two settleable solids limit violations, and two total suspended solids limit violations. In addition, one of the secondary clarifiers was out for service throughout the summer, not alleviating the total suspended solids issue. However, as soon as feasibly possible, the Discharger returned the secondary clarifier back into service in October 2006, and since then, the Discharger has not violated the total suspended solids limit.

2007 Violations

The Discharger was violation-free from September 30, 2006, until July 24, 2007, when it violated the total settleable solids limit again. The Plant Operator could not find a plausible cause for the total settleable solids violation. The only unusual event at the time was the cleaning of a chlorine contact basin. As required by its permit, the Discharger immediately increased its monitoring. Although this episode remains unexplained, the plant returned to compliance.

In August 2007, the Discharger violated the acute toxicity limit, most likely because of elevated nitrite levels. The Discharger's plant is not set up to nitrify, but nitrification is a temperature-dependent reaction. In the warm months of June and July, the aeration basins were partially nitrifying, which caused the build-up of nitrite. Suspecting this to be the problem, the Discharger tested for nitrites and found it present within the toxic range for fathead minnow.

To avoid nitrite toxicity in the future, the Discharger developed and is implementing fixed schedules for increased internal monitoring to detect and deter nitrification before it causes toxicity.

E. Assessment of penalties

- **Serious Violations**
  Oil and grease, total settleable solids, and total suspended solids are Group I pollutants. Serious violations for Group I pollutants are those that exceed the limitation by more than 40%. Eight of these violations are serious, and therefore those eight are each subject to a $3,000 MMP.

  Chlorine is a Group II pollutant. Serious violations for Group II pollutants are those that exceed the limitations by more than 20%. The one chlorine violation is serious, and therefore it is subject to a $3,000 MMP.

- **Fourth or greater within running 180-day period**
  MMPs also apply to violations that are the fourth or greater consecutive violation within a running 180-day period. Eleven of the violations fit into this category, and therefore each of the eleven is subject to a $3,000 MMP.

- **Total assessment**
  Violations that meet both the conditions listed above are only subject to one $3,000 penalty, under MMP regulations. Therefore, the total MMP assessment for these violations is $42,000.

- **Suspended MMP Amount**
  Instead of paying the full penalty amount to the State Water Pollution Cleanup and Abatement Account, the Discharger may spend an amount of up to $28,500 on an SEP acceptable to the Executive Officer. Any such amount expended to satisfactorily complete an SEP will be permanently suspended.

THE DISCHARGER IS HEREBY GIVEN NOTICE THAT:

1. The Executive Officer proposes that the Discharger be assessed MMPs in the total amount of $42,000.

2. The Water Board will hold a hearing on this Complaint on January 30, 2008, unless the Discharger waives the right to a hearing by signing the included waiver and checks the appropriate box. By doing so, the Discharger agrees to:

   a) Pay the full penalty as stated above within 30 days after the signed waiver becomes effective, or

   b) Propose an SEP in an amount up to $28,500. Pay the balance of the penalty within 30 days after the signed waiver becomes effective. The sum of the SEP amount and the amount of the fine to be paid to the State Water Pollution Cleanup and Abatement Account shall equal the full penalty as stated above.

3. If the Discharger chooses to propose an SEP, it must submit a preliminary proposal by the close of the public comment period, as stated in the attached public notice, to the Executive Officer for conceptual approval. Any SEP proposal shall also conform to the requirements specified in Section IX of the Water Quality Enforcement Policy, which was adopted by the State Water Resources Control Board on February 19, 2002, and the attached Standard Criteria and Reporting Requirement for Supplemental Environmental Project. If the proposed SEP is not acceptable to the Executive Officer, the Discharger has 30 days from receipt of notice of an unacceptable SEP to either submit a new or revised proposal, or make a payment for the suspended portion of the penalty. All payments, including any money not used for the SEP, must be payable to the State Water Pollution Cleanup and Abatement Account. Regular reports on the SEP implementation shall be provided to the Executive Officer according to a schedule to be determined. The completion report for the SEP shall be submitted to the Executive Officer within 60 days of project completion.

4. The signed waiver will become effective on the day after the public comment period for this Complaint is closed, provided that there are no significant public comments on this Complaint during the public comment period. If there are significant public comments, the Executive Officer may withdraw the Complaint and reissue it as appropriate.

5. If a hearing is held, the Water Board may impose an administrative civil liability in the amount proposed or for a different amount; decline to seek civil liability; or refer the matter to the Attorney General to have a Superior Court consider imposition of a penalty.

Digitally signed by Bruce Wolfe
Date: 2007.11.28 14:37:37 -08'00'

November 28, 2007

Bruce H. Wolfe
Executive Officer

Attachments: 1 – Waiver
2 – Table 1: Violations
3 – Standard Criteria and Reporting Requirements for Supplemental Environmental Project
4 – General Overview of MMP Calculations

Item Number	Date of Violation	Effluent Limitation Described - E001	Permit Limit	Reported Value	Type of Violation[1]	Penalty	Start of 180 days[2]
1	3-Dec-05	E-001 D-2 (Richmond) Total suspended solids eff weekly mg/l	Max 45	58.91	C1		6-Jun-05
2	24-Dec-05	E-001 D-2 (Richmond) Total suspended solids eff weekly mg/l	Max 45	71.06	C2 (also S)	$3,000	27-Jun-05
3	31-Dec-05	E-001 D-2 (Richmond) Total suspended solids eff monthly mg/l	Max 30	45.14	C3 (also S)	$3,000	4-Jul-05
4	27-Feb-06	E-001 D-2 (Richmond) Oil and grease eff daily mg/l	Max 20	23.00	C4	$3,000	31-Aug-05
5	28-Feb-06	E-001 D-2 (Richmond) Oil and grease eff monthly mg/l	Max 10	14.00	C5 (also S)	$3,000	1-Sep-05
6	14-Mar-06	E-001 D-2 (Richmond) Total settleable solids eff daily ml/l-hr	Max .2	1.50	C6 (also S)	$3,000	15-Sep-05
7	15-Mar-06	E-001 DC (Combined) Chlorine residual eff instantaneous max mg/l	Max 0	2.25	C7 (also S)	$3,000	16-Sep-05
8	31-Mar-06	E-001 D-2 (Richmond) Total Settleable Solids Eff Monthly ml/l-hr	Max. 0.1	0.20	C8 (also S)	$3,000	2-Oct-05
9	1-Jul-06	E-001 D-2 (Richmond) Biochemical Oxygen Demand 5 Day Eff Weekly mg/l	Max 45	54.33	C6	$3,000	2-Jan-06
10	1-Jul-06	E-001 D-2 (Richmond) Total suspended solids eff weekly mg/l	Max 45	47.37	C7	$3,000	2-Jan-06
11	29-Aug-06	E-001 D-2 (Richmond) Total Settleable Solids Eff Daily ml/l-hr	Max 0.2	1.20	C6 (also S)	$3,000	2-Mar-06
12	31-Aug-06	E-001 D-2 (Richmond) Total Suspended Solids Eff Monthly mg/l	Max 30	30.78	C7	$3,000	4-Mar-06
13	31-Aug-06	E-001 D-2 (Richmond)Total Settleable Solids Eff Monthly ml/l-hr	Max 0.1	1.20	C8 (also S)	$3,000	4-Mar-06
14	30-Sep-06	E-001 D-2 (Richmond)Total Suspended Solids Eff Monthly mg/l	Max 30	32.32	C6	$3,000	3-Apr-06
15	24-Jul-07	E-001 D-2 (Richmond) Total Settleable Solids Eff Daily ml/l-hr	Max 0.2	0.3	C1 (also S)	$3,000	25-Jan-07
16	27-Aug-07	E-001 DC (combined) Test1 specie eff 11samp 90th percentile, %survival	Min 70	40	C2		28-Feb-07
		Total Penalty Amount				$42,000	

[1] C = Chronic – The number that follows represents the number of chronic violations in the past 180 days; S = Serious.

[2] This column documents the start date for assessing chronic violations. As indicated in Finding No. 4, Water Code Section 13385(i) requires the Water Board to assess a mandatory penalty of three thousand dollars ($3,000) for each violation, not counting the first three violations if the Discharger violates an effluent limit four or more times in any six consecutive months.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
JANUARY 2004, updated AUGUST 2007

STANDARD CRITERIA AND REPORTING REQUIREMENT FOR SUPPLEMENTAL ENVIRONMENTAL PROJECT

A. BASIS AND PURPOSE

The San Francisco Bay Regional Water Quality Control Board (Water Board) accepts and encourages Supplemental Environmental Projects (SEP) in lieu of a portion of the ACL imposed on Dischargers in the Bay Area.

The Water Board does not select projects for SEP; rather, the Discharger identifies a project it would like to fund and then obtains approval from the Water Board's Executive Officer. The Water Board facilitates the process by maintaining a list of possible projects, which is made available to Dischargers interested in pursuing the SEP option. This list is available on the Water Board web site:

http://www.waterboards.ca.gov/sanfranciscobay/

Dischargers are not required to select a project from this list. Dischargers may contact local governments or public interest groups for potential projects in their area, or develop projects of their own.

B. GENERAL SEP QUALIFICATION CRITERIA

All SEPs approved by the Water Board must satisfy the following general criteria:

(a) An SEP shall only consist of measures that go above and beyond all legal obligations of the Discharger (including those from other agencies). For example, sewage pump stations should have appropriate reliability features to minimize the occurrence of sewage spills in that particular collection system. The installation of these reliability features following a pump station spill would not qualify as an SEP.

(b) The SEP should benefit or study groundwater or surface water quality or quantity, and the beneficial uses of waters of the State. SEPs in the following categories have received approval from the Water Board's Executive Officer:

- Pollution prevention. These are projects designed to reduce the amount of pollutants being discharged to either sewer systems or to storm drains. Examples include improved industrial processes that reduce production of pollutants or improved spill prevention programs.
- Pollution reduction. These are projects that reduce the amounts of pollution being discharged to the environment from treatment facilities. An example is a program to recycle treated wastewaters.
- Environmental restoration. These projects either restore or create natural environments. Typical examples are wetland restoration or planting of stream bank vegetation.
- Environmental education. These projects involve funding environmental education programs in schools (or for teachers) or for the general public.

Further, an SEP should be located near the Discharger, in the same local watershed, unless the project is of region-wide importance.

C. APPROVAL PROCESS

The following information shall be submitted to the Executive Officer for approval of an SEP:

1. Name of the organization and contact person, with phone number.
2. Name and location of the project, including watershed (creek, river, bay) where it is located.
3. A detailed description of the proposed project, including proposed activities, time schedules, success criteria, other parties involved, monitoring program where applicable, and any other pertinent information.
4. General cost of the project.
5. Outline milestones and expected completion date.

Generally SEP proposals are submitted along with waivers of hearings. In such a case the approval of a proposal will not become effective until the waiver goes into effect, i.e. at the close of the public comment period. There will not be a public hearing on the SEP proposal unless new and significant information becomes available after the close of the public comment period that could not have been presented during the comment period.

If the Discharger needs additional time to prepare an SEP it may waive its right to a hearing within 30 days of the issuance of a Complaint (and retain its right to a hearing to contest the Complaint at a later date), and request additional time to prepare an SEP proposal. Any such time extension needs to be approved by Water Board staff.

D. REPORTING REQUIREMENT

On January 15 and July 15 of each year, progress reports shall be filed for the SEPs with expected completion date beyond 240 days after the issuance of the corresponding complaint.

E. FINAL NOTIFICATION

No later than 60 days after completion of the approved SEP, a final notification shall be filed. The final notification shall include the following information:

- Outline completed tasks and goals;
- Summary of all expenses with proof of payment; and
- Overall evaluation of the SEP.

F. THIRD PARTY PROJECT OVERSIGHT

For SEPs of more than $9,000 the Water Board requires there to be third party oversight of the project. The Water Board has made arrangements with the San Francisco Estuary Project to provide this oversight, or a Discharger may choose an alternative third party acceptable to the Executive Officer. If the San Francisco Estuary Project is chosen, six per cent of the SEP funds shall be directed to the San Francisco Estuary Project for oversight services (the remaining 94% of funds go directly to the SEP). If an alternative third party is chosen, the amount of funds directed to the SEP, as opposed to oversight, shall not be less than 94% of the total SEP funding. For projects greater than $9,000 the Discharger shall indicate when submitting the information required under C. above whether the San Francisco Estuary Project or an alternative third party oversight entity will be used.

General Overview of Mandatory Minimum Penalty (MMP) Calculations

The Water Board is required by State law to assess MMPs for certain types of permit violations from point-source facilities. These complaints are issued by the Water Board Executive Officer, and the MMPs are finalized in a public hearing before the Water Board, unless the Discharger decides to waive their right to the hearing. This is an overview of the general process for determining which violations are subject to MMPs, the amount of penalty the complaint will assess, and the portion of the penalty the Discharger may apply towards an environmental project. This procedure is the same for all facilities to which the MMP laws apply.

I. **State law requires a $3,000 minimum penalty for all serious violations, and requires a $3,000 penalty for any sort of violation, if it is the 4th or greater violation within a running 6-month period.**
Even though a specific violation may fit into both of the above categories, under the MMP laws, any one violation may only be assessed $3,000.

A. **State law requires a penalty for serious violations.**
The Water Board must assess an MMP of $3,000 for each serious violation, per Water Code Section 13385(h)(1). A "serious violation" is defined as any waste discharge of a Group I pollutant that exceeds the effluent limitation contained in the applicable waste discharge requirements by 40 percent or more, or any waste discharge of a Group II pollutant that exceeds the effluent limitation by 20 percent or more, per Water Code Section 13385(h)(2). Pollutants are assigned to Group I or Group II by federal regulations, and the MMP complaint specifies to which group each violation belongs. The full lists of Group I and Group II violations are defined in Section 123.45 of Title 40 of the Code of Federal Regulations. Additionally, the late submittal (by 30 days or more) of monitoring reports is also considered a serious violation, per Water Code Section 13385.1. Each full 30-day increment a report is late counts as a violation.

B. **State law requires a penalty for 4th or higher violation within last six months.**
The Water Board must assess an MMP of $3,000 for each violation, in a running six-month period, per Water Code Section 13385(i), if the Discharger does any of the following **four or more times**:
   1. Violates a waste discharge requirement effluent limitation.
   2. Fails to file a report pursuant to Section 13260.
   3. Files an incomplete report pursuant to Section 13260.
   4. Violates a toxicity discharge limitation contained in the applicable waste discharge requirements where the waste discharge requirements do not contain pollutant-specific effluent limitations for toxic pollutants.

The first three violations (meeting any of 1-4 above) occurring within a six month period do not trigger the $3,000 penalty. Also, the running six-month period is counted backwards from each individual violation considered. For example, to determine whether a violation that occurred

on August 1st was subject to a penalty, you would count how many other violations had occurred since February 1st of the same year. If there had been at least three other violations in that period, the August 1st violation would be subject to a $3,000 penalty.

C. State law limits the amount of the penalty that may be applied toward an environmental project (or to multiple projects).

If the Water Board agrees, the Discharger may choose to direct a portion of the penalty amount to fund a supplemental environmental project (SEP) in accordance with the enforcement policy of the State Water Resources Control Board, per Water Code Section 13385(l). The Discharger may undertake an SEP up to the full amount of the penalty for liabilities less than or equal to $15,000. If the penalty amount exceeds $15,000, the maximum penalty amount that may be expended on an SEP may not exceed $15,000 plus 50 percent of the penalty amount that exceeds $15,000.

D. A supplemental environmental project (SEP) must be within certain categories.

If the Discharger chooses to propose an SEP, the proposed SEP shall be in the following categories:

1. Pollution prevention
2. Pollution reduction
3. Environmental clean-up or restoration
4. Environmental education

APPENDIX B

WAIVER

If you waive your right to a hearing, the matter will be included on the agenda of a Water Board meeting but there will be no hearing on the matter, unless a) the Water Board staff receives significant public comment during the comment period, or b) the Water Board determines it will hold a hearing because it finds that new and significant information has been presented at the meeting that could not have been submitted during the public comment period. If you waive your right to a hearing but the Water Board holds a hearing under either of the above circumstances, you will have a right to testify at the hearing notwithstanding your waiver. Your waiver is due no later than December 30, 2007.

☐ Waiver of the right to a hearing and agreement to make payment in full.
By checking the box, I agree to waive my right to a hearing before the Water Board with regard to the violations alleged in Complaint No. R2-2007-0071 and to remit the full penalty payment to the State Water Pollution Cleanup and Abatement Account, c/o Regional Water Quality Control Board at 1515 Clay Street, Oakland, CA 94612, within 30 days after the Water Board meeting for which this matter is placed on the agenda. I understand that I am giving up my right to be heard, and to argue against the allegations made by the Executive Officer in this Complaint, and against the imposition of, or the amount of, the civil liability proposed unless the Water Board holds a hearing under either of the circumstances described above. If the Water Board holds such a hearing and imposes a civil liability, such amount shall be due 30 days from the date the Water Board adopts the order imposing the liability.

☒ Waiver of right to a hearing and agree to make payment and undertake an SEP.
By checking the box, I agree to waive my right to a hearing before the Water Board with regard to the violations alleged in Complaint No. R2-2007-0071, and to complete a supplemental environmental project (SEP) in lieu of the suspended liability up to $28,500 and paying the balance of the fine to the State Water Pollution Cleanup and Abatement Account (CAA) within 30 days after the Water Board meeting for which this matter is placed on the agenda. The SEP proposal shall be submitted no later than December 30, 2007. I understand that the SEP proposal shall conform to the requirements specified in Section IX of the Water Quality Enforcement Policy, which was adopted by the State Water Resources Control Board on February 19, 2002, and be subject to approval by the Executive Officer. If the SEP proposal, or its revised version, is not acceptable to the Executive Officer, I agree to pay the suspended penalty amount within 30 days of the date of the letter from the Executive Officer rejecting the proposed/revised SEP. I also understand that I am giving up my right to argue against the allegations made by the Executive Officer in the Complaint, and against the imposition of, or the amount of, the civil liability proposed unless the Water Board holds a hearing under either of the circumstances described above. If the Water Board holds such a hearing and imposes a civil liability, such amount shall be due 30 days from the date the Water Board adopts the order imposing the liability. I further agree to satisfactorily complete the approved SEP within a time schedule set by the Executive Officer. I understand failure to adequately complete the approved SEP will require immediate payment of the suspended liability to the CAA.

RICHARD DAVIDSON	Richard Davidson
Name (print)	Signature
12/27/2007	CITY OF RICHMOND
Date	Title/Organization

APPENDIX C

Printed on Recycled Paper

DEC 31 2007

City of Richmond

ENGINEERING DIVISION

December 28, 2007

Carolina Silva
California Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

RE: MMP Complaint No.R2-2007-0071 NDPES Permit Number: CA0038539

Dear Ms. Silva:

Enclosed you will find the City of Richmond's request for "Waiver of right to a hearing and agree to make payment and undertake SEP".

Under the "Standard Criteria and Reporting Requirement for Supplemental Environmental Project", the City of Richmond respectfully requests the Board's approval under the Environmental Education category. There are two educational groups that the City of Richmond is working with regarding environmental projects. Enclosed are program highlights for both projects.

The first group is the Watershed Project, or "Kids Win Program". Their program cost is $5,000 per school. We are proposing to visit two schools for a total of $10,000.

The second program is "Kids for the Bay". They, too, visit classrooms, plan field trips, educate both students and staff through their "Watershed Action Program" (WAP). The cost for this program is $8,000 per school. The City of Richmond is proposing projects for 2 schools, for a total of $16,000.

This would bring the grand total of the SEP cost to $26,000. The remainder of the penalties ($16,000) would be paid directly to the Board.

If you should have any questions regarding this proposal or the contents of this letter, please contact me. I can be reached at (510) 621-1269.

Regards,

Mary Phelps

Mary L. Phelps
Senior Industrial Waste Inspector
City of Richmond

Copies: EJ Shalaby, West County Agency
Jon Whitfield, Veolia Water North America
Rich Davidson, City of Richmond

1401 MARINA WAY SOUTH, RICHMOND, CA 94804

Telephone: (510) 307-8091
Fax: (510) 307-8116

KIDS for the BAY
Environmental education through action

A Project of Earth Island Institute
1771 Alcatraz Avenue, Berkeley, CA 94703
Tel: (510) 985-1602 • Fax: (510) 547-4259
info@kidsforthebay.org • www.kidsforthebay.org
Mandi Billinge, Executive Director/Founder

July 12, 2007

Lynne Scarpa
Industrial Waste Inspector
City of Richmond
1401 Marina Way South
Richmond, CA 94804

Dear Lynne,

KIDS for the BAY (KftB) has finished another exciting year of delivering, hands-on, experiential learning through the Watershed Action Program (WAP) in schools throughout Contra Costa County. In the WAP, each class participated in five interactive classroom workshops; at least one action project; and a fieldtrip to a creek, bay or wetland habitat. Students learned their place in the watershed and chose how they would take action to help clean up and restore their local environment. This Final Report provides highlights of the fieldtrips and action projects completed in Antioch during the 2006-2007 school year.

Creek and Bay Fieldtrip Descriptions
The fieldtrips have given students and teachers a direct, hands-on experience in a natural watershed habitat. In addition to learning the science of the habitat, students made real connections with nature and developed further reasons to protect and care for their watershed. The Program Director met the class at the fieldtrip site and led activities with students and modeled them for the teacher. Students used scientific equipment and field guides to investigate the many organisms that inhabit the creek, bay or delta habitat they studied.

Local Watershed Action Project Description
Students had the opportunity to develop their leadership skills by completing an action project in their local watershed environment. Students selected their own project, as a class, and took action to bring the classroom workshops to the community. Action Projects empowered students to make immediate impacts on their environment.

Action Project & Fieldtrip Highlights:

School: Nystrom Elementary
Teachers: Benda-Pace and Alvin Kemmer
Action Project: Neighborhood Clean up

Students from Ms. Benda-Pace's class performed a two-hour clean up of their neighborhood. The class divided into four groups, picked up trash along the streets

around Nystrom Elementary and collected over fifteen large garbage bags of trash. The students were amazed at how much trash they found within about ten blocks. Along their clean up, many neighbors peered through their windows, asking the students what they were doing. "Thanks for cleaning up our neighborhood, we really need it!" exclaimed one lady. In addition to picking up trash along the sidewalks, the students also picked up trash in the neighboring park. Some students used reaching tools to pull out trash in the storm drains. As they cleaned the neighborhood, many of the students commented on the affects of the garbage on the environment. Even though it had been four months since the classroom workshops, the students were easily able to connect that the garbage in the streets would eventually get into the San Francisco Bay and Pacific Ocean. "Oh, I found two batteries! The battery acid could get into and make the fish and us sick!" stated Paola. "Look at all these cigarettes! They make people and all the birds around here sick. I wish people would put them in the trash," exclaimed Travon.

During the activity, students were shocked and concerned to see a large amount of soap in the street. "Someone must have been washing their car! This is going to hurt the animals in the Bay!" exclaimed the students. Some of the students were so upset that they stood watching the soap for a few minutes, trying to figure out what they could do to stop it from getting into the Bay. Program Director Kristina Cervantes consoled the students and told them that they could remind their family and friends to wash their cars at the car wash instead of the street.

Before the activity, Ms. Cervantes met with Nystrom Elementary Principal Wendy Holmes. Principal Holmes was very excited to hear that her students were "taking charge to clean up the neighborhood."

School: Washington Elementary
Teacher: Dionne Libran
Action Project: School Presentations

Ms. Libran's students decided to do presentations about their watershed to their first grade buddy class. The students were divided into five groups with each responsible for teaching one lesson of the WAP program. The presentation lasted for thirty minutes and between each segment students' questions were taken. Students also provided the class with alternatives to urban runoff pollution and harmful pesticides.

Ms. Libran shared that many of her students and the first graders were inspired to clean up their school environment as a result of the project. They picked up trash after lunch and said, "Look Ms. Libran, we are getting rid of this garbage!" and "Ms. Libran, this stuff should go in the recycling bin or else a sea animal could get hurt!" "The cooperation between both classes has been great," stated Ms. Libran.

School: Nystrom Elementary
Teachers: Benda-Pace and Alvin Kemmer
Fieldtrip: Vincent Park at the Richmond Regional Shoreline

On May 23rd, Ms. Benda-Pace's class went to Vincent Park located along the Richmond Regional Shoreline. During their fieldtrip, the students investigated the shoreline habitats and organisms. In the first part of the fieldtrip, the students rotated between three science stations. In the first station, the students gathered plankton from the harbor using a plankton net. Next the students used microscopes to observe and identify the plankton. Many of the students were amazed at the abundant life they discovered in their own bay waters. "I never knew that there were so many plants and animals in one drop of water!" exclaimed Marisa. "Now I know that doing our clean up and bringing good to the environment will also help all of the plankton too!" stated another student.

In the second science station, the students used binoculars to complete the Richmond Binocular Bingo worksheet. For the activity, the students had to locate various geographic locations, landmarks and wildlife. Many of the locations and organisms on the list allowed students to use the knowledge they had gained from the Watershed Action Program classroom workshops. For example, the students used their binoculars to locate the various bridges and islands in the central San Francisco Bay.

In the third science station, the students created pastel drawings of the landscape. Students were able to create personal, visual interpretations of the habitat and reflect on their experiences at the Shoreline. This activity allowed students to take a memory of the fieldtrip home with them.

Students also investigated the rocky shoreline habitat. They learned that the organisms in this habitat have adapted to survive in and out of water. The students were excited to learn that Purple Shore Crabs and beach hoppers could survive by hiding under rocks! In addition to finding crabs, barnacles, pile worms and mussels, the students found two dead bat rays along the shore. Many of the students were distraught by their discovery; however it lead to an important discussion about how the animals could have died. Some of the students stated that they could have been killed by garbage that made its way down the storm drains; others speculated that chemicals from the nearby factories and refineries could have killed them.

During the closing discussion, many of the students expressed that they were excited to return to the shoreline with their families. Vincent Park is located within walking distance of many of the students' homes. "I will show my dad how to hold a crab so that you don't hurt it. I will remember to put the rocks back where I found them and be a good visitor to the environment" shared Victor.

Unfortunately, Alvin Kemmer's class was not able to complete an action project or attend a fieldtrip with the KIDS for the BAY due to unforeseen circumstances beyond the control of KftB.

School: Washington Elementary
Teacher: Dionne Libran
Fieldtrip: Alvarado Park

The opportunity to observe creek life under a microscope enabled the students to learn about creek organisms and how they are affected by pollution in more detail. For example, after Program Coordinator Leslie Parra described the two life stages of several organisms, many made the connection of how larvae would be primarily affected by pollution in the creek. One student, Ricky shared with the class, "Larvae are baby insects, and so if they don't get a healthy environment to grow up in, they could die from pollution or grow with mutations."

Ms. Libran commented that her students truly enjoyed the opportunity to do a creek investigation. Many had never been in such an environment. "As a result, more than half have developed a new appreciation for a healthy environment," she said.

Included in this packet, you will also find photographs from the fieldtrips and action projects and sample teacher evaluations. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Mandi J. Billinge

Mandi Billinge
Executive Director

Final Report for the City of Richmond
Richmond Kids Watershed Institute
Fiscal Year 2006-07

PROJECT DESCRIPTION

In Fiscal Year 2006-2007, the Watershed Project received funding from the City of Richmond to develop and administer the *Richmond Kids Watershed Institute (Richmond WIn)* program at Washington Elementary School. The emphasis or the Richmond Kids WIn program is educating students in Richmond about their watersheds and encouraging them to be stewards of their local resources.

The following report summarizes the content and results of this program, as well as provides detailed descriptions of project components.

PROGRAM SUMMARY

The Watershed Project provided a four-part series of classroom visits to all second-graders at Washington Elementary in the winter and spring of 2006 - 2007. A total of 70 2nd grade students from Washington participated in the program.

The goals of the program were to teach students:

- the importance of creeks and watersheds
- about the issue of urban runoff pollution
- that specific actions that they and their families take, such as litter abatement and recycling, are positive for their community and reduce pollution of our creeks and the environment.

The Kids WIn program was a series of four classes with each of the 2nd grade classrooms at Washington. The program covered the causes and effects of stormwater pollution and the differences between sanitary sewer and storm drain system. Students learned simple things that they and their communities can do to protect their creeks and watershed, and developed outreach materials to use to educate others in their community.

During the program, students participated in the following activities:

1. Watershed in Your Hand
   Using recycled materials, students created a miniature landscape. They drew water in the areas, hillsides in high areas and human development throughout the landscape. Students then rained on their landscapes, observing how rain water carries urban run-off, as well as eroded natural materials down hillsides and into waterways.

2. Pollution Soup
   This activity enabled students to visualize the common ways that pollution enters our waterways. Students added colored water and other common materials to a jar of water that represented the creek. The students were required to create a story as to how these pollutants ended up in the creek. At the end of the activity, students discussed the impact of urban runoff and non-point source

pollution on the watershed, and talked about simple things they could do to prevent storm water pollution.

3. **Watershed Model**
   Interacting with a realistic watershed model, students were able to see how a variety of pollutants flow into storm drains and out to the bay. They were also able to see how water flows from within the sanitary sewer system to the Waste Water Treatment Plant.

4. **Storm Drain Mapping**
   Students used maps to locate and count the storm drains around their school, as well as other significant local landmarks. Then they counted the number of blocks between their school and the bay in preparation for the walking trip to the stormdrain outflow.

5. **Walking Trip to Storm Drain Outflow**
   Students walked to the bay while locating the stormdrains they identified on the map during the previous in-class visit. At the bay, students learned to use binoculars to observe wildlife. Students also observed the stormdrain discharge and the immediate effects of pollutants on the area around the stormdrain outflow pipe.

6. **Getting the Word Out**
   Based on what they learned, students created posters that helped to educate others in their school about the importance of reducing pollution and keeping our stormdrains clean.

The following chart outlines the dates, classrooms and activities for each program day.

Richmond Kids Watershed Institute
Spring 2006 Schedule of Programs

	Visit 1 Watershed in Your Hand and Pollution Soup		Visit 2 Storm Drain Mapping and WS Model		Visit 3 Storm Drain Walking Trip		Visit 4 Outreach Project	
Teacher	Date	Time	Date	Time	Date	Time	Date	Time
Ms. Clark	1/12/07	1:00	2/09/07	1:00	3/09/07	1:00	4/20/07	1:00
Ms. Feldman	1/12/07	1:50	2/09/07	1:50	3/09/07	1:50	4/20/07	1:50
Ms Darson	1/19/07	1:00	2/16/07	1:00	3/16/07	1:00	4/27/07	1:00
Ms Saxton	1/19/07	1:50	2/16/07	1:50	3/16/07	1:50	4/27/07	1:50

The classroom program supported California State Standards wherever possible. Grade 2 Standards in Science, Language Arts and History-Social Science that were supported by the Richmond Kids Win - curriculum presented by the Watershed Project included:

SCIENCE

1a. Students know the position of an object can be described by locating it in relation to another object or to the background.
3b. Students know smaller rocks come from the breakage and weathering of larger rocks.
4f. Use magnifiers or microscopes to observe and draw descriptions of small objects or small features of objects.
4g. Follow oral instructions for a scientific investigation.

LANGUAGE ARTS

1.4 Give and follow three- and four-step oral directions.
2.1 Recount experiences or present stories.

HISTORY-SOCIAL SCIENCE

2.2.1. Locate on a simple letter-number grid system the specific locations and geographic features in their neighborhood or community (e.g., map of the classroom, the school).
2.2.4. Compare and contrast basic land use in urban, suburban, and rural environments in California.
2.5 Students understand the importance of individual action and character.

Students took a pre-survey to evaluate their prior knowledge about watersheds and stormdrains, and took a post-survey after completion of the program. Prior to the Richmond WIn program, only 59% of students knew that the stormdrain went to the Bay, and after the program 82% knew the correct answer. Only 1% knew what a watershed was before the program and at the end 81% knew that a watershed included where they live, streets, and the bay. A copy of the survey and summary of the results can be found in Appendix B.

During the final classroom visit, teachers in each classroom were asked to evaluate the program. The evaluations were very positive; teachers commented that they liked the hands-on, well prepared, energetic approach to teaching about watersheds and pollution prevention offered by the staff of the Watershed Project. When asked what she liked most about the classroom visits, a teacher from Washington Elementary replied, "The visits were organized, on time and engaging for students." Copies of the evaluations received from teachers are in Appendix A.

APPENDIX J - DESIGN CRITERIA SUMMARY

Appendix J	**Design Criteria Summary** **Richmond Wastewater Treatment Master Plan** **City of Richmond and Veolia Water**				
		Value			
	Units	Existing	Phase 1	Phase 2	Phase 3
Flows					
Design Flow (ADWF)	mgd	6.5	6.5	10.8	10.8
Design Flow (ADMMF)	mgd	12.1	12.1	20.1	20.1
Design Flow (PHWWF)	mgd	40	55	55	55
Loads					
Influent BOD (ADAL)	mg/L	250	250	250	250
Influent TSS (ADAL)	mg/L	400	400	400	400
Equalization Basin (upstream of pump station)					
No	-	0	1	1	1
Volume	MG	N/A	3.5	3.5	3.5
Bar Screens					
Number	-	1	2	2	2
Bar Spacing	in	1	0.25	0.25	0.25
Capacity	mgd	33	55	55	55
Influent Pumps					
Number	-	4	4	4	4
Configuration	duty + standby	4+ 0	3 + 1	3 + 1	3 + 1
Firm Capacity	mgd	40	40	40	40
Grit Basins					
Number of Channels	-	3	3	3	3
Width	ft	8	8	8	8
Sidewater Depth	ft	varies	varies	varies	varies
Length	ft	70	70	70	70
Horizontal Velocity	ft/s	2.5	1	1	1
Primary Clarifiers					
Number	-	2	2	2	2
Length	ft	210	210	210	210
Width	ft	38	38	38	38
Depth	ft	11	11	11	11
Total Surface Area	sq ft	15960	15960	15960	15960
Volume (total)	MG	1.3	1.3	1.3	1.3
Wier Length	ft	888	888	888	888
Overflow rate at ADWF	gpd/sf	410	680	680	680
Total Capacity (PHWWF)	mgd	39	40	40	40
Enhanced Coagulation	-	No	Yes	Yes	Yes
Secondary Process					
Capacity (ADMMF)	mgd	12.5	18.5	20.1	20.1
Capacity (PHWWF)	mgd	18.5	20	20.1	40
Aeration Basins					
Number	-	2	3	4	4
Length (nominal)	ft	165	165	165	165
Width (nominal)	ft	55	55	55	55
Depth	ft	15	15	15	15
Volume (each)	MG	0.9	0.9	0.9	0.9

Appendix J	**Design Criteria Summary** **Richmond Wastewater Treatment Master Plan** **City of Richmond and Veolia Water**				
		Value			
	Units	Existing	Phase 1	Phase 2	Phase 3
MLSS (range)	mg/L	1500-3500	1000-3000	1000-3000	1000-3000
SRT (range)	days	3 to 8	3 to 8	3 to 8	3 to 8
Aeration System	-	Mech.	Fine Bub.	Fine Bub.	Fine Bub.
Secondary Clarifiers					
Squircles:					
Number	-	2	2	2	2
Width	ft	110	110	110	110
Depth	ft	11	11	11	11
Surface Area (each)	sf	11650	11650	11650	11650
Overflow rate (ADWF)	gpd/sf	200	200	325	155
Overflow rate (PHWWF)	gpd/sf	600	600	600	600
Circular:					
Number	-	1	1	1	1
Diameter	ft	110	110	110	110
Depth	ft	15	15	15	15
Surface Area (each)	sf	9500	9500	9500	9500
Overflow rate (ADWF)	gpd/sf	200	200	325	155
Overflow rate (PHWWF)	gpd/sf	600	600	600	600
Rectangular:					
Number	-	0	0	0	2
Length	ft	-	-	-	165
Width	ft	-	-	-	60
Depth	ft	-	-	-	18
Surface Area (each)	sf	-	-	-	19800
Overflow rate (ADWF)	gpd/sf	-	-	-	250
Overflow rate (PHWWF)	gpd/sf	-	-	-	1000
Chlorine Contact Basins					
No	-	2	2	2	2
Width	ft	12	12	12	12
Depth	ft	11.5	11.5	11.5	11.5
Length	ft	235	235	235	235
Volume (total)	MG	0.97	0.97	0.97	0.97
Contact Time (PHWWF)	min	35	35	35	35
Sludge Thickening					
Number of DAFTs	-	1	1	0	0
Number of GBTs	-	0	1	2	2
Anaerobic Digesters					
Number	-	1	2	2	2
Volume (total)	MG	1.7	3.4	3.4	3.4
Design HRT	days	15	15	15	15
Design Loading	lb VSS/cf-d	0.12	0.12	0.12	0.12

APPENDIX K - CONTRA COSTA COUNTY GREEN BUSINESS CHECKLIST

January 24, 2010

Multifamily GreenPoint Checklist

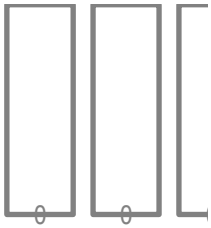
Build
Smart Soluti

Current Point Total	0

The GreenPoint Rated checklist tracks green features incorporated into the home. The recommended minimum requirements for a green home are: Earn a total of 50 points or more; obtain the following minimum points per category: Community (6), Energy (30), Indoor Air Quality/Health (5), Resources (6), and Water (3); and meet the prerequisites B.1.a (50% construction waste diversion), A.8 (exceed Title 24 requirements by 15%), C.10.a (3-year subcontractor guarantee and 20-year manufacturer warranty for shingle roofing), and F.1 (incorporate Green Points checklist in blueprints).

Build It Green is a non-profit organization providing the GreenPoint Rated program as a public service. Build It Green encourages local governments to leverage program resources to support voluntary, market-based programs and strategies.

The green building practices listed below are described in greater detail in the Multifamily Green Building Guidelines, available at www.builditgreen.org/greenpoint-rated/guidelines



Enter Total Conditioned Floor Area of the Project:	**10,000**
Enter Total Non-Residential Floor Area of Project:	
Percent of Project Dedicated to Residential Use	**100%**

ENTER PROJECT NAME	Community	Energy	IAQ/Health	Resources	Water
A. PLANNING & DESIGN	Possible Points				
1. Infill Sites					
☐ a. Project is Located Within an Urban Growth Boundary & Avoids Environmentally Sensitive Sites	1				
☐ b. Project Includes the Redevelopment of At Least One Existing Building				1	
0 c. Housing Density of 15 Units Per Acre or More (1 pt for every 5 u/a) *Enter Project Density Number (In Units Per Acre)*	10				
☐ d. Locate Within Existing Community that has Sewer Line & Utilities in Place	1				
☐ e. Project Redevelops a Brownfield Site or is Designated a Redevelopment Area by a City	1				
f. Site has Pedestrian Access Within ½ Mile to Neighborhood Services (1 Pt for 5 Or More, 2 Pts for 10 Or More):					
☐ 1) Bank ☑ 2) Place of Worship ☐ 3) Full Scale Grocery/Supermarket	2				
☐ 4) Day Care ☑ 5) Cleaners ☐ 6) Fire Station					
☐ 7) Hair Care ☑ 8) Hardware ☐ 9) Laundry					
☐ 10) Library ☐ 11) Medical/Dental ☐ 12) Senior Care Facility					
☐ 13) Public Park ☐ 14) Pharmacy ☐ 15) Post Office					
☐ 16) Restaurant ☐ 17) School ☐ 18) After School Programs					
☐ 19) Commercial Office ☐ 20) Community Center ☐ 21) Theater/Entertainment					
☐ 22) Convenience Store Where Meat & Produce are Sold.					
g. Proximity to Public Transit					
Development is Located Within:					
☐ 1/4 Mile of One Planned or Current Bus Line Stop	1				
☐ 1/4 Mile of Two or More Planned or Current Bus Line Stops	1				
☐ 1/2 Mile of a Commuter Train/Light Rail Transit System	1				
h. Reduced Parking Capacity:					
☐ Less than 1.5 Parking Spaces Per Unit	1				
☐ Less than 1.0 Parking Spaces Per Unit	1				
2. Mixed-Use Developments					
☐ a. At least 2% of Development Floorspace Supports Mixed Use (Non-Residential Tenants)	1				
☐ b. Half of Above Non-Residential Floorspace is Dedicated to Neighborhood Services	1				
3. Building Placement & Orientation					
☐ a. Protect Soil & Existing Plants & Trees	1				
4. Design for Walking & Bicycling					
☐ a. Sidewalks Are Physically Separated from Roadways & Are 5 Feet Wide	1				
☐ b. Traffic Calming Strategies Are Installed by the Developer	1				
☐ c. Provide Dedicated, Covered & Secure Bicycle Storage for 15% of Residents	1				
☐ d. Provide Secure Bicycle Storage for 5% of Non-Residential Tenant Employees & Visitors	1				
5. Social Gathering Places					
☐ a. Outdoor Gathering Places for Residents (Average of 50 sf Per Unit Or More)	1				
☐ b. Outdoor Gathering Places Provide Natural Elements *(For compact sites only)*	1				
6. Design for Safety and Natural Surveillance					
☐					

ENTER PROJECT NAME	Community	Energy	IAQ/Health	Resources	Water
☐ a. All Main Entrances to the Building and Site are Prominent and Visible from the Street	1				
☐ b. Residence Entries Have Views to Callers (Windows or Double Peep Holes) & Can Be Seen By Neighbors	1				

ENTER PROJECT NAME	Community	Energy	IAQ/Health	Resources	Water
7. Landscaping					
☐ *Check here if the landscape area is <10% of the total site area.* *Projects with <10% landscape area can cnly check up to 3 boxes in this section.*					
☐ a. No Plant Species will Require Shearing				1	
☐ b. No plantings are Listed on the Invasive Plant Inventory by the California Invasive Plant Council				1	
☐ c. Specify Drought-tolerant California Natives, Mediterranean or Other Appropriate Species					1
d. Create Drought Resistant Soils:					
☐ i. Mulch All Planting Beds to a Depth of 2 Inches or Greater as Per Local Ordinance					1
☐ ii. Amend with 1 Inch of Compost or as per Soil Analysis to Reach 3.5% Soil Organic Matter					1
e. Design & Install High-Efficiency Irrigation System					
☐ i. Specify Smart (Weather-Based) Irrigation Controllers					1
☐ ii. Specify Drip, Bubblers or Low-Flow Sprinklers for All Non Turf Landscape Areas					1
☐ f. Group Plants by Water Needs (Hydrozones) in Planting Plans & Identify Hydrozones on Irrigation Plans					1
g. Minimize Turf in Landscape Installed by Builder					
☐ i. Do Not Specify Turf on Slopes Exceeding 10% or in Areas Less Than 8 Feet Wide					1
☐ ` ii. Less Than 33% of All Landscaped Area is Specified as Turf AND All Turf has Water Requirement <= To Tall Fescue					1
8. Building Performance Exceeds Title 24 by at least 15%-*Required*					
Enter the Percent Above the 2005 Version of Title 24 for Residential and Non-Residential Portions of the Project.					
0% a. Residences: 2 Points for Every 1% Above 2005 T24		0			
0% b. Non-Residential Spaces: 2 Points for Every 1% Above 2005 T24					
9. Cool Site					
☐ a. At least 30% of the Site Includes Cool Site Techniques	1				
10. Adaptable Buildings					
a. Include Universal Design Principles in Units					
☐ 50% of Units	1				
☐ 80% of Units	1				
☐ b. Live/Work Units Include A Dedicated Commercial Entrance	1				
11. Affordability					
a. A Percentage of Units are Dedicated to Households Making 80% or Less of AMI					
☐ 10% of All Units	1				
☐ 20%	1				
☐ 30%	1				
☐ 50% or More	1				
☐ b. Development Includes Multiple Bedroom Units (At least 1 Unit with 3BR or More at or Less Than 80% AMI)	2				

B. SITEWORK	Possible Points				
1. Construction & Demolition Waste Management					
Divert a Portion of all Construction & Demolition Waste:					
☐ a. *Required* : Divert 50%				R	
☐ b. Divert 65%				2	
☐ c. Divert 80% or more				2	
2. Construction Material Efficiencies					
☐ a. Lumber is Delivered Pre-Cut from Supplier (80% or More of Total Board Feet)				1	
b. Components of the Project Are Pre-Assembled Off-Site & Delivered to the Project					
☐ 25% of Total Square Footage				2	
☐ 50% of Total Square Footage				2	
☐ 75% of Total Square Footage or More				2	
3. Construction Indoor Air Quality (IAQ) Management Plan					
☐ a. An IAQ Management Plan is Written & Followed for the Project			2		

C. STRUCTURE	Possible Points				
1. Recycled Aggregate					
☐ a. Minimum 25% Recycled Aggregate (Crushed Concrete) for Fill, Backfill & Other Uses				1	
2. Recycled Flyash in Concrete					
a. Flyash or Slag is Used to Displace a Portion of Portland Cement in Concrete					
☐ 20%				1	
☐ 30% or More				1	

ENTER PROJECT NAME	Community	Energy	IAQ/Health	Resources	Water
3. FSC-Certified Wood for Framing Lumber					
a. FSC-Certified Wood for a Percentage of All Dimensional Studs:					
☐ 40%				2	
☐ 70%				2	
b. FSC-Certified Panel Products for a Percentage of All Sheathing (OSB & Plywood):					
☐ 40%				1	
☐ 70%				1	
4. Engineered Lumber or Steel Studs, Joists, Headers & Beams					
☐ a. 90% or More of All Floor & Ceiling Joists				1	
☐ b. 90% or More of All Studs				2	
☐ c. 90% or More of All Headers & Beams				2	
5. Optimal Value Engineering Framing					
☐ a. Studs at 24" Centers on Top Floor Exterior Walls &/or All Interior Walls				1	
☐ b. Door & Window Headers Sized for Load				1	
☐ c. Use Only Jack & Cripple Studs Required for Load				1	
6. Steel Framing					
☐ a. Mitigate Thermal Bridging by Installing Exterior Insulation (At Least 1-Inch of Rigid Foam)		2			
7. Structural Insulated Panels (SIPs) Or Other Solid Wall Systems					
a. SIPs Or Other Solid Wall Systems are Used for 80% of All:					
☐ Floors		2		2	
☐ Walls		2		2	
☐ Roofs		2		2	
8. Raised Heel Roof Trusses					
☐ a. 75% of All Roof Trusses Have Raised Heels		1			
9. Insulation					
☐ a. All Ceiling, Wall & Floor Insulation is 01350 Certified OR Contains No Added Formaldehyde			1		
☐ b. All Ceiling, Wall & Floor Insulation Has a Recycled Content of 50% or More				1	
10. Durable Roofing Options					
☐ a. *Required:* No Shingle Roofing OR All Shingle Roofing Has 3-Yr Subcontractor Guarantee & 20-Yr Manufacturer Warranty				R	
☐ b. All Sloped Roofing Materials Carry a 40-Year Manufacturer Warranty				1	
11. Moisture Shedding & Mold Avoidance					
☐ a. Building(s) Include a Definitive Drainage Plane Under Siding				4	
☐ b. ENERGY STAR Bathroom Fans are Supplied in All Bathrooms, Are Exhausted to the Outdoors & Are Equipped with Control				1	
☐ c. A Minimum of 80% of Kitchen Range Hoods Are Vented to the Exterior			1		
12. Green Roofs					
a. A Portion of the Low-Slope Roof Area is Covered By A Vegetated or "Green" Roof					
☐ 25%	2				2
☐ 50% or More	2				2

D. SYSTEMS	Possible Points				
1. Passive Solar Heating					
☐ a. Orientation: At Least 40% of the Units Face Directly South		2			
☐ b. Shading On All South-Facing Windows Allow Sunlight to Penetrate in Winter, Not in Summer		1			
☐ c. Thermal Mass: At Least 50% of the Floor Area Directly Behind South-Facing Windows is Massive		2			
2. Radiant Hydronic Space Heating					
☐ a. Install Radiant Hydronic Space Heating for IAQ purposes (No Forced Air) in All Residences			2		
3. Solar Water Heating					
☐ a. Pre-Plumb for Solar Hot Water		1			
☐ b. Install Solar Hot Water System for Preheating DHW		4			
4. Air Conditioning with Advanced Refrigerants					
☐ a. Install Air Conditioning with Non-HCFC Refrigerants	1				
5. Advanced Ventilation Practices					
Perform the Following Practices in Residences:					
☐ a. Infiltration Testing by a C-HERS Rater for Envelope Sealing & Reduced Infiltration		2			
☐ b. Operable Windows or Skylights Are Placed To Induce Cross Ventilation (At Least One Room In 80% of Units)		1	1		
☐ c. Ceiling Fans in Every Bedroom & Living Room OR Whole House Fan is Used		1			
6. Garage Ventilation					
☐ a. Garage Ventilation Fans Are Controlled by Carbon Monoxide Sensors (Passive Ventilation Does Not Count)			1		

ENTER PROJECT NAME	Community	Energy	IAQ/Health	Resources	Water
7. Low-Mercury Lamps					
a. Low-Mercury Products Are Installed Wherever Linear Fluorescent Lamps Are Used				1	
b. Low-Mercury Products Are Installed Wherever Compact Fluorescent Lamps Are Used				2	
8. Light Pollution Reduction					
a. Exterior Luminaires Emit No Light Above Horizontal OR Are Dark Sky Certified	1				
b. Control light Trespass Onto Neighboring Areas Through Appropriate Fixture Selection & Placement	1				
9. Onsite Electricity Generation					
a. Pre-Wire for Photovoltaics & Plan for Space (Clear Areas on Roof & in Mechanical Room)				1	
b. Install Photovoltaics to Offset a Percent of the Project's Total Estimated Electricity Demand					
10%	2	2			
20%	2	2			
30% or more	2	2			
c. Educational Display is Provided in a Viewable Public Area	1				
10. Elevators					
a. Gearless Elevators Are Installed		1			
11. ENERGY STAR® Appliances					
a. Install ENERGY STAR Refrigerators in All Locations					
ENERGY STAR-Qualified		1			
ACEEE-Listed Refrigerators		1			
b. Install ENERGY STAR Dishwashers in All Locations					
All Dishwashers Are ENERGY STAR-qualified		1			
Residential-grade Dishwashers Use No More than 6.5 Gallons Per Cycle		1			1
c. Install ENERGY STAR Clothes Washers In All Locations		1			2
d. Install Ventless Natural Gas Clothes Dryers in Residences			1		
12. Central Laundry					
a. Central Laundry Facilities Are Provided for All Occupants				1	
13. Water-Efficient Fixtures					
a. All Showerheads Use 2.0 Gallons Per Minute (gpm) or Less		1			1
b. High-Efficiency Toilets Use 1.28 gpf or Less or Are Dual Flush					
In All Residences					3
In All Non-Residential Areas					3
c. Install High Efficiency Urinals (0.5 gpf or less) or No-Water Urinals Wherever Urinals Are Specified:					
Average flush rate is 0.5 gallons per flush or less					1
Average flush rate is 0.1 gallons per flush or less					1
d. Flow Limiters Or Flow Control Valves Are Installed on All Faucets					
Residences: Kitchen - 2.0 gpm or less		1			1
Non-Residential Areas: Kitchen - 2.0 gpm or less		0			0
Residences: Bathroom Faucets- 1.5 gpm or less		1			1
Non-Residential Areas: Bathroom Faucets - 1.5 gpm or less		0			0
e. Non-Residential Areas: Install Pre-Rinse Spray Valves in Commercial Kitchens - 1.6 gpm or less					1
14. Source Water Efficiency					
a. Use Recycled Water for Landscape Irrigation or to Flush Toilets/Urinals					2
b. Use Captured Rainwater for Landscape Irrigation or to Flush 5% of Toilets &/or Urinals					4
c. Water is Submetered for Each Residential Unit & Non-Residential Tenant					4

E. FINISHES AND FURNISHINGS	Possible Points				
1. Construction Indoor Air Quality Management					
a. Perform a 2-Week Whole Building Flush-Out Prior to Occupancy			1		
2. Entryways					
a. Provide Permanent Walk-Off Mats and Shoe Storage at All Home Entrances			1		
b. Permanent Walk-Off Systems Are Provided at All Main Building Entrances & In Common Areas			1		
3. Recycling & Waste Collection					
a. Residences: Provide Built-In Recycling Center In Each Unit				2	

ENTER PROJECT NAME	Community	Energy	IAQ/Health	Resources	Water
4. Use Low/No-VOC Paints & Coatings					
a. Low-VOC Interior Paints (<50 gpl VOCs (Flat) and <150 gpl VOCs (Non-Flat))					
In All Residences			1		
In All Non-Residential Areas:			0		
b. Zero-VOC: InteriorPaints (<5 gpl VOCs (Flat))					
In All Residences			1		
In All Non-Residential Areas:			0		
c. Wood Coatings Meet the Green Seal Standards for Low-VOCs					
In All Residences			2		
In All Non-Residential Areas:			0		
d. Wood Stains Meet the Green Seal Standards for Low-VOCs					
In All Residences			2		
In All Non-Residential Areas:			0		
5. Use Recycled Content Exterior Paint					
a. Use Recycled Content Paint on 50% of All Exteriors				1	
6. Low-VOC Construction Adhesives					
a. Use Low-VOC Construction Adhesives (<70 gpl VOCs) for All Adhesives			1		
7. Environmentally Preferable Materials for Interior Finish					
Use Environmentally Preferable Materials for Interior Finish: A) FSC-Certified Wood, B) Reclaimed Lumber, C) Rapidly Renewable D) Recycled-Content or E) Finger-Jointed					
a. Residences: At Least 50% of Each Material:					
i. Cabinets				1	
ii. Interior Trim				1	
iii. Shelving				1	
iv. Doors				1	
v. Countertops				1	
b. Non-Residential Areas: At Least 50% of Each Material:					
i. Cabinets				0	
ii. Interior Trim				0	
iii. Shelving				0	
iv. Doors				0	
v. Countertops				0	
8. Reduce Formaldehyde in Interior Finish Materials					
Reduce Formaldehyde in Interior Finish Materials (Section 01350) for At Least 50% of Each Material Below:					
a. Residences:					
i. Cabinets			1		
ii. Interior Trim			1		
iii. Shelving			1		
iv. Subfloor			1		
b. Non-Residential Areas:					
i. Cabinets			0		
ii. Interior Trim			0		
iii. Shelving			0		
iv. Subfloor			0		
9. Environmentally Preferable Flooring					
Use Environmentally Preferable Flooring: A) FSC-Certified or Reclaimed Wood, B) Rapidly Renewable Flooring Materials, C) Recycled-Content Ceramic Tiles, D) Exposed Concrete as Finished Floor or E) Recycled-Content Carpet. Note: Flooring Adhesives Must Have <50 gpl VOCs.					
a. Residences:					
i. Minimum 15% of Floor Area				1	
ii. Minimum 30% of Floor Area				1	
iii. Minimum 50% of Floor Area				1	
iv. Minimum 75% of Floor Area				1	
b. Non-Residential Areas:					
i. Minimum 15% of Floor Area				0	
ii. Minimum 30% of Floor Area				0	
iii. Minimum 50% of Floor Area				0	
iv. Minimum 75% of Floor Area				0	
10. Low-Emitting Flooring					
a. Residences: Flooring Meets Section 01350 or CRI Green Label Plus Requirements (50% Minimum)			1		

ENTER PROJECT NAME	Community	Energy	IAQ/Health	Resources	Water
☐ b. Non-Residential Areas: Flooring Meets Section 01350 or CRI Green Label Plus Requirements (50% Minimum)			0		

ENTER PROJECT NAME	Community	Energy	IAQ/Health	Resources	Water
11. Durable Cabinets					
Install Durable Cabinets in All:					
☐ a. Residences				1	
☐ b. Non-Residential Areas				0	
12. Furniture & Outdoor Play Structures					
☐ a. Play Structures & Surfaces Have an Overall Average Recycled Content Greater Than 20%				1	
☐ b. Environmentally Preferable Exterior Site Furnishings				1	
☐ c. At Least 25% of All newly Supplied Interior Furniture has Environmentally Preferable Attributes			1		
13. Vandalism Deterrence					
☐ a. Project Includes Vandalism Resistant Finishes and Strategies	1				

F. OTHER	Possible Points				
1. Incorporate GreenPoint Checklist in Blueprints					
☑ a. *Required:* Incorporate GreenPoint Checklist in Blueprints	Y				
2. Operations & Maintenance Manuals					
☐ a. Provide O&M Manual to Building Maintenance Staff		1			
☐ b. Provide O&M Manual to Occupants		1			1
3. Transit Options					
☐ a. Residents Are Offered Free or Discounted Transit Passes	2				
4. Educational Signage					
☐ a. Educational Signage Highlighting & Explaining the Project's Green Features is Included	1				
5. Vandalism Management Plan					
☐ a. Project Includes a Vandalism Management Plan for Dealing with Disturbances Post-Occupancy	1				

6. Innovation: List innovative measures that meet the green building objectives of the Multifamily Guidelines. Enter up to a 4 Points in each category. Points will be evaluated by local jurisdiction or GreenPoint rater.

0	Innovation in Community: Enter up to 4 Points at left. Enter description here
0	Innovation in Energy: Enter up to 4 Points at left. Enter description here
0	Innovation in IAQ/Health: Enter up to 4 Points at left. Enter description here
0	Innovation in Resources: Enter up to 4 Points at left. Enter description here
0	Innovation in Water: Enter up to 4 Points at left. Enter description here

Summary

	Community	Energy	IAQ/Health	Resources	Water
Points Achieved from Specific Categories	0	0	0	0	0
Current Point Total	0				

Project has not yet met the recommended minimum requirements

- *Total Project Score of At Least 50 Points*
- *Minimum points in specific categories: Community (6), Energy (30), IAQ/Health (5), Resources (6), Water (3)*
- *Required measures B.1a, C.10a, and/or F.1a*

APPENDIX L - COMPARISON OF PIPE MATERIALS

Table L.1 Comparison of Commonly Used Pipe Materials in Wastewater Treatment

Characteristic	PVC	HDPE	PEX	PP	ABS	Ductile Iron	Concrete	Copper	Cast Iron
Uses	Low voltage installation cable. Conduits, water and sewer pipe. Windows, siding, and doors.[1]	All pipe applications. Outdoor and underground conduit and ducting.[2]	Water and sewer piping. Plumbing and heating applications. Electrical wiring, conduits.[3]	Water and sewer piping, conduits, and industrial applications.[4]	Sanitary, storm drain, and waste piping.[1]	Water and sewer piping. Widely used in large diameter piping.[2]	Primarily used for sewers. Alternative to PVC in water applications. Widely used in large diameter piping.[5]	Conveyance for oil, chemicals, process and marine industries, plumbing and water transfer.[5]	Sanitary, storm drain, and waste piping.[5]
Performance	Abrasion and moisture resistant. Tolerates high mechanical stress. UV resistant. High thermal expansion. Degraded by organic solvents at high concentrations. Ignites at high temperatures.[5] 30 - 100 year useful life.[6]	More leak resistant than PVC due to electro-fusion of joints and more flexible. Expansion coefficient 3 times PVC. Recycled HDPE has a lower expansion coefficient.[5] 50 -100 year useful life.[7]	Can handle temperatures up to 200 degrees F. Freeze-break resistant. 50-year useful life. Not recommended for long-term exposure to UV light.[3]	Corrosion, chemical, and abrasion resistant. Temperature resistance up to 190 degrees F for short term. Up to 100-year useful life.[8]	Expansion coefficient is 2 times PVC. Resistant to wastewater chemicals.[5] 60-year useful life.[7]	Does not lose strength at high or low temperatures.[2] High tensile strength. 40 to 130 year useful life.[6]	Corrosion resistant. Susceptible to acids if not coated. Good load support.[9] 30 to 200 years.[6]	Corrosion resistant. High level of heat transfer.[10]	Durable and quiet. Low thermal expansion coefficient (1/5 of PVC). 30 to 170 year useful life.[6]
Toxic/Health Impacts	Manufacturing produces carcinogens (including dioxin), heavy metals, persistent organic pollutants (POPs), and endocrine disruptors.[1] Releases toxic gas and acid when burned.[3]	Contains more benign plastics than PVC - no chlorine and no POPs.[2]	More benign than PVC, similar to other plastics.[2] Toxic chemicals transported by the pipe can leach and enter the groundwater.[11]	Similar to HDPE, more benign plastic than PVC.[2]	Not chlorinated, but manufacturing intermediates are carcinogenic.[9]	Impermeable to hydrocarbons and other groundwater contamination.[12]	Nonvolatile organic compounds.[12]	Toxic to aquatic organisms.[2]	Worst among alternatives for combined health impacts including impacts from particulate matter, toxics, carcinogens, and impacts from climate change.[12]
Material Cost	Cheap to manufacture, less expensive than metal pipe.[1]	Similar to PVC.[13]	Similar to PVC piping, more expensive in electrical applications.[1]	Similar to PVC.[13]	Slightly more expensive than PVC, less expensive than metal pipe.[5]	More expensive than PVC.[13]	Cheaper than PVC.[13]	Much higher cost for small pipe.[13]	Materials up to twice as expensive as PVC. Installation costs vary.[5][13]
Recyclability	Recycling is economically feasible. PVC recycled material is downcycled to other products and does not reduce the use of virgin material.[2]	High recycle rate. Recycled HDPE available for purchase.[5][2]	Can only be used as inert filler for other polymers.[1]	High recycle rate, less costly than PVC or HDPE recycling.[1]	Difficult to recycle.[9]	Can be manufactured from scrap metals.[14]	Concrete can be reused to supplement crushed virgin rock.[12]	Highly recyclable.[2]	US manufacturing entirely from recycled iron and steel.[12]
Impacts from production	Chlorine production is one of the world's most energy intensive processes.[1]	Polyethylene and polypropylene based plastics are preferable to PVC based on energy consumption and environmental hazards.[2][12]	Similar to other plastic piping - preferable to PVC.[2][12]	Similar to other plastic piping - preferable to PVC.[2][12]	Similar to other plastic piping - preferable to PVC.[2][12]	If lined with concrete, has similar or greater energy intensity than PVC.[1]	High-energy intensity for production.[1]	Environmental impacts from mining copper.[12]	Highest energy intensity after HDPE and PVC.[1]

Table L.1 Comparison of Commonly Used Pipe Materials in Wastewater Treatment									
Characteristic	**PVC**	**HDPE**	**PEX**	**PP**	**ABS**	**Ductile Iron**	**Concrete**	**Copper**	**Cast Iron**
Installation	Rigid 20-foot sections. Fireproofing requirements increase installation costs.(5)	Flexible, rollout installation. Comes in rolls of several hundred feet. Fusion installation can take more time, but lightweight.(9)	Flexible, easy to install. Requires few directional fittings.(3)	Light weight, easy to install.(4)	Light weight. 1-step solvent cementing.(15)	Material is heavy, difficult to install.(5)	Heavy, careful installation is required to avoid cracking.(5)	Available in rigid lengths of 20 feet and flexible lengths of up to 60 feet.(10)	Heavy, requires careful installation.(1)
Roughness Coefficient(16)	0.009	0.009	0.007	0.009	0.009	0.011(17)	0.013	0.011	0.012-0.014

PVC - polyvinyl chloride
HDPE - High-density polyethylene
PEX - Cross-linked polyethylene
ABS - Acrylonitrile butadiene styrene
PP - Polypropylene

(1) Commissioned by the European Commission (2004) *Life Cycle Assessment of PVC and of Principal Competing Materials.*
(2) Thorton, J. *Environmental Impacts of Polyvinyl Chloride (PVC) Building Materials*. Prepared for the Healthy Building Network.
(3) Plastic Pipe and Fitting Association. *PEX Offers Environmentally Sound Solutions.* Glen Ellyn, IL
(4) Plastics Industry Pipe Association of Australia*. Polypropylene (PP) material for pipe applications*. http://www.pipa.com.au/docs/PPflyer.html.
(5) Healthy Building Network (2003) *PVC Free Building Material Alternatives*.
(6) AWWARF Report (1998) *Quantifying Future Rehabilitation and Replacement Needs of Water Mains.*
(7) Plastic Pipe Institute. *Cost Effective, Long Term and Permanent -- Benefits.* http://plasticpipe.org/municipal_pipe/index.html
(8) AWWARF Report 91167 (2007) *Installation, Condition Assessment, and Reliability of Service Lines* .
(9) Harvie, J., and T. Lent (2002) *PVC Free Pipe Purchasers Report.* Healthy Building Network.
(10) Industrias Nacobre. http://www.nacobre.com
(11) Final Statement of Reasons for Proposed Building Standards of the Office Statewide Health Planning and Development Regarding the California Plumbing Code, California Code of Regulations, Title 24, Part 5.
(12) US Green Building Council, Board of Directors (2007) *TSAC Report on PVC.* Washington DC.
(13) Carollo Unit Price Catalog
(14) Vinidex Pty. Limited (1996) *Energy Requirements for PVC and Ductile Iron Pipe.* Australia.
(15) Plastic Pipe Fittings Association http://www.ppfahome.org/
(16) Manning's Roughness Coefficient, average values, from Lindeburg, M (2006). Civil Engineering Reference Manual. 10th Ed. Professional Publications, Inc. Belmont, CA.
(17) Value for ductile iron pipe with a cement mortar lining or epoxy lining.

APPENDIX M - SUSTAINABLE DESIGN INCENTIVES

APPENDIX M - SUSTAINABLE DESIGN INCENTIVES

PG&E Incentives

Pacific Gas and Electric (PG&E) offers many rebates for energy efficient retrofit projects and new construction. Rebates and incentives vary from cash awards for installing specific equipment to technical design assistance to energy policy development.

Cash awards are offered for wastewater treatment equipment through the Energy Management Solutions Program. Dissolved oxygen control, variable frequency drives, premium-efficiency motors, efficient aeration blowers, efficient effluent pumping, UV disinfection, and screw presses are each eligible to receive $0.08 per kWh savings. Energy savings are calculated by comparing these technologies to the energy consumption of traditional technologies.

For equipment that is not covered in the incentive catalog or in the wastewater program, PG&E offers the Customized Energy Efficiency Incentive. Any nonresidential, new construction project may apply under the program to seek custom incentives. Technical assistance is available to help analyze energy loads and improve design criteria. The program also offers cash awards for “meeting ambitious efficiency targets,” as determined through consultation with PG&E.

Energy Watch Partnership Program

PG&E administers the Energy Watch Partnership Program for cities and counties in order to develop local energy policies. PG&E works with local governments to offer incentives and technical assistance to both municipal facilities and the public. Energy Watch partners receive design review for new municipal construction, local building code and standards support, and training seminars. The program builds capacity by helping local governments to coordinate with contractors to offer efficiency upgrades to residences and small businesses.

To date, Energy Watch has over twenty partners including cities, counties, and four statewide partnerships. The cities of Madera, Fresno, Merced, and Stockton are partners as well as the University of California and California State University systems, the California Community Colleges system, the California Department of Corrections, and the California Department of General Services.

California Water Process Optimization Program

The California Water Process Optimization Program (CalPOP) offered by the California Public Utilities Commission works with water and wastewater facilities to optimize their processes to reduce energy costs. The program assists treatment plant operators to

provide training, perform energy audits, and install new equipment. Projects typically include upgrades for aeration and pumping, but a wide array of equipment upgrades is eligible for funding, including SCADA systems, variable frequency drives, and low powered mixers. Program funds may used to cover up to 100 percent of project costs depending on energy savings. On average 60 percent of costs are covered. Projects are assisted on a first-come, first-served basis; however, the program is set to expire December 31, 2008.

A recent CalPOP project is the optimization of the Discovery Bay Community Services District Wastewater Facility. The project included installation of two solar-powered mixers in the facility's sludge lagoons and a dissolved oxygen monitoring system to automatically match aeration supplied to plant loading. The estimated savings in energy costs are over $80,000 per year . Coupled with CalPOP rebates, the project has an estimated payback period of seven months.

Savings by Design

Savings by Design, sponsored by four of California's largest utilities, encourages high-performance nonresidential building design and construction. The program offers design assistance in improving energy efficiency of new construction through two alternative approaches: the Systems Approach and the Whole Building Approach.

The Systems Approach examines the systems of buildings rather than individual equipment or fixtures. Systems include: daylighting, interior lighting, HVAC, hot water, and "other systems." "Other systems" may consist of any renovation or nonresidential new construction that has a significant process load. Wastewater specific equipment is eligible under "other systems." A Savings by Design program representative can aid the design team in identifying energy efficient system options and estimate potential savings. In addition, the representative can identify the potential owner incentives that apply for specific alternatives.

The Whole Building Approach enables the design team to take an integrated approach to optimize energy use. Integrated systems often make a building more productive and comfortable for the occupants, and less costly for the owner to build. The Whole Building Approach provides design assistance in developing simulation tools that can be used to examine cost-effective, energy efficient design solutions. In addition, this approach will calculate the estimated total energy savings for the building compared with Title 24 minimum requirements.

Financial incentives are available to the owner when the design exceeds minimum energy savings requirements. Under the Whole Building Approach, a maximum incentive of $150,000 per free standing building or individual meter can be realized if the overall efficiency of the building is at least 10 percent greater than the baseline set by Title 24 standards. With the Systems Approach, owner incentives are based on an annualized kWh

and thermal savings with a maximum incentive of $75,000 per free-standing building or individual meter.

In addition to the owner incentives, the Savings by Design program has included incentives for the design team if they take the Whole Building Approach. This encourages an integrated design approach that raises the bar on energy efficient design.

Resource Conservation Funds

Region 9 of the Environmental Protection Agency, including California, Nevada, Arizona, and Hawaii, offers grants for green building through the Resource Conservation Fund program. Eligible projects include surveys, studies, and demonstration projects that promote sustainable design and the reduction of solid waste. The EPA seeks projects that have a significant environmental impact and develop techniques or strategies that will promote the uptake of green building in Region 9. Applicants may request up to $100,000 per project, however the average award is $40,000. The 2008 solicitation period has past, but the program is likely to have funding available in 2009 and beyond.

National Environmental Performance Track

The National Environmental Performance Track offered by the U.S. Environmental Protection Agency gives support and recognition to both public and private facilities that go above and beyond regulations to reduce their environmental impact. To join the program facilities must develop an environmental management system (EMS) and show continuous improvement in four categories. Example categories include: material procurement, material use, energy use, land use, air emissions, discharges to water, and waste generation.

Partners benefit from the performance track in a variety of ways. Wastewater facilities that meet the criteria of the performance track are given priority among Clean Water State Revolving Fund projects and are given more favorable terms and conditions. Partner facilities are also granted low priority for routine inspections and given regulatory incentives including reduced reporting requirements.

Currently 80 percent of program partners are manufacturing facilities, but the EPA is working to increase benefits for the public sector.

The Wastewater Division of Eugene, Oregon represents one example of how the National Environmental Performance Track has been successful in wastewater treatment applications. In early 2004, the City of Eugene developed an EMS to navigate the permit renewal process while protecting local endangered species. The program evolved to encompass the efficient use of natural resources and improve effluent quality. After two years, the program had recouped its implementation costs of $50,000 and associated staff time via savings through energy efficiency, reduced paper consumption, and changes in waste disposal.

Stepp Foundation

The Stepp Foundation, a private charitable organization, works as an intermediary to connect sustainable projects with grant-making organizations. The foundation supports projects that improve air and water quality, reduce solid waste, promote energy efficiency and renewable energy, and protect ecosystem health. Applicants submit a general application through the foundation's website which is held for one year. During that time, the project is matched with appropriate funding sources.

The majority of past projects funded through the Stepp Foundation have been energy efficiency retrofits and renewable programs within the state of Colorado, the foundation's home state. Past awards have ranged from $26,000 to $253,000 in 2003 for the Posada project in Pueblo, Colorado. Posada resulted in the implementation of alternative energies in the Via Don Carlos housing development and community center for migrant workers.

Loans for Energy Efficiency

The California Energy Commission (CEC) offers loans of up to $3 million, at a fixed interest rate of 3.95 percent, to finance energy efficiency upgrades. New municipal construction and retrofit projects are eligible to apply. The loan can cover 100 percent of the cost of energy management systems and equipment controls, cogeneration systems, pumps and motors, and renewable energy projects. Energy audits and feasibility studies may also be financed through this program in some cases.

The CEC requires a payback period of no more than 15 years for efficiency projects and two years for audits and feasibility studies. Currently, the program has $26 million available for loan agreements.

Smart Growth Leadership Institute

The Smart Growth Leadership Institute offers support and technical assistance for sustainability at the state and local level. The institute is a charitable organization located in Washington DC and offers policy, planning, design, and implementation support for sustainable practices. More specifically, governments are offered assistance with:

- Developing economic strategies and policies to promote green building at the local level.
- Developing codes, ordinances, and regulations to unify sustainability goals.
- Developing design review standards and design review protocol.
- Proposing a community engagement plan to involve stakeholders and garner public support.

The Smart Growth Leadership Institute provides assistance via presentations, leadership workshops, and in-depth reports with recommendations. The City of Richmond is familiar

with this Institute, as they recently provided recommendations to the City as to how to best ease development pressure, better integrate public transit into city policies, and promote pedestrian friendly public spaces.

Performance Contracts

Energy Services Companies (ESCos) offer performance contracts in which energy efficient technologies are paid for through energy savings. Host facilities contact an ESCo to set up an energy audit to identify energy efficiency projects. The ESCo then coordinates with an equipment vendor and arranges financing of the project. The host facility and the ESCo develop a performance contract in which the energy savings of the upgrades pay for the equipment costs over the term of the contract. Once the contract expires, all additional savings are accrued by the host facility.

Performance contracts are very flexible and are used by many industries and sectors. Municipalities, universities, schools, and hospitals make up 58 percent of ESCo business according to a 2006 survey (Hopper et al., 2007). Federal, commercial, industrial, and residential contracts represent the other 42 percent of the performance contract market. In addition to efficiency upgrades, ESCos offer master planning consulting and performance contracts for renewable energy generation.

The National Association of Energy Services Companies website allows potential clients to search for local companies and provides contact information.

Table M.1 in Appendix M summarizes the sustainable design incentives discussed previously.

Table M.1: Sustainable Design Funding Opportunities

Organization	Program	Type	Description	Eligibility	Maximum Award	Application Due Date	Application Procedures	Website or contact information
Pacific Gas & Electric	Energy Management Solutions for Wastewater Treatment	Rebate/Technical assistance	Design assistance and incentives are available for the following wastewater treatment equipment: Dissolved oxygen control, variable frequency drives, premium-efficiency motors, efficient aeration blowers, efficient effluent pumping, UV disinfection, and screw presses. Each technology's energy use is compared to the energy use of a traditional technology. Incentives are $0.08 per kWh of savings per technology type.	Wastewater facilities.	$150,000	Not given.	Contact PG&E directly.	http://www.pge.com/biz/
Pacific Gas & Electric	Customized Energy Efficiency	Rebate	The Customized Energy Efficiency offers cash awards for non-residential equipment including air compressors, lighting, motors, etc. For new construction, technical assistance is available to help analyze energy loads and improve design criteria. The program also offers cash incentives for “meeting ambitious efficiency targets”, as determined through consultation with PG&E.	Cities, counties, and agencies.	$350,000	Not given.	Contact a PG&E prior to submitting an application in order to participate in PG&E's Customized Energy Efficiency/Demand Response Incentive offering.	http://www.pge.com/biz/
Pacific Gas & Electric	Energy Watch Partnership	Technical Assistance	PG&E works with local governments to offer incentives and technical assistance to both municipal facilities and the public for the development of local energy policy. Energy Watch partners receive design review for new municipal construction, local building code and standards support, and training seminars. The program builds capacity by helping local governments to coordinate with subcontractors to offer efficiency upgrades to residences and small businesses.	Cities, counties, and state agencies.	Not applicable.	Not given.	Contact PG&E directly.	http://www.pge.com/biz/
California Public Utilities Commission	California Water Process Optimization Program (CalPOP)	Rebate	The program assists treatment plant operators to provide training, perform energy audits, and install new energy efficient equipment. Projects typically include upgrades for aeration and pumping, but a wide array of equipment upgrades is eligible including SCADA systems, variable frequency drives, and low powered mixers.	Water and wastewater facilities.	Up to 100% of project cost depending upon energy savings.	Rolling deadline, projects must be completed by December 31, 2008.	Contact the CalPOP Program Manager for a facility analysis and to reserve funding for your project to ensure availability.	http://www.calwastewater.com/index.php?fmv=dt
Savings By Design	Systems Approach/Other Systems/Whole Building Approach	Rebate/Technical Assistance	Savings By Design Offers incentives to facilities that perform energy efficiency projects. The Systems Approach examines the systems of buildings rather than individual equipment or fixtures. Systems include: daylighting, interior lighting, HVAC, hot water, and “other systems”. “Other systems” may consist of any renovation or nonresidential new construction that has a significant process load. Wastewater specific equipment is eligible under “other systems”. The Whole Building Approach provides design assistance in developing simulation tools that can be used to examine cost-effective, energy efficient design solutions.	Any nonresidential new construction or renovation/remodel project with substantial process loads that is located within a service area of a participating utility is eligible. Applicant can not apply for or receive any other incentive offered by local or state entities or utilities for measures covered under Savings By Design.	$75,000 for the Systems Approach; $150,000 for Whole Building Approach.	Ongoing applications until December 31, 2008, or until the 2006-08 funding has been depleted.	Submit a letter of interest and construction documents. Program will issue an Incentive Agreement to the Owner/Design team with terms and conditions. The Utility’s countersignature and date indicate funds have been reserved for the project for a period of 48 months.	http://www.savingsbydesign.com/
Environmental Protection Agency Region 9	Resource Conservation Funds	Grant	To fund cooperative agreements that promote recycling, solid waste reduction, and energy conservation through source reduction, product stewardship, reuse and composting, market development and job creation, education and outreach, or the procurement of postconsumer recycled content products.	States, tribes, territories, multi-state/tribe organizations, universities, local governments, and non-profits located within Region 9 (California, Nevada, Arizona, and Hawaii).	$100,000	2008 applications have past, but program is likely to be active in the future.	Applications are submitted electronically through grants.gov.	Cara Peck, Solid Waste Team; 415-972-3382, peck.cara@epa.gov.

Organization	Program	Type	Description	Eligibility	Maximum Award	Application Due Date	Application Procedures	Website or contact information
Environmental Protection Agency	National Environmental Performance Track	Other	The program offers support and recognition to facilities that go above and beyond regulations to reduce their environmental impact. To join the program facilities must develop an environmental management system (EMS) and show continuous improvement in four categories. Example categories include: material procurement, material use, energy use, land use, air emissions, discharges to water, and waste generation. Wastewater facilities that meet the criteria of the performance track are given priority among Clean Water State Revolving Fund projects and are given more favorable terms and conditions.	Public and private facilities.	Not applicable.	Applications are accepted twice a year: April 1 - May 31, and September 1 - October 31.	The program uses an online application.	http://www.epa.gov/performancetrack/
Stepp Foundation	Grant Program	Grant	Funds to provide a direct strategy for improving air and water quality; to provide incentives for the development and implementation of energy efficiency and renewable energy projects; to support investments in opportunities that have environmental benefits from renewable related projects; to support energy efficiency/renewable energy (EERE) products; to increase the number of renewable energy projects; to connect land use and ecosystem health; and to connect environmental and public health issues.	Government entities (local, state and national), non-profit organizations, academic institutions and other organizations are all encouraged to enter project ideas into the Stepp Project Pipeline for funding consideration.	Not given. Past awards have ranged from $26,000 to $253,000.	Ongoing applications.	Register online and submit preliminary application. If a funding match becomes available, the applicant will be asked to provide a full application.	http://www.steppfoundation.org/about_us/about_us.htm
California Energy Commission	Loans for Energy Efficiency and Energy Generation Projects	Loan	Projects with proven energy and/or capacity savings are eligible for low interest loans. Common projects include energy efficiency upgrades to lighting systems; heating, ventilating and air conditioning systems; light emitting diode traffic signals; energy management systems and equipment controls; cogeneration systems; pumps and motors; and renewable energy projects. Energy audits and feasibility studies may be eligible for loans in some cases.	Cities, counties, special districts, public schools, colleges and universities, public care institutions, and public hospitals are eligible to apply. Existing buildings or other energy using facilities are eligible. Some new buildings and facilities may also be eligible. Please call to discuss eligibility.	$3 million with an interest rate 3.95%.	This solicitation is open continuously with no final filing date. Applications for funding will be accepted on a first come, first served basis, reviewed by a technical committee, and awarded based on project merit.	Submit a loan application, summary of Recommended Energy Efficiency Measures in Loan Request Table, a feasibility study, and a resolution authorizing the application.	http://www.energy.ca.gov/contracts/efficiency_pon.html
Smart Growth Leadership Institute	Implementation Technical Assistance	Technical Assistance	The institute provides technical assistance to communities that have made a commitment to smart growth but are struggling with implementation, building support, identifying the most problematic policies, and other issues that typically accompany a major change in development practice. Provides advice on effective strategies for implementation, proposing a community engagement plan, assessing policies and implementing codes, ordinances, and regulations, developing design review standards and design review protocol.	Local governments.	Not applicable.	Ongoing application process.	Contact the program directly at info@sgli.org or (202) 207-3355.	http://www.sgli.org/assistance.htm
Energy Services Company (ESCo)	Energy Savings Performance Contract	Other	An energy savings performance contract is a partnership between a customer facility and an ESCo. The ESCo conducts a comprehensive energy audit and identifies improvements that will save energy at the facility. In consultation with the customer, the ESCo designs and constructs the project and arranges financing. The ESCo guarantees that the improvements will generate savings sufficient to pay for the project over the term of the contract. After the contract ends, all additional cost savings accrue to the customer.	All facilities are eligible.	Depends upon contract.	Not applicable.	The National Association of Energy Services Companies website has contact information for local service providers.	http://www.naesco.org/

APPENDIX N – ODOR REPORT (WEBSTER & ASSOCIATES)

January 28, 2010

City of Richmond, CA
Richmond Water Pollution Control Plant

Odor Evaluation Report

September 2007

Prepared for

VEOLIA WATER NORTH AMERICA – WEST, LLC

Prepared by

Webster Environmental Associates, Inc.
13121 Eastpoint Park Blvd, Suite E
Louisville, KY 40223

CITY OF RICHMOND, CA
RICHMOND WATER POLLUTION CONTROL PLANT
ODOR EVALUATION REPORT

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RICHMOND WATER POLLUTION CONTROL PLANT
ODOR EVALUATION REPORT

1.0 INTRODUCTION

1.1 Background

The City of Richmond (City) owns the Richmond Water Pollution Control Plant (RWPCP), which provides wastewater treatment for the Richmond Municipal Sewer District 1 service area. The City has a long-term agreement with Veolia Water North America – West, LLC (Veolia) to operate, maintain and manage capital improvements to the plant.

Odors from the RWPCP result in some odor complaints from residents in the community near the plant. The City and Veolia desire to control odor emissions from the RWPCP and to prevent odor emissions from being a nuisance to current and future developments in the communities near the plant. **Figure 1** is an aerial photograph of the RWPCP and surrounding area.

Veolia retained Webster Environmental Associates, Inc. (WEA) to conduct a plant-wide odor evaluation at the RWPCP and the drying beds controlled by the West County Wastewater District (WCWD).

1.2 Objectives

The primary objectives of this odor evaluation are to:

- Quantify odor emissions from the RWPCP
- Identify and prioritize specific processes contributing to odor problems, including the planned dewatering processes
- Determine impacts of plant odors on existing and potential future receptors near the RWPCP
- Evaluate odor control technology alternatives
- Recommend odor control systems needed for specific process areas
- Provide capital and operating cost estimates for the recommended odor control system alternatives

Figure 1
Richmond WPCP & Surrounding Area

1.3 Richmond WPCP Description

The original RWPCP was constructed in 1958 and provided influent pumping, grit removal, comminution, chlorination, and discharge to San Francisco Bay. The plant was upgraded to provide primary sedimentation treatment with anaerobic sludge digestion in 1961. Secondary activated sludge treatment was added in 1968. A pipeline to pump plant effluent from the West County Wastewater District's WPCP to the RWPCP confluence structure for combined discharge through a new outfall was completed in 1980. A pipeline to pump digested sludge from the RWPCP to the WCWPCP sludge drying beds was completed in 1982. This pipeline is also used to pump landfill leachate from the landfill near the WCWPCP to the RWPCP for treatment. Projects to provide capacity expansion, conversion to hypochlorite and bisulfite, and wet weather blending were completed in 1993.

The RWPCP has a current design treatment capacity of 16 million gallons per day (MGD). The annual daily flow averages approximately 8.7 MGD, with average summer flows of 6.5 MGD and average winter flows of 11 MGD.

Figure 2 shows the RWPCP liquid process flow schematic. Wastewater influent flows through a mechanical bar screen before entering the Influent Pump Station (IPS) wet well for pumping to the grit removal structure. Wastewater flows by gravity through the remaining plant processes, which include primary sedimentation, aeration basins, secondary clarifiers, and chlorine contact tanks for disinfection. The plant effluent flows to the effluent confluence structure, mixes with WCWPCP effluent, and is pumped to the San Francisco Bay via the outfall pipeline.

Figure 3 shows the RWPCP solids process flow schematic. Primary sludge from the Primary Sedimentation Tanks is pumped through sludge heaters and to the digesters. Waste activated sludge from the Secondary Clarifiers is pumped to the Dissolved Air Flotation Thickener (DAFT) for thickening. Thickened Waste Activated Sludge (TWAS) is pumped from the DAFT, mixes with the primary sludge, and flows through the sludge heaters and on to the digesters. Digested sludge is pumped approximately 4.5 miles through a six inch pipeline to the WCWPCP drying beds. The sludge is pumped every other day. Landfill leachate is pumped through the same pipeline from the West County landfill on the alternating days.

In addition to the existing processes, a centrifuge dewatering process is currently in the planning phase for the RWPCP. The dewatering facility will be located in the area currently occupied by the sludge heating building and old digesters. The dewatering process will eventually eliminate the need to pump digested sludge to

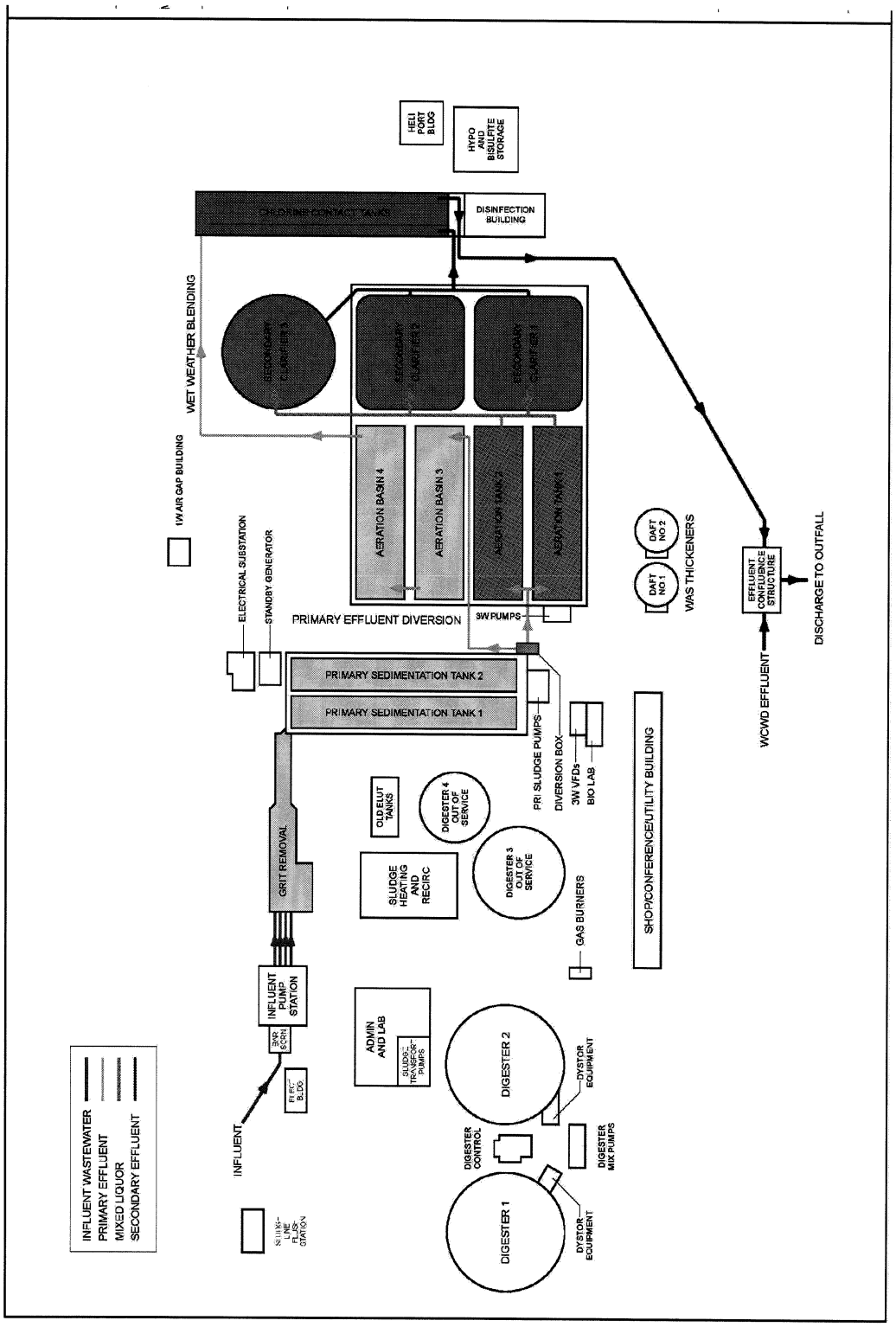


Figure 2
Richmond WPCP Liquid Process Flow Schematic

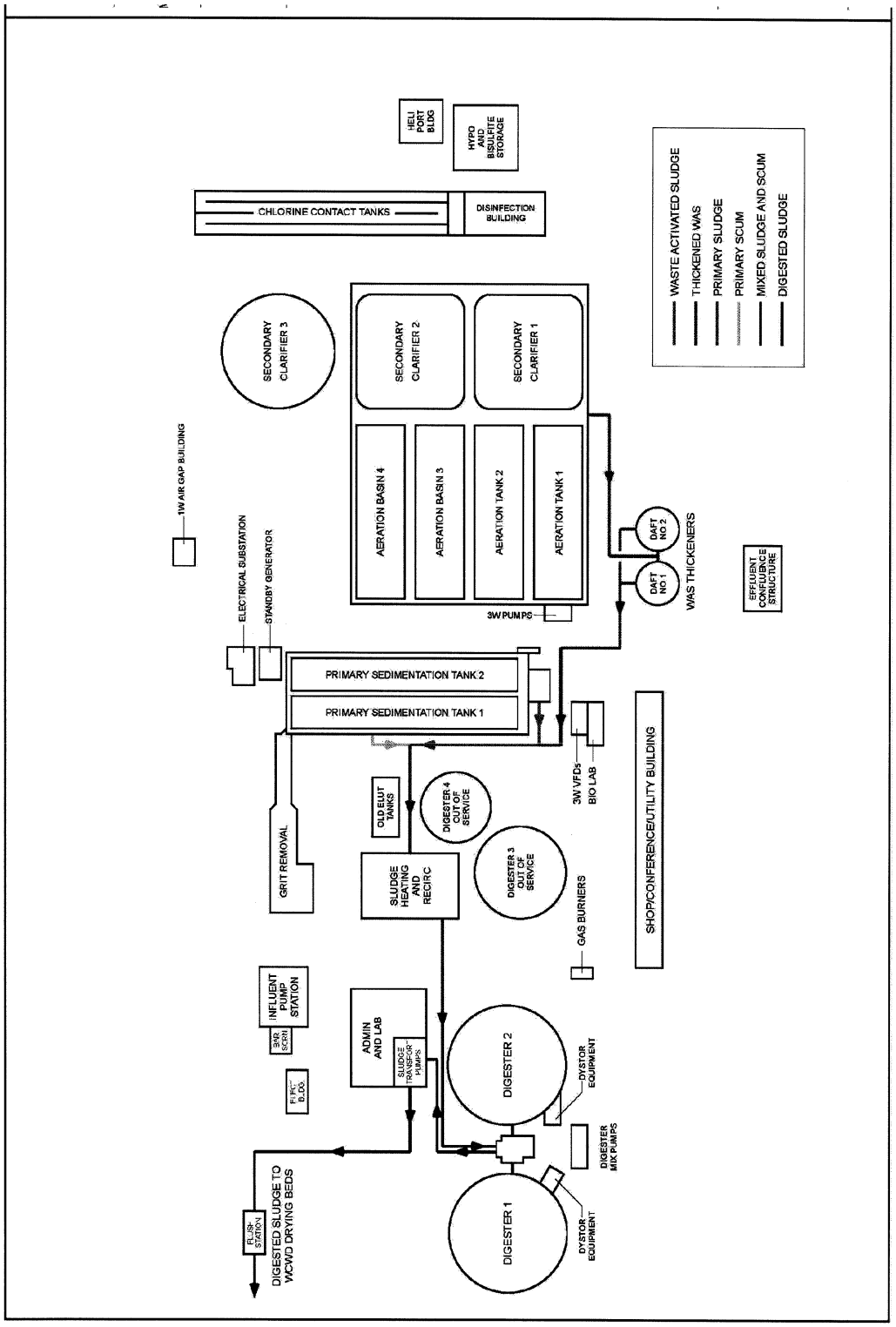


Figure 3
Richmond WPCP Solids Process Flow Schematic

the WCWPCP drying beds. An odor control system is planned to treat odorous air from the dewatering processes.

2.0 ODOR GENERATION AND CHARACTERIZATION OF ODORS

2.1 Odor Generation

Odor-producing substances found in domestic wastewater and sludge are small, relatively volatile molecules with a molecular weight of 30 to 150 pounds (lbs) per pound mole. Most of these substances result from the anaerobic decomposition of organic matter containing sulfur and nitrogen. Inorganic gases produced from domestic wastewater decomposition commonly include hydrogen sulfide, ammonia and carbon dioxide. In addition, wastewater processes often generate odorous organic compounds, such as indoles, skatoles, mercaptans and nitrogen-bearing organics.

Hydrogen sulfide (H_2S) is the most commonly known and prevalent odorous gas associated with domestic wastewater collection and treatment systems. It is a colorless gas, has a characteristic rotten egg odor, and is directly corrosive to metals and indirectly corrosive to concrete. H_2S can be oxidized to sulfuric acid, which causes corrosion of concrete, metals and other materials.

Many of the odors detected in wastewater collection and treatment systems result from the presence of sulfur-bearing compounds. A list of common malodorous sulfur-bearing compounds is shown in **Table 1**. The lower the molecular weight of a compound, the higher the volatility and potential for emission to the atmosphere. Substances of high molecular weight are usually not perceptibly odorous and are neither volatile nor soluble. It should be noted that organic chemicals of industrial origin, particularly solvents, are highly volatile as well as odorous and may contribute to overall odor emissions. Presence of turbulent or splashing conditions, such as overflow weirs in grit chambers and primary clarifiers increase the release of volatile odorous molecules. On the other hand, if the wastewater is aerobic and such odorous compounds are not present, such turbulence is beneficial because it promotes reaeration and the addition of dissolved oxygen, and thus prevents formation of odorous compounds associated with anaerobic conditions.

Perceived odors are often complex mixtures of odorous compounds acting together to create "an odor" which may have characteristics significantly different from each of the individual components. For this reason, attempts to identify the specific compounds present in an odorous air sample may not be justified when evaluating odor control alternatives, although analytical instruments can be used to identify the presence of certain common odorous compounds such as H_2S which can provide useful information regarding the character of the odor and the need for treatment.

TABLE 1
ODOROUS SULFUR COMPOUNDS IN WASTEWATER

COMPOUND	FORMULA	CHARACTERISTIC ODOR	ODOR THRESHOLD (ppm)
Allyl Mercaptan	CH_2=CH-CH_2-SH	Strong garlic-coffee	0.00005
Amyl Mercaptan	CH_3-(CH_2)$_3$-CH_2-SH	Unpleasant-putrid	0.0003
Benzyl Mercaptan	$C_6H_5CH_2$-SH	Unpleasant-strong	0.00019
Crotyl Mercaptan	CH_3-CH=CH-CH_2-SH	Skunk-like	0.000029
Dimethyl Sulfide	CH_3-S-CH_3	Decayed-vegetables	0.0001
Dimethyl Disulfide	CH_3-S-CH_3-S	Decayed-vegetables	0.0001
Ethyl Mercaptan	CH_3-CH_2-SH	Decayed-cabbage	0.00019
Hydrogen Sulfide	H_2S	Rotten eggs	0.00047
Methyl Mercaptan	CH_3SH	Decayed-cabbage	0.0011
Propyl Mercaptan	CH_3-CH_2-CH_2-SH	Unpleasant	0.000075
Sulfur Dioxide	SO_2	Pungent, irritating	0.009
Tert-butyl Mercaptan	(CH_3)$_3$C-SH	Skunk, unpleasant	0.00008
Thiocresol	CH_3-C_6H_4-SH	Skunk, rancid	0.000062
Thiophenol	C_6H_5SH	Putrid, garlic-like	0.000062

Odor Threshold – lowest concentration at which compound may be detected by a person with an average to above average sense of smell.

Reference: Design Manual: Odor and Corrosion Control in Sanitary Sewer Systems and Treatment Plants, USEPA/625/1-85/018, October 1985

2.2 Odor Panel Procedures

Odor panels involve human panelists who participate in a series of scientifically controlled sensory tests.

Common sensory properties used to characterize odors are:

- Odor detectability reported as Detection Threshold (DT)
- Odor recognition reported as Recognition Threshold (RT)
- Odor intensity or dose-response
- Hedonic tone (HT) or pleasantness/unpleasantness
- Odor character (word descriptors)

DT and RT were the only sensory properties evaluated in this study. DT values are used as inputs to the odor dispersion modeling, as discussed later in this report. Testing for the remaining sensory properties was not deemed necessary or cost effective for purposes of this odor evaluation.

A six to eight member odor panel consists of trained personnel who are scientifically screened to determine their smelling acuity to butanol. The odor panel testing, although subjective, is conducted under strictly controlled "clean" conditions to produce statistically valid results.

The odor evaluations are conducted in accordance with ASTM Standard Practice E679-91 (Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Concentration Series of Limits) and E544-99 (Referencing Suprathreshold Odor Intensity).

The dynamic dilution of odorous emissions is a physical process that occurs in the atmosphere down-wind of the odor source. An individual, or citizen from the community, sniffs the diluted odor. The number of dilutions needed to make the odor emission just detectable is known as the DT. The RT value is the dilution ratio at which the assessor first recognizes the odor's character. For example, an odor panel's response at DT may be "that smells" where the odor panel response at RT may be "that smells like a skunk".

Odor Detectability and Recognition

DT values reported from the odor panel refer to the number of dilutions of an odorous air sample required before half the panel members are still able to detect the presence of the odor. RT refers to the number of dilutions of an odorous air sample required before half the panel members are still able to characterize or recognize the odor.

A high DT indicates a strong odor requiring many dilutions to render it undetectable. RT values are always less than DT values because it is easier to detect an odor than identify an odor. The relative magnitude of DT and RT values indicates the relative significance of odors from various odor sources.

2.3 Hydrogen Sulfide (H_2S) Measurements

H_2S can be measured in the field using H_2S analyzers that provide instantaneous readings and/or continuous data logging. Since it is easy to measure, H_2S is often used in wastewater situations as an odor indicator. In many cases if the H_2S is controlled, the odor problem will be eliminated. H_2S is slightly heavier than air and moderately soluble in water.

H_2S dissolves in water and disassociates in accordance with the following reversible reaction:

$$H_2S \leftrightarrow HS^- + H^+$$

The distribution of the above species is a function of pH, as shown graphically in **Figure 4**. The relative H_2S concentration increases with decreasing pH. Only the dissolved sulfides can escape from the liquid (as H_2S). Hydrogen sulfide is formed under anaerobic or septic (absence of oxygen) conditions.

During this evaluation, H_2S was measured using an Arizona Instruments Jerome 631X H_2S analyzer with a range of 0.003 to 50 parts per million (ppm). These measurements will be used to identify or confirm odor (and H_2S) sources at the plant. In addition, diurnal H_2S concentrations were logged in the influent screen channel and wet well room during the testing period using OdaLog H_2S analyzers. The data was downloaded to the PC for plotting the diurnal H_2S concentration profile at these locations.

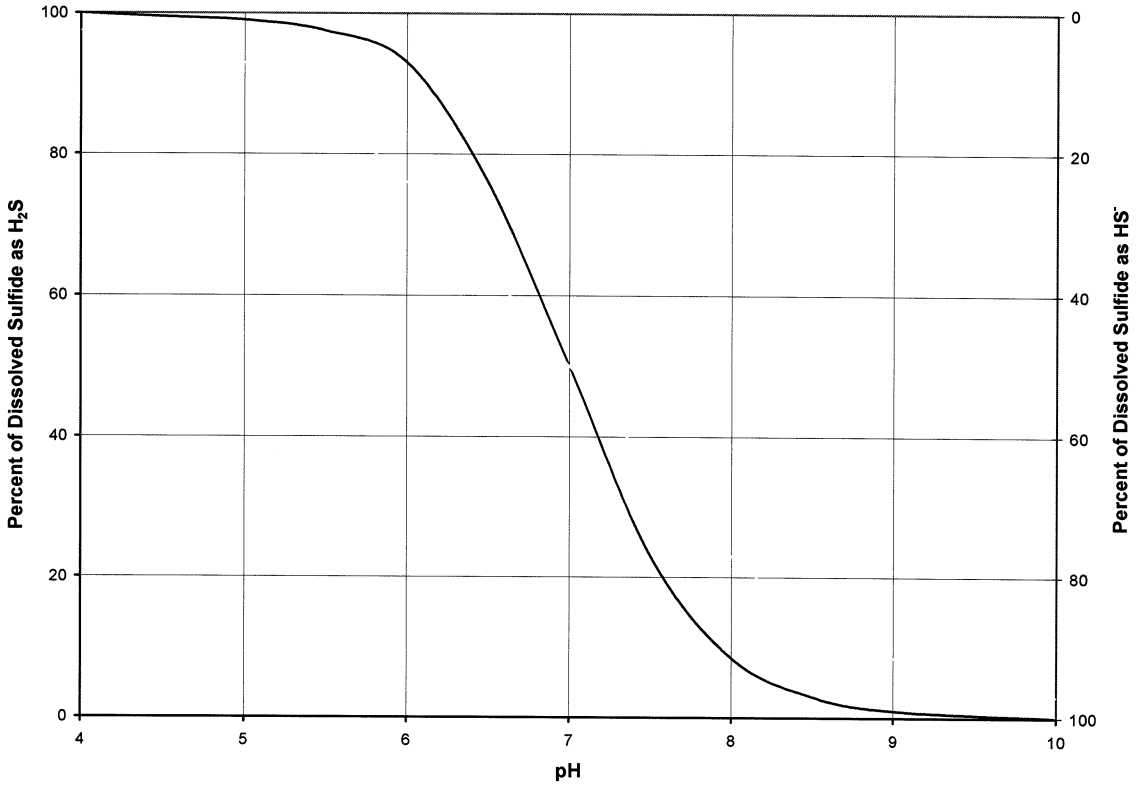


Figure 4
Effects of pH on Distribution of Hydrogen Sulfide (H_2S) in Water

2.4 Wastewater Analysis

Sulfides, which are the dissolved liquid form of hydrogen sulfide, are formed biologically in the wastewater collection system in the absence of dissolved oxygen. Sulfates are reduced to sulfides in the absence of oxygen or nitrates (anaerobic conditions) in the slime layer of force mains and gravity sewers. H_2S is moderately soluble in water.

The rate of sulfide production by the slime layer is related to the following factors:

- Wastewater organic strength
- Dissolved oxygen (D.O.)
- pH
- Temperature
- Velocity
- Detention time in the force main or gravity sewer

Within a D.O. range of 0.1 - 0.5 mg/L, anaerobic bacteria reduce sulfates to sulfides. Low velocities can promote the formation of thicker slime layers. As detention time increases, oxygen depletion occurs and the conditions favor sulfide production. The rate of sulfide production can double for every 10°C increase in temperature. pH governs the ratio of H_2S gas and ions in solution.

Sulfide generation is directly proportional to detention time in the sewer.

The formation of sulfides is an important parameter to measure to determine the potential for H_2S generation and release. In this study, samples for sulfide analyses were taken to assist in identifying the causes of odor problems. In addition to analytical testing for sulfides, field measurements of pH, dissolved oxygen (DO), oxidation reduction potential (ORP), and temperature were made. The following is a description of each parameter tested and the methods used for analysis:

Total and dissolved sulfide concentrations (mg/L) in the wastewater were measured using a LaMotte Pomeroy Sulfide Test Kit (Model CC-PS). The bacterial reduction of sulfates to sulfides occurs in the absence of dissolved oxygen and nitrates. Sulfides form dissolved hydrogen sulfide (H_2S) in the wastewater which can then be released at points of turbulence. Sulfides indicate the presence of H_2S in the wastewater and the potential for odor and corrosion problems. Dissolved sulfide represents the fraction that exists as dissolved H_2S, available to be released. Dissolved sulfide concentrations greater than 1.0 – 1.5 mg/L may contribute to odor and corrosion problems.

The oxidation reduction potential (ORP) of the wastewater was measured using a Digi-Sense Digital pH/ORP Meter (Model 5938-50). The ORP is measured in millivolts (mV) and is an indication of materials in the reduced form (sulfide) and in the oxidized form (sulfate). In an aerobic environment, bacteria use dissolved oxygen for respiration and sulfate is not reduced to sulfide. In an anaerobic environment with a low ORP (less than zero), bacteria use the sulfate for respiration, reducing the sulfate to sulfide. The following are ranges of ORP:

ORP (mV)	**Condition**
+ 50	No action by anaerobic bacteria
0	Poor anaerobic bacteria activity
-100 to -200	Maximum efficiency for anaerobic bacteria activity
-50 to -300	Favored by sulfate reducing bacteria for production of sulfide

The pH of the wastewater was measured using the Digi-Sense Digital pH/ORP Meter. The relative portions of H_2S and HS^- are dependent on pH, which is important in assessing the potential for H_2S gas release. A pH of less than 7 is conducive to sulfide generation and H_2S release.

3.0 DESCRIPTION OF ODOR TESTING AND MODELING

3.1 Overview of Sampling Program

Gas phase (odor) sampling was conducted over a two day period at the RWPCP and the WCWPCP drying beds. A total of fourteen (14) air samples for odor panel analyses were collected on June 26 – 27, 2007. Since landfill leachate is pumped into the plant influent on alternating days, several processes at the RWPCP were tested on both days to evaluate any differences in odor when the leachate is added to the wastewater flow. The WCWPCP drying bed receiving the RWPCP digested sludge was also tested on both days. The first day was during the sludge pumping operation and the second day was after pumping was completed the day before.

The odor samples were packaged and shipped daily by overnight express for odor panel analyses by St. Croix Sensory, Inc. in Lake Elmo, MN.

Field H_2S monitoring was conducted at the time each air sample was collected. Air samples were collected using grab and flux chamber methodology described herein. In addition, data logging H_2S analyzers (OdaLogs) were placed at two locations to record H_2S concentrations continuously.

Air samples were also collected for analyses of the reduced sulfur compounds (RSCs) that are a major source of odors. The samples were shipped via overnight express to Columbia Analytical Services, Inc. in Simi Valley, CA for GC/MS laboratory analyses.

Multiple liquid phase wastewater samples from the plant influent, plant recycle, and primary sedimentation effluent troughs were collected over the two day testing period. The wastewater samples were analyzed in the field with instruments and analyzers provided by WEA, including analyses for total and dissolved sulfides, pH, oxidation-reduction potential and temperature.

3.2 Air Sampling Protocol

Air samples for odor panel and RSC analyses were collected in 10 liter chemically inert Tedlar bags with a polypropylene access valve. Air samples from aerated tanks, like the biosolids holding tanks, were collected using a surface emission flux chamber (an EPA approved device used to measure emissions from

surfaces), vacuum chamber and small battery-operated Teflon pump connected by tubing as shown in **Figure 5**. Air samples from non-aerated surfaces such as the headworks channels, were collected in the same way except filtered sweep air was added to the flux chamber as shown on **Figure 6**. Air samples from point sources like the wet well room exhaust fan were collected in the tedlar bag using the vacuum chamber, but without the flux chamber as shown on **Figure 7**.

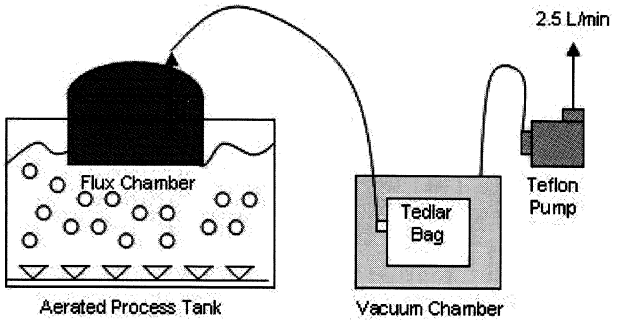


Figure 5
Gas Sampling Train for aerated surfaces

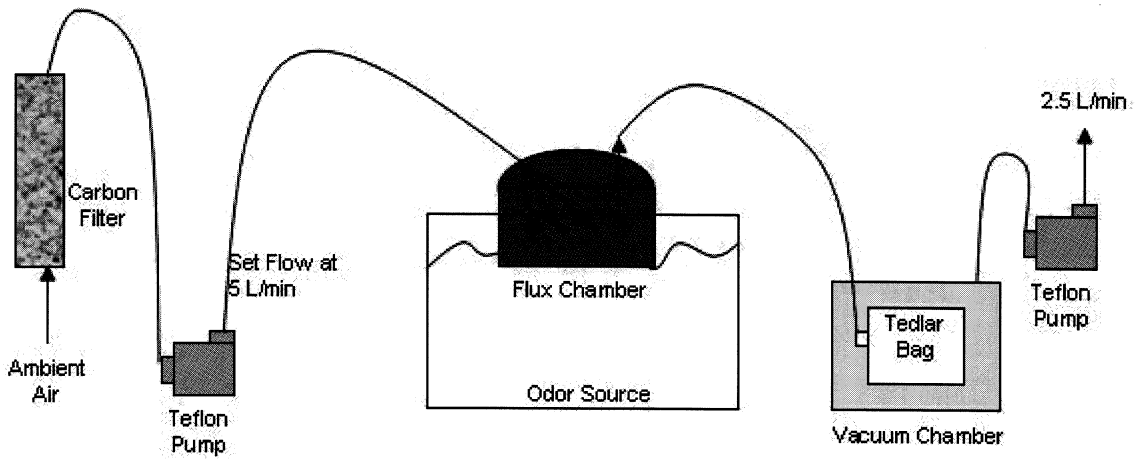


Figure 6
Gas Sampling Train for quiescent surfaces

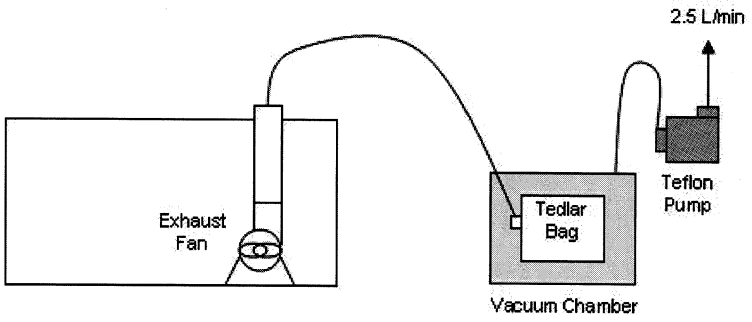


Figure 7
Gas Sampling Train for point sources

In all cases, the sample container was filled with the sample and then purged to "condition" the container and remove any background container odor prior to collection of the final sample for odor panel analysis.

The air samples were collected from each source and shipped to the laboratory via overnight express courier where they were analyzed the following day.

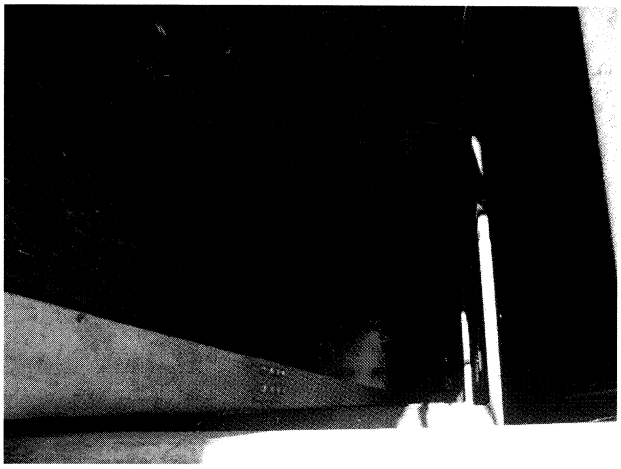
Figure 8 shows pictures of the locations where each of the samples were collected at the RWPCP and WCWPCP.

The flux chamber is an enclosed chamber used to isolate a surface and is set-up as a continuously stirred reactor. Sweep air is added to the chamber at a controlled, fixed rate of 5 liter per minute (L/min). The emission rate for hydrogen sulfide and odors is calculated by knowing the sweep air flow rate, concentration and the surface area exposed to the chamber.

The operation of the flux chamber involves:

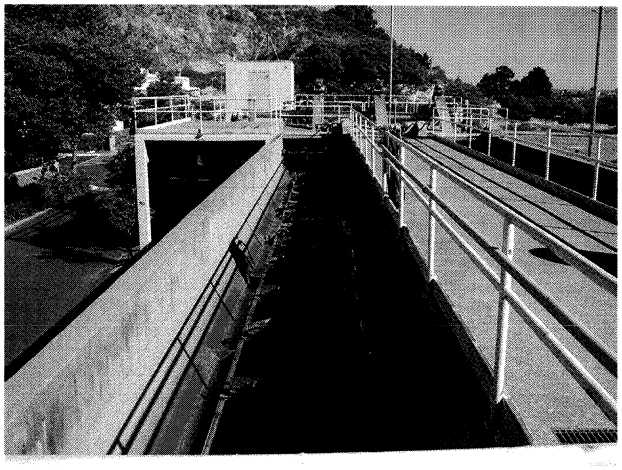
(1) Identifying the test area and placing the chamber
(2) Initiating the sweep air (clean, filtered air) flow rate to the flux chamber
(3) Operating the chamber for four residence times before collecting samples
(4) Collecting exhaust gas for analysis
(5) Decontaminating the chamber for the next test area

The sweep air flow rate using filtered air is adjusted and the time is recorded to monitor the number of chamber detention times. The samples for odor panel testing were collected at a rate less than 2.5 L/m after four (4) residence times.

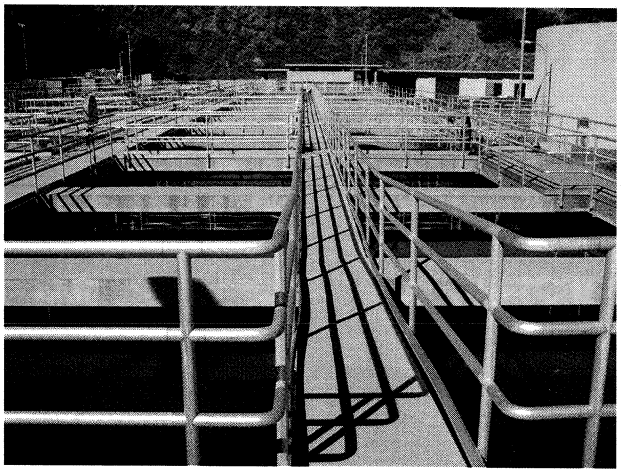


Screen Channel

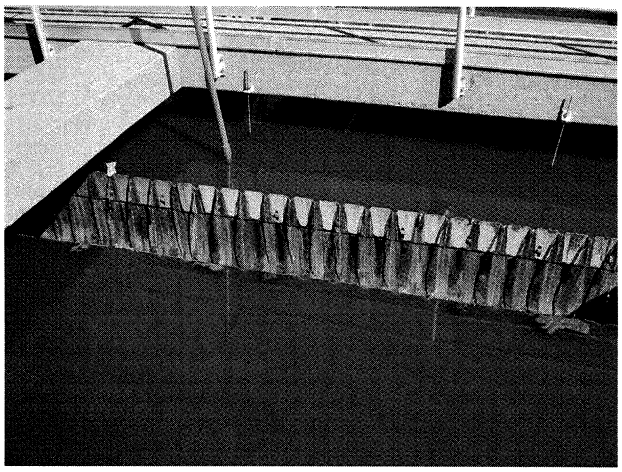
Wet Well Room Exhaust Fan



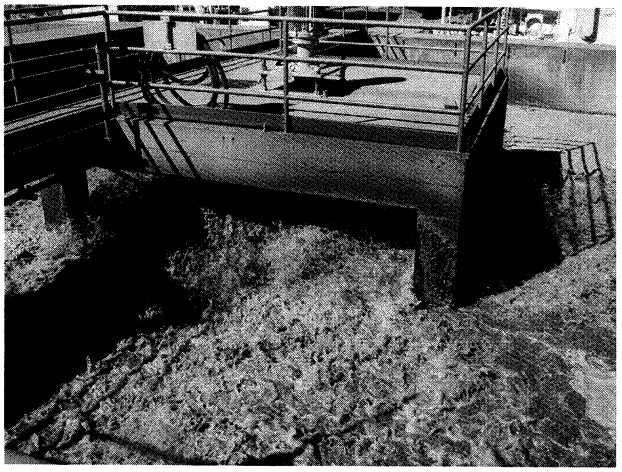
Grit Tank Surface



Primary Sedimentation Tank Surface



Primary Sedimentation Effluent Trough



Aeration Tank Surface

Figure 8
Sampling Locations

DAF Surface

Manhole near Admin. Bldg. Entrance

WCWPCP Drying Bed

Figure 8
Sampling Locations (continued)

The specific sizes of the flux chamber are:

Chamber surface area = 0.13 square meters (m^2)
Chamber volume = 0.03 cubic meters (m^3)

H_2S and odor emissions for each source are quantified with the flux chamber technique, using the following calculation:

$$ER = Y * Q * (A_2/A_1) * C$$

where: ER = Emission Rate of compound or odor (lbs/hr for H_2S and DT * cfm for odor)

Y = concentration of compound from air in the flux chamber (ppm or DT)
Q = sweep air flow rate of filtered air into flux chamber (L/min)
A_1 = surface area enclosed by the flux chamber (ft^2)
A_2 = surface area of odor source (ft^2)
C = correction factor for conversion from metric to English units

Hydrogen sulfide concentrations were measured from the sample bags with the Arizona Instruments Jerome 631X. This analyzer is sensitive down to 3 parts per billion (ppb). In addition, the App-Tek Odalog datalogger was used to continuously log H_2S concentrations in the air stream above the wastewater surfaces at the following locations:

- Directly above the Influent Screen Channel
- In the Wet Well Room near the exhaust fan

3.3 Wastewater Samples

Grab samples were collected from the Influent Screen Channel, Plant Recycle Return, and the Primary Sedimentation Effluent Troughs. Samples were collected two times from each of these locations over the two day testing period.

The samples were analyzed in the field for total sulfides, dissolved sulfides, pH, ORP, and temperature. Sulfides are emitted as H_2S and are indicative of the sources of H_2S and the potential for odor and corrosion.

3.4 Odor Dispersion Modeling

3.4.1 Description of Modeling

Odor dispersion modeling has been used as a reliable and cost-effective approach for predicting off-site odor impacts from odor sources and evaluating odor mitigation alternatives.

The odor dispersion model is essentially a computer program designed to predict what impact an odor source, or group of odor sources, will have on an area based on a number of factors that are input into the program. The primary inputs include:

- Odor emission rates from individual odor sources
- Odor source dimensions and characteristics
- Historic meteorological data
- Local terrain data

The software used to complete the modeling is Breeze ISC GIS ProVersion 4.0.4 developed by Trinity Consultants Inc. This dispersion model is based on the U.S. Environmental Protection Agency's (USEPA) Industrial Source Complex (ISC) model methodology.

Breeze is a Gaussian plume model that incorporates source-related factors (air flow rate, stack diameter, odor source area, contaminant concentration, and distance from the odor source to particular receptors) and meteorological factors to estimate contaminant concentrations from continuous sources.

The modeling in this study uses actual meteorological data, from the closest and the most recent full year surface and mixing height data available, obtained from the Trinity Consultants, Inc. The data includes the actual hourly meteorological data (wind speed, wind direction, temperature, cloud cover, ceiling height, and mixing height) from every hour of the year.

The information input into the model for this study was Odor Emission Rates (OER) for each point source (sources with stacks &/or exhaust fans); Odor Emission Rate per square foot for each area source (open channels and tanks); odor source locations, discharge heights and size; the local meteorological conditions from the Oakland airport; and digital terrain data. The OER is the Detection Threshold (DT) at the source multiplied by the air flow rate.

3.4.2 Modeling Output

The model output predicts the highest DT level, estimated over the area of analysis. The resulting peak DT levels are shown graphically on odor contour plots. Essentially, the model predicts the number of dilutions in the atmosphere in the downwind DT, or the detection threshold of the odor. In this study, the hourly average DT levels at particular receptor points were converted to peak DT levels by applying a multiplier to account for short exposure to odors (less than 15 seconds). The peak DT is more relevant for odors, since the odor plume meanders and is very transient. Perceived odor complaints are generally related to peak odor levels, as opposed to an hourly average odor level.

Another modeling routine also predicts the frequency of odor events for the areas surrounding the plant. In other words, it predicts the number of times per year odors may be detectable for at least a fifteen second period at any point in the study area. For example, a person standing at a point where a frequency of 100 is predicted would be expected to experience an odor that exceeds the selected odor detection threshold 100 times (or during 100 hours) per year. In this study, an odor detection threshold of seven (7) DT has been selected. An odor with a detection threshold of seven dilutions or less may not be detected because it could be overwhelmed by other natural odors in the area such as grass, trees, soil and flowers, or it may not be detectable at all.

3.4.3 Modeling Protocol

The modeling scenarios were completed with the following modeling protocol settings:

- Peak-to-mean multiplier of:

  (Averaging Period / Peak Duration) $^{0.5}$ = (60 min / 15 sec) $^{0.5}$ = **15.49**, based on one hour averaging period, 15 second average peak duration, and 0.5 power factor.

- Elevated terrain option

- Digital local terrain data

- 2002 surface and mixing height meteorological data, collected from the Oakland airport (closest available meteorological data)

- Threshold of 7 DT used for the odor frequency modeling

4.0 PRESENTATION OF TESTING RESULTS

4.1 Air Sampling Test Results

4.1.1 Air Sampling Results Summary

A summary of the odor panel testing results for the RWPCP is provided on **Table 2**. The data includes H_2S concentrations, Detection Thresholds, Recognition Thresholds and RSC concentrations. The complete odor panel test report from St. Croix Sensory, Inc. is included in **Appendix A**. The complete RSC analysis report from Columbia Analytical Services, Inc. is also included in **Appendix A**.

The Primary Sedimentation Tank surface air sample had the highest DT value (16,000) at the plant, followed by the Primary Sedimentation Tank Effluent Troughs (15,000), the Grit Tank Surface (9,200), Screen Channel (4,200), Manhole near Admin Bldg (with digester supernatant) (4,200), Wet Well Room Exhaust (3,000), DAF Surface (1,300), and Aeration Tank Surface (120). All DT values exceeding 1,000 would be considered to be in the high range. The 120 value in the Aeration Tank Surface air sample would be considered in the low to moderate range, and is a typical value for well-operating aeration basins.

The WCWPCP drying bed air sample collected during digested sludge pumping had a very high DT value of 23,000. This compares to a DT value of 3,700 from the air sample collected during digested sludge pumping in 2003. The WCWPCP drying bed air sample collected the day after digested sludge pumping had a DT value of 2,400. This compares to a DT value of 1,200 from the air sample collected in "older" sludge in 2003.

Odor samples taken at the drying beds in both 2003 and 2007 were "snapshots" of odors on that day and may not represent an average over a sustained period or a trend. Reasons why the 2003 and 2007 results vary so widely may include:

- in 2003, readings may have been lower than normal;
- in 2007:
    - readings may have been higher than normal;
    - the pipeline from the RWPCP to the WCWD lagoons now transports both sludge and leachate, as compared to 2003 when only sludge was transported. This has caused a change in the way sludge is transported. In 2003, because the line was less congested, sludge could be transported in smaller batches as needed. In 2007, because sludge

Table 2
Richmond WPCP
Odor Evaluation
Air Testing Results Summary

Location	H_2S Concentration Measurements (ppm)		Odor Panel Testing		RSC Testing [2]				
	Range	Avg [1]	Detection Threshold (DT)	Recognition Threshold (RT)	H_2S (ppb)	COS (ppb)	MM (ppb)	DMS (ppb)	CDS (ppb)
Screen Channel	0 - 9.3	2.3	1,100	590	22		4.8		2.5
Screen Channel (with landfill leachate)	0 - 11.5	2.5	4,200	2,600					
Wet Well Room Exhaust	0.1 - 4.7	1.0	3,000	1,500					
Wet Well Room Exhaust (with landfill leachate)	0.1 - 3.5	1.1	2,100	1,400					
Grit Tank Surface		13	9,200	5,800					
Grit Tank Surface (with landfill leachate)		15	3,700	2,600					
Primary Sedimention Tank Surface		15	16,000	11,000					
Primary Sedimention Tank Effluent Trough		63	15,000	9,700	63,000		300	26	
Pri. Sed. Tank Effl. Trough (with landfill leachate)		26	4,500	3,000					
Aeration Tank Surface		0.0	120	90					
DAF Surface		0.15	1,300	760	32		1.7		
WCWD Drying Bed (during pumping)		530	23,000	16,000	530,000	79.0	80		
WCWD Drying Bed (day after pumping)		1.0	2,400	1,300					
Manhole near Admin Bldg entrance		14.5	4,200	2,600					

Notes:

(1) The average H_2S values accompanied with a Range were collected using continuous data loggers during the June 25 - June 28 site visit. All other H_2S average values were based on limited instantaneous measurements collected during the site visit.

(2) Laboratory Reduced Sulfur Compound (RSC) results are reported in parts-per-billion (ppb). Values left blank indicate either no sampling or testing was conducted, or the resulting measurements were below the detection limits of the laboratory instrumentation. RSC Abbr. (odor threshold, ppb): H_2S = hydrogen sulfide (0.5), COS = carbonyl sulfide (100), MM = methyl mercaptan (0.5), DMS = dimethyl sulfide (0.1), CDS = carbon disulfide (25),

and leachate movement must be coordinated, sludge is transported in larger batches.

The highest H_2S concentrations measured at the plant were in the Primary Sedimentation Tank Effluent Troughs (63 ppm). Other high H_2S concentrations were measured in the Primary Sedimentation Tank Surface (15 ppm), Grit Tank Surface (15 ppm), Manhole near Admin Bldg (with digester supernatant) (14.5 ppm), and above the Screen Channel (11.5 ppm). Moderate H_2S concentrations were measured in the Wet Well Room Exhaust (4.7 ppm). The H_2S concentration measurements in the Aeration Basin surface and DAF surface were low (non-detectable and 0.15 ppm, respectively).

The WCWPCP drying bed air sample collected during digested sludge pumping had an extremely high H_2S concentration of 530 ppm. The WCWPCP drying bed air sample collected the day after digested sludge pumping had a moderate H_2S concentration of 1.0 ppm.

The diurnal H_2S concentration profiles generated from the Odalog data from above the Influent Screen Channel and Wet Well Room exhaust are included in **Appendix B**.

Moderate levels of methyl mercaptan (300 ppb) and low levels of dimethyl sulfide (26 ppb) concentrations were measured in the Primary Sedimentation Tank Effluent Trough air sample. These compounds should be considered during design of odor control systems for this process.

Moderate levels of methyl mercaptan (80 ppb) and carbonyl sulfide (79 ppb) concentrations were measured in the WCWPCP drying bed sample collected during digested sludge pumping.

4.1.2 Odor Emission Rates

The potential for off-site odors from the RWPCP was evaluated in this report by calculating "Odor Emission Rates" (OER), which is the product of DT times exhaust air flow rate, and then using the OER data in the dispersion modeling to predict off-site odors from individual sources as well as combined source groups.

The following methods were used to determine the air exhaust flow rates (cfm) from the sampled sources at the RWPCP:

1. Rated capacity or measured air flow rate of blower or exhaust fan

2. Estimate of the surface air emissions based on surface area of the source and the amount of sweep air added to the flux chamber. (See formula in Section 3).

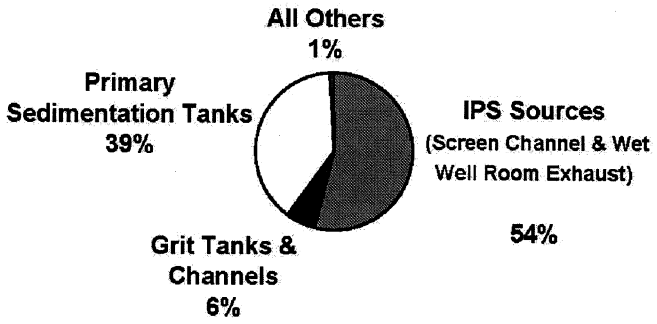
Table 3 presents the results of the odor emission rate calculations for all odor sources evaluated during the odor testing.

The Wet Well Room Exhaust has the largest odor emission rate (OER) from all tested sources at the RWPCP. The OER from this exhaust is 32,100,000, which is approximately 54% of the total odor emissions from the plant. The Primary Clarifier Surfaces and Effluent Troughs have the next highest OER, totaling 23,563,008 or 39% of the total plant odor emissions. The only other significant processes, in terms of OER, are the Grit Tank surfaces and channels. The OER from these grit removal processes totaled 3,674,128 or approximately 6% of the total plant odor emissions. Each of the other plant processes contributes less than 1% to the total plant odor emissions, as shown on Table 3.

Table 3
Richmond WPCP
Odor Evaluation
Odor Emission Rates Inventory

Location	Surface Area (ft^2)	Air Flow Rate (cfm)	Detection Threshold (D/T)	Odor Emission Rate (D/T x cfm)	Percentage of Total
Screen Channel	191	24	4,200	101,077	0.2%
Wet Well Room Exhaust		10,700	3,000	32,100,000	53.6%
Grit Tank Surfaces	3,170	399	9,200	3,675,128	6.1%
Primary Sedimention Tank Surfaces	9,888	1,246	16,000	19,934,208	33.3%
Primary Sedimention Tank Effluent Troughs	1,920	242	15,000	3,628,800	6.1%
Aeration Tank Surfaces	18,150	2,287	120	274,428	0.5%
DAF Surface	962	121	1,300	157,594	0.3%
Manhole near Admin Bldg entrance	3	0.4	4,200	1,663	0.0%
Total Plant Sources				**59,872,898**	**100%**
WCWD Drying Bed (during pumping)	148,500	18,711	23,000	430,353,000	
WCWD Drying Bed (day after pumping)	148,500	18,711	2,400	44,906,400	
WCWD Drying Bed (during pumping) (2003 Testing)	148,500	18,711	3,700	69,230,700	
WCWD Drying Bed ("older" sludge) (2003 Testing)	148,500	18,711	1,200	22,453,200	

Richmond WPCP Odor Emission Rates



4.2 Wastewater Sampling Results

Wastewater sampling results from the wastewater sampling program are shown on **Table 4**.

Total and dissolved sulfide concentrations in the plant influent (screen channel) averaged 4.0 and 2.4 mg/L, respectively. This equates to moderately high sulfide loading in the influent wastewater. The pH in the plant influent averaged 7.2, which is in the neutral range. The ORP in the influent wastewater averaged -285 mV, which is in the range favored by sulfate reducing bacteria and conducive to sulfide generation.

Total and dissolved sulfide concentrations in the plant recycle were non-detectable. The pH in the plant recycle averaged 7.2, which is in the neutral range. The ORP in the plant recycle averaged -240 mV, which is in the range favored by sulfate reducing bacteria and conducive to sulfide generation.

Total and dissolved sulfide concentrations in the primary sedimentation effluent troughs averaged 2.4 and 1.4 mg/L, respectively. These concentrations were lower than the concentrations measured in the plant influent, indicating some sulfide reduction and no additional sulfide generation in the plant headworks, grit removal or primary sedimentation processes. The pH in the primary sedimentation effluent troughs averaged 7.1, which is in the neutral range. The ORP in the primary sedimentation effluent troughs averaged -223 mV, in the range conducive to sulfide generation.

4.3 Odor Dispersion Modeling

4.3.1 Description of Modeling Scenarios

Four primary modeling scenarios were evaluated in this odor evaluation. Following is a description of each of the modeling scenarios.

Existing Conditions

This scenario simulates the odor impact of all significant existing processes at the RWPCP, as tested on June 25 – 28, 2007. All significant existing plant processes are simulated in this modeling scenario, including the screen channels, wet well room exhaust, grit tanks and channels, primary sedimentation tanks and effluent troughs, aeration basins, DAF tank, and the manhole near the Administration Building entrance containing the digester supernatant drain. Some of these plant processes were tested twice, once with landfill leachate being pumped to the plant, and once without leachate being pumped to the plant. The worst case odor

Table 4
Richmond WPCP
Odor Evaluation
Wastewater Testing Results Summary

Location	Date	Time	Total Sulfide (mg/L)	Dissolved Sulfide (mg/L)	pH	ORP (mV)	T (°F)
Screen Channel	6/26/07	8:00 AM	6.2	3.5	7.2	-330	76
	6/27/07	12:05 PM	1.8	1.2	7.3	-240	70
		Averages	**4.0**	**2.4**	**7.2**	**-285**	**73**
Plant Recycle	6/26/07	8:25 AM	0	0	7.1	-250	76
	6/27/07	12:30 PM	0	0	7.3	-230	70
		Averages	**0**	**0**	**7.2**	**-240**	**73**
Primary Sedimentation Effluent Trough	6/26/07	8:40 PM	3.5	2.0	7.0	-250	76
	6/27/07	12:40 PM	1.2	0.8	7.2	-196	72
		Averages	**2.4**	**1.4**	**7.1**	**-223**	**74**

condition was used in the modeling. All plant processes were operating in "normal" mode during the testing. The contributions of key individual sources and/or source groups were also evaluated in this scenario.

Odor Control Scenario 1 (OC1)

This scenario simulates the odor impact of the existing plant processes, assuming the screen channels are covered, with air collected from the channel headspace and combined with air collected from the wet well room. The odorous air from these two areas is ducted to a new odor control system for treatment prior to exhausting to the atmosphere. This scenario mitigates the area with the highest odor emission rate of all the plant processes.

Odor Control Scenario 2 (OC2)

This scenario includes the improvements described in OC1. In addition, the grit tanks and channels are covered, with air collected from the headspaces and combined with the air from the screen channels and wet well room. The odorous air from these areas is ducted to a new odor control system for treatment prior to exhausting to the atmosphere.

Odor Control Scenario 3 (OC3)

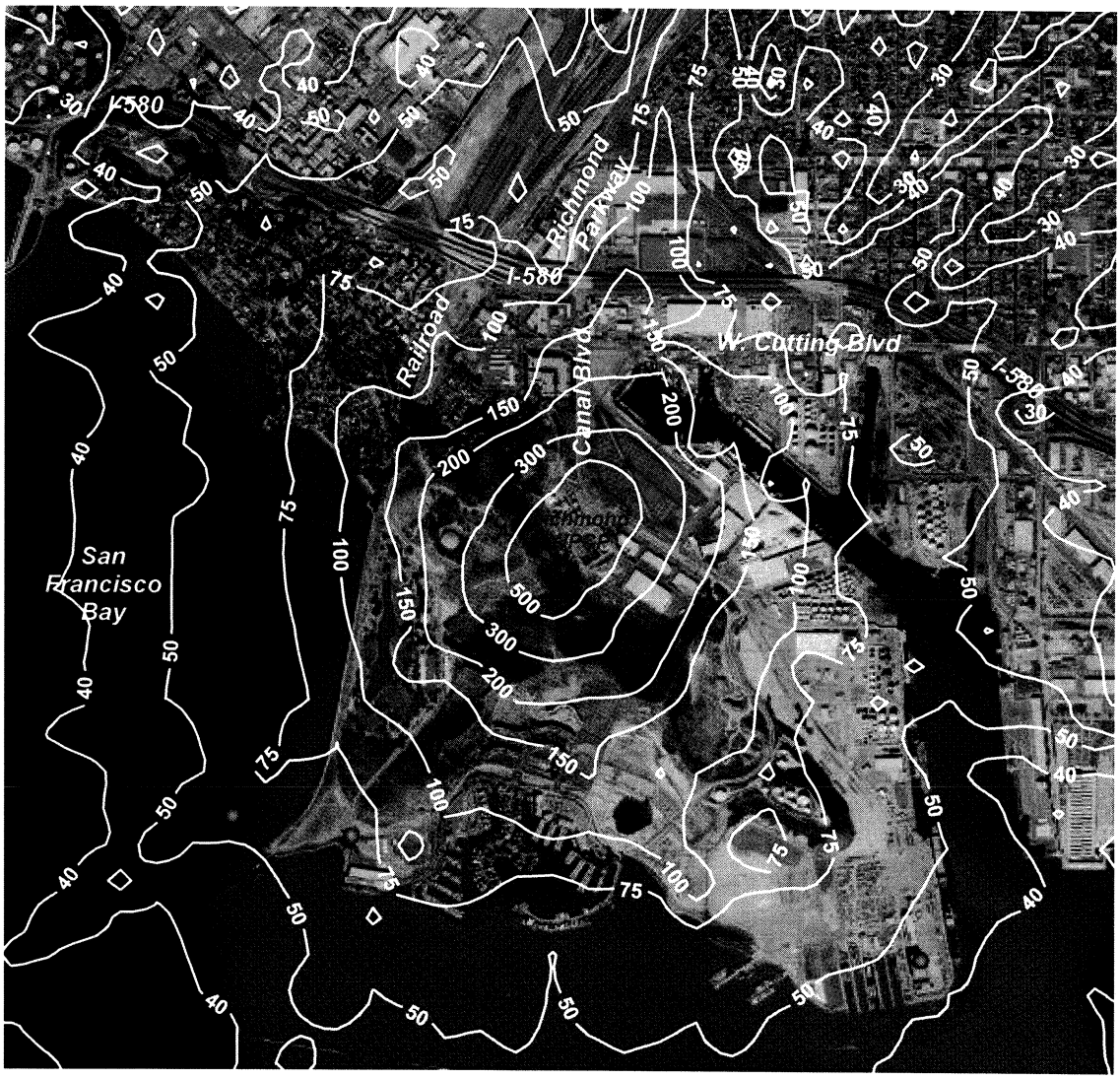
This scenario includes the improvements described in OC2. In addition, the primary sedimentation tanks are covered, with air collected from the headspaces and ducted to a separate new odor control system for treatment prior to exhausting to the atmosphere.

4.3.2 Discussion of Modeling Results

Existing Conditions

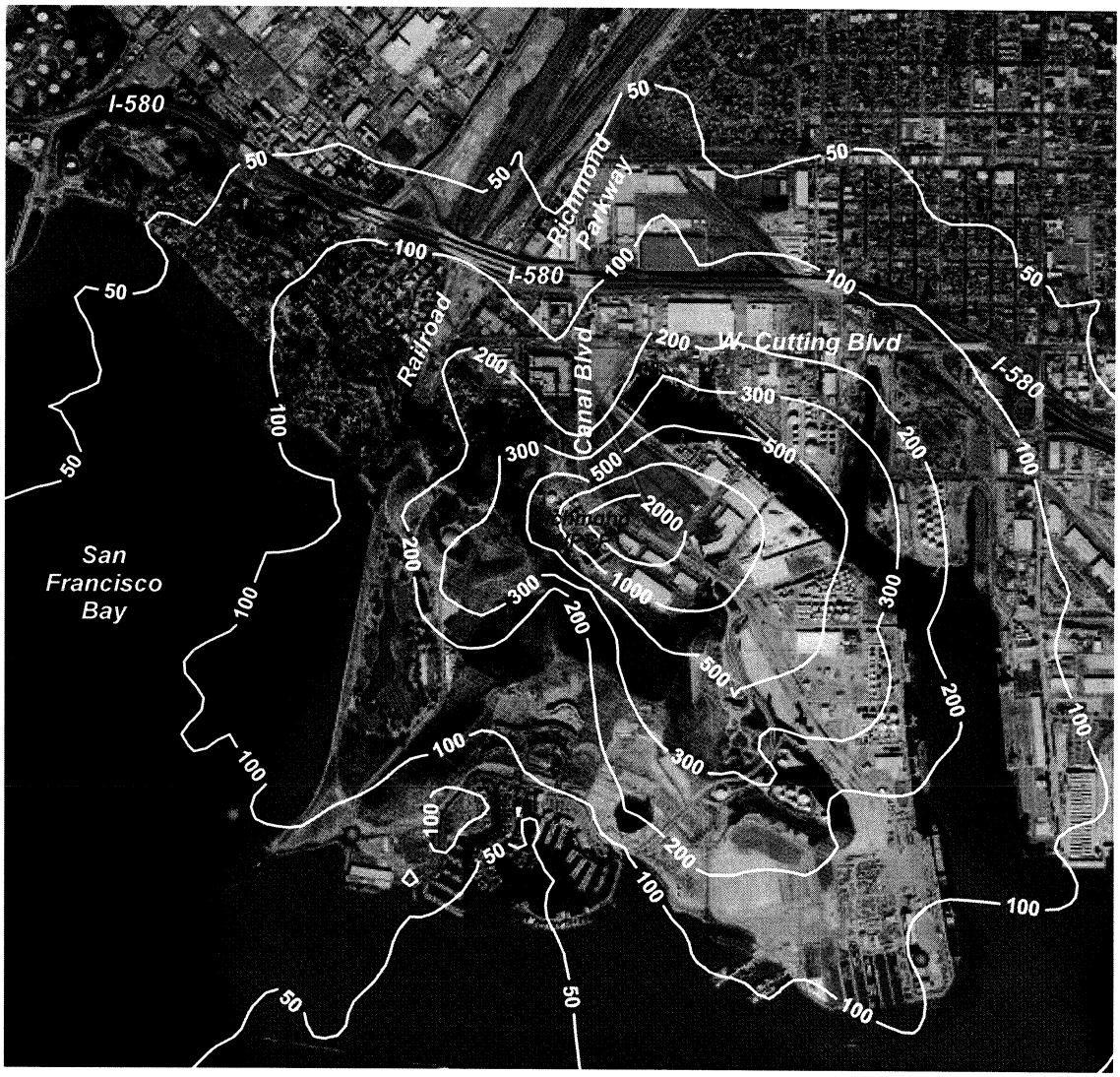
Figures 9 & 10 show the Peak DT and Odor Frequency contour maps for this scenario.

The model predicts Peak DT values exceeding 100 in the neighborhoods to the northwest across the railroad tracks, to the north and northeast along West Cutting Blvd., to the south in the harbor area, and to the west in the Bay shoreline park area. These odor levels are considered moderately high and would be considered annoying. The model predicts odors from the plant could be detectable (> 7 DT) during over 100 – 200 hours per year in the northwest neighborhoods, during up to 200 hours per year along West Cutting Blvd., during up to 100 hours per year in the south harbor area, and up to 200 hours per year in the Bay shoreline park area.



Richmond WPCP
Existing Conditions
Peak DT Contours

Figure 9



Richmond WPCP
Existing Conditions
Frequency Contours
(Hrs/Yr > 7 DT)

Figure 10

Figure 11 shows the locations of odor complaints from 2002 to the present, along with the odor frequency contours for the existing conditions. This map shows most odor complaints are from locations along Canal Blvd. and the neighborhoods to the northeast of the plant.

Figure 12 shows the locations of odor complaints from 2006 to the present, along with the odor frequency contours for the existing conditions. This odor complaint map shows odor complaints have decreased over the past two years.

Figures 13 - 15 show the individual contributions of key odor sources and/or source groups. These contours validate the primary sedimentation tanks have the highest odor impact on the surrounding community under existing conditions. The influent pump station sources (screen channels and wet well room) and the grit tanks and channels also contribute significantly to off-site odors, but to a lesser degree.

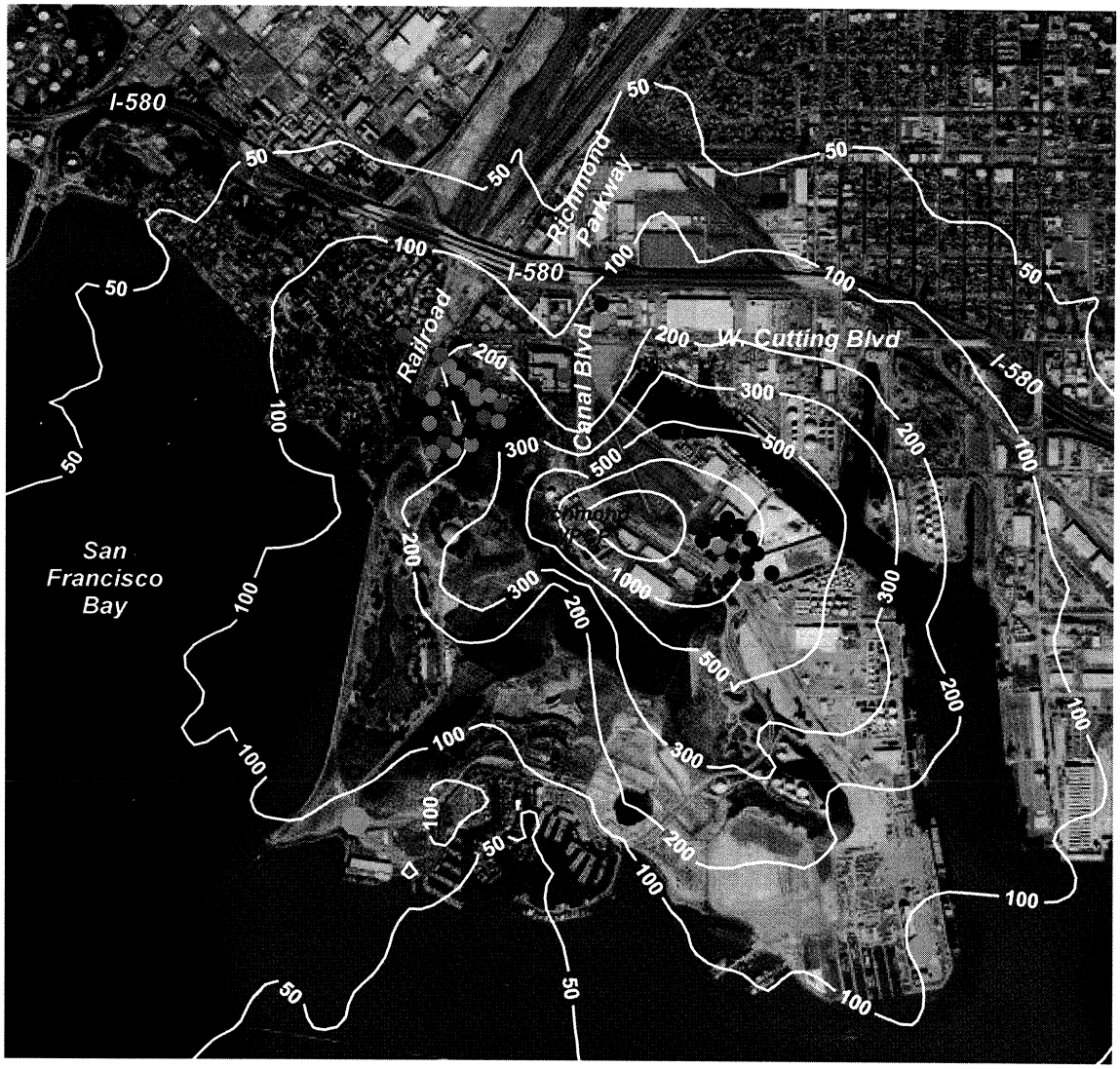
Figure 16 shows the individual contribution of an odor control system for the proposed dewatering processes. The odor control system assumed in this model is based on the dewatering alternative that produces the highest air flow to be treated. This dewatering alternative assumes all dewatering processes are enclosed in a building with 50,000 cfm (12 air changes per hour) of air exhausted from the building to an odor control air treatment system. These contours show the dewatering odor control system would not contribute significantly to off-site odors. To illustrate the insignificance of the proposed dewatering odor control system, **Figures 17 & 18** show the Peak DT and Odor Frequency contours superimposed on the "Existing Conditions" contour maps.

Odor Control Scenario 1 (OC1)

Figures 19 & 20 show the Peak DT and Odor Frequency contour maps for this scenario.

This model scenario simulates elimination of over 50% of plant odor emissions. The model predicts Peak DT values are slightly reduced in the neighborhoods to the northwest across the railroad tracks, but remain in the 75 – 100 range. However, the model predicts a larger positive impact on odor frequency as odors from the plant could be detectable (< 7 DT) in 50 - 100 hours per year in this area. This frequency represents less than 1% of the time that odors could be detectable.

The model predicts Peak DT values are also slightly reduced to the north and northeast along West Cutting Blvd. Again, there is a larger positive

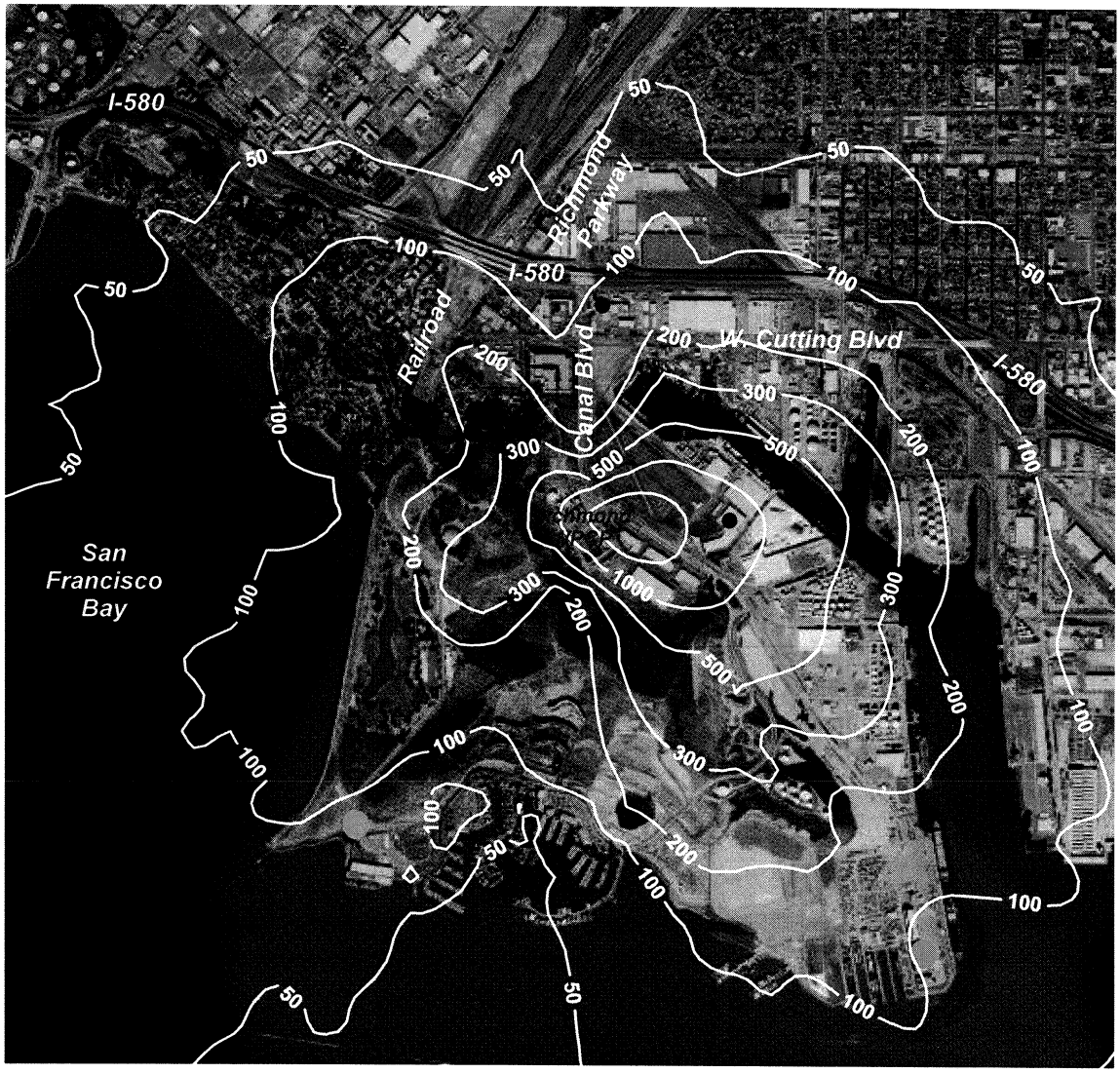


Richmond WPCP
Odor Complaints (2002 - Present) and Existing Conditions Frequency Contours

Legend

2002 Blue ●
2003 Purple ●
2004 Pink ●
2005 Green ●
2006 Orange ●
2007 (to date) Red ●

Figure 11



Richmond WPCP
Odor Complaints (2006 - Present) and Existing Conditions Frequency Contours

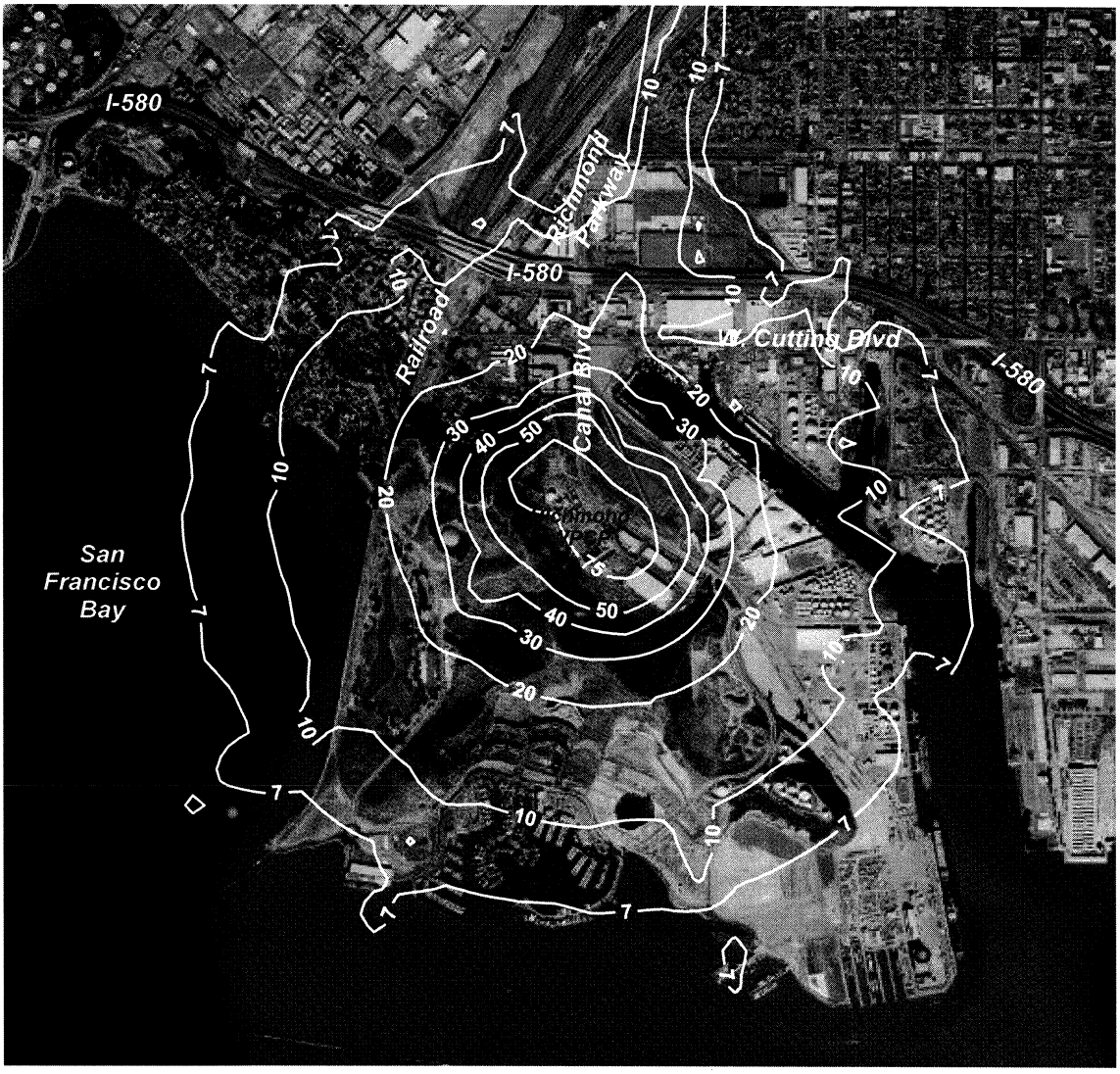
Legend

2006 Orange ●
2007 (to date) Red ●

Figure 12

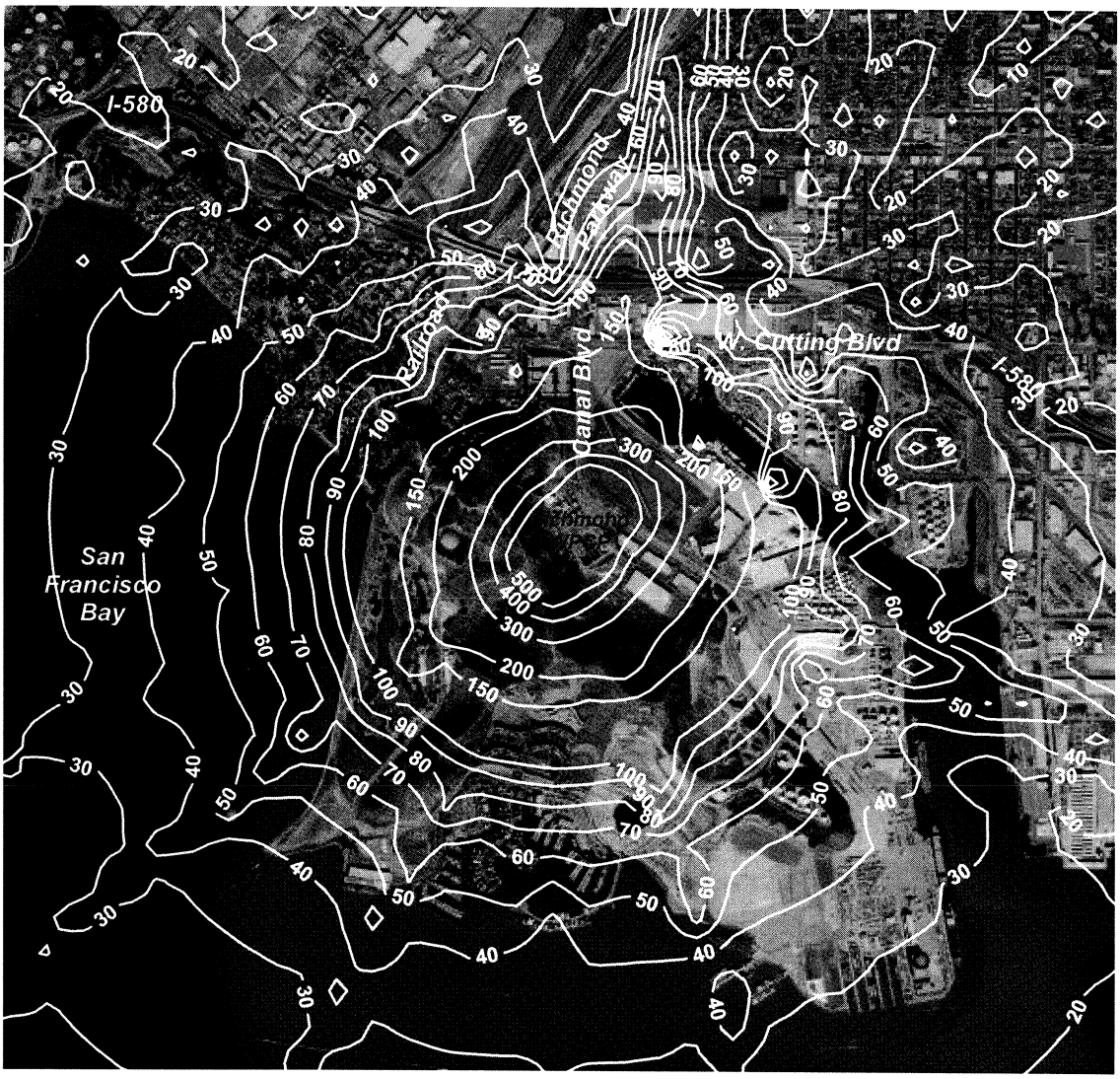
Richmond WPCP
Existing Conditions
Influent Pump Station Only
Peak DT Contours

Figure 13



Richmond WPCP
Existing Conditions
Grit Tanks & Channels Only
Peak DT Contours

Figure 14

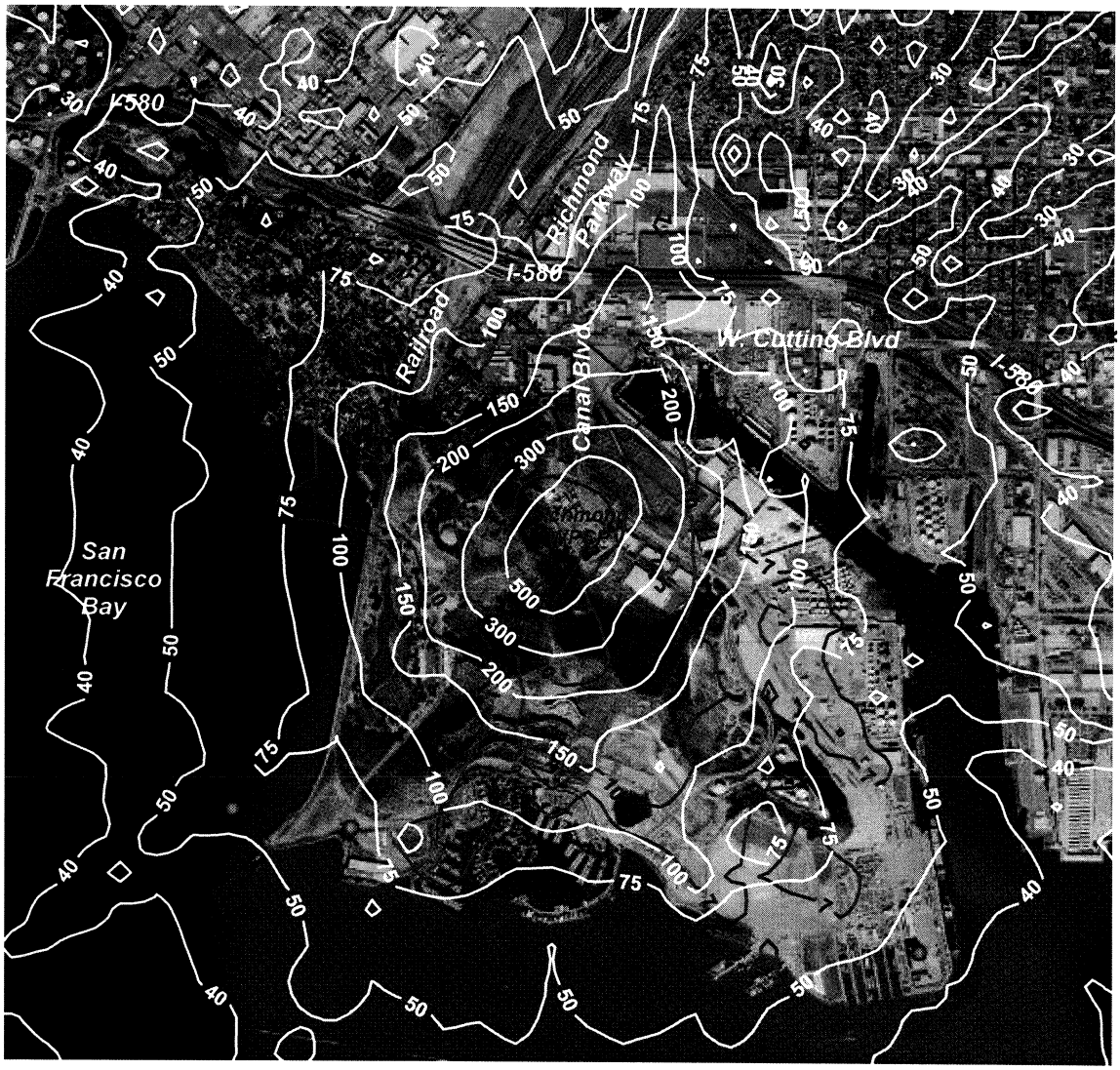


Richmond WPCP
Existing Conditions
Primary Sedimentation Tanks Only
Peak DT Contours

Figure 15

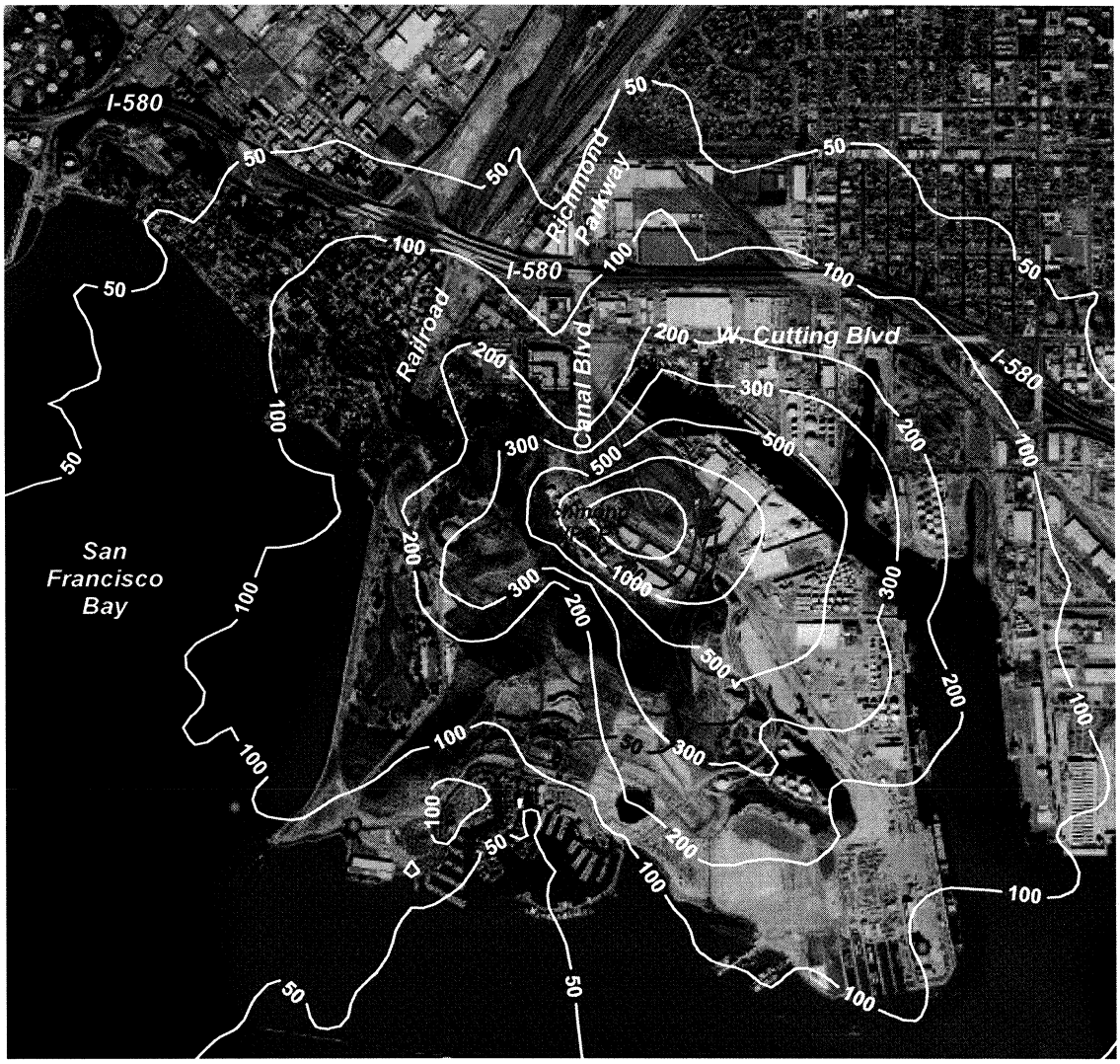
Richmond WPCP
Dewatering Odor Control System Only
Peak DT Contours

Figure 16



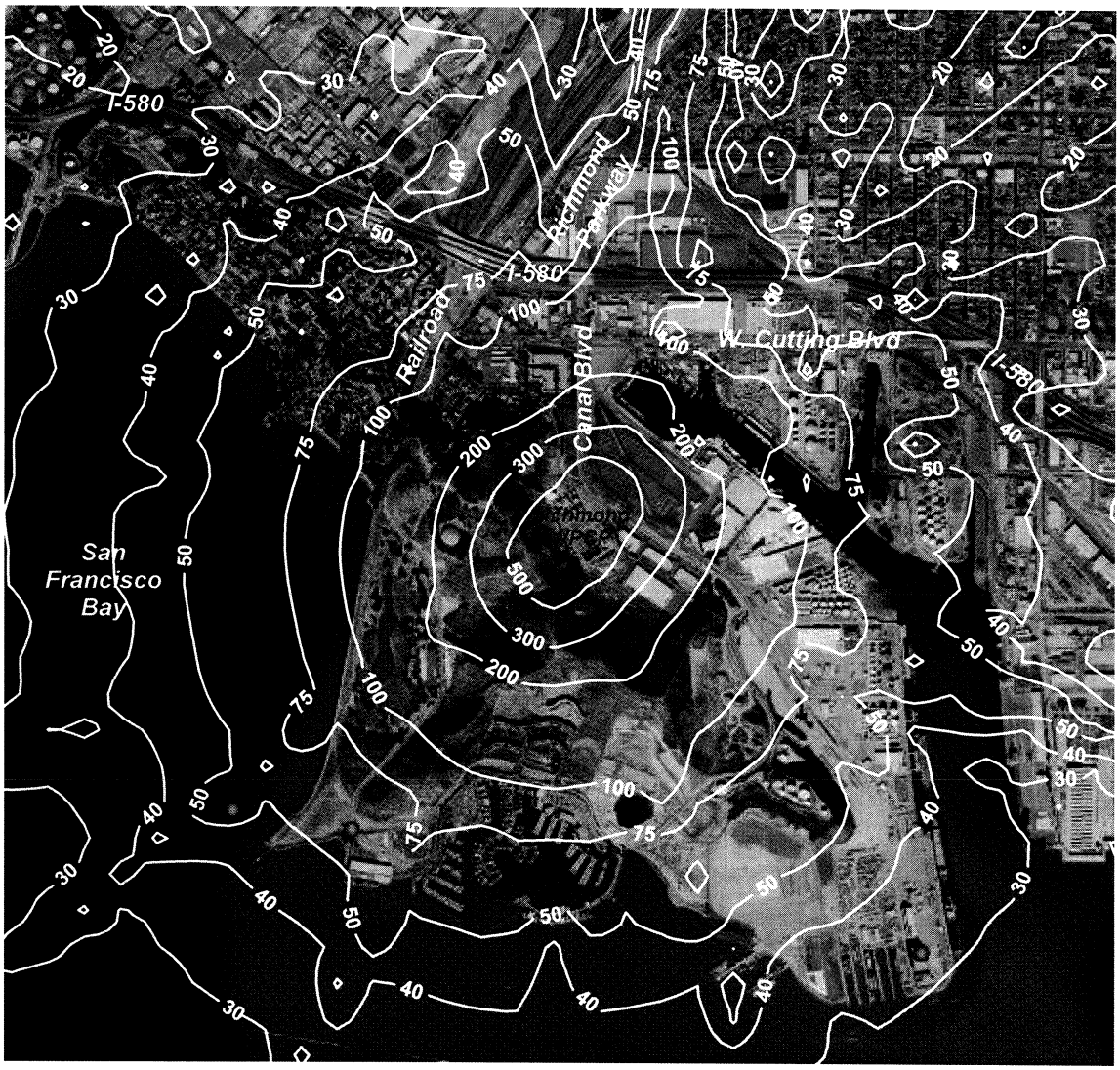
Richmond WPCP
Existing Conditions (White) &
Proposed Dewatering Odor Control System (Orange)
Peak DT Contours

Figure 17



Richmond WPCP
Existing Conditions (Yellow) &
Proposed Dewatering Odor Control System (Orange)
Frequency Contours
(Hrs/Yr > 7 DT)

Figure 18



Richmond WPCP
With IPS Odor Control System (OC1)
Peak DT Contours

Figure 19

Richmond WPCP
With IPS Odor Control System (OC1)
Frequency Contours
(Hrs/Yr > 7 DT)

Figure 20

impact on odor frequency, but odors from the plant could still be detectable (< 7 DT) in 100 – 200 hours per year in this area.

The model predicts minor improvements in both Peak DT and odor frequencies to the south in the harbor area and to the west in the Bay shoreline park area. Peak DT values remain close to 100 and odor frequencies are approximately 100 hours per year in these areas.

Odor Control Scenario 2 (OC2)

Figures 21 & 22 show the Peak DT and Odor Frequency contour maps for this scenario.

The model predicts only minor improvements in both Peak DT and odor frequencies, compared to OC1, in all directions around the plant.

Odor Control Scenario 3 (OC3)

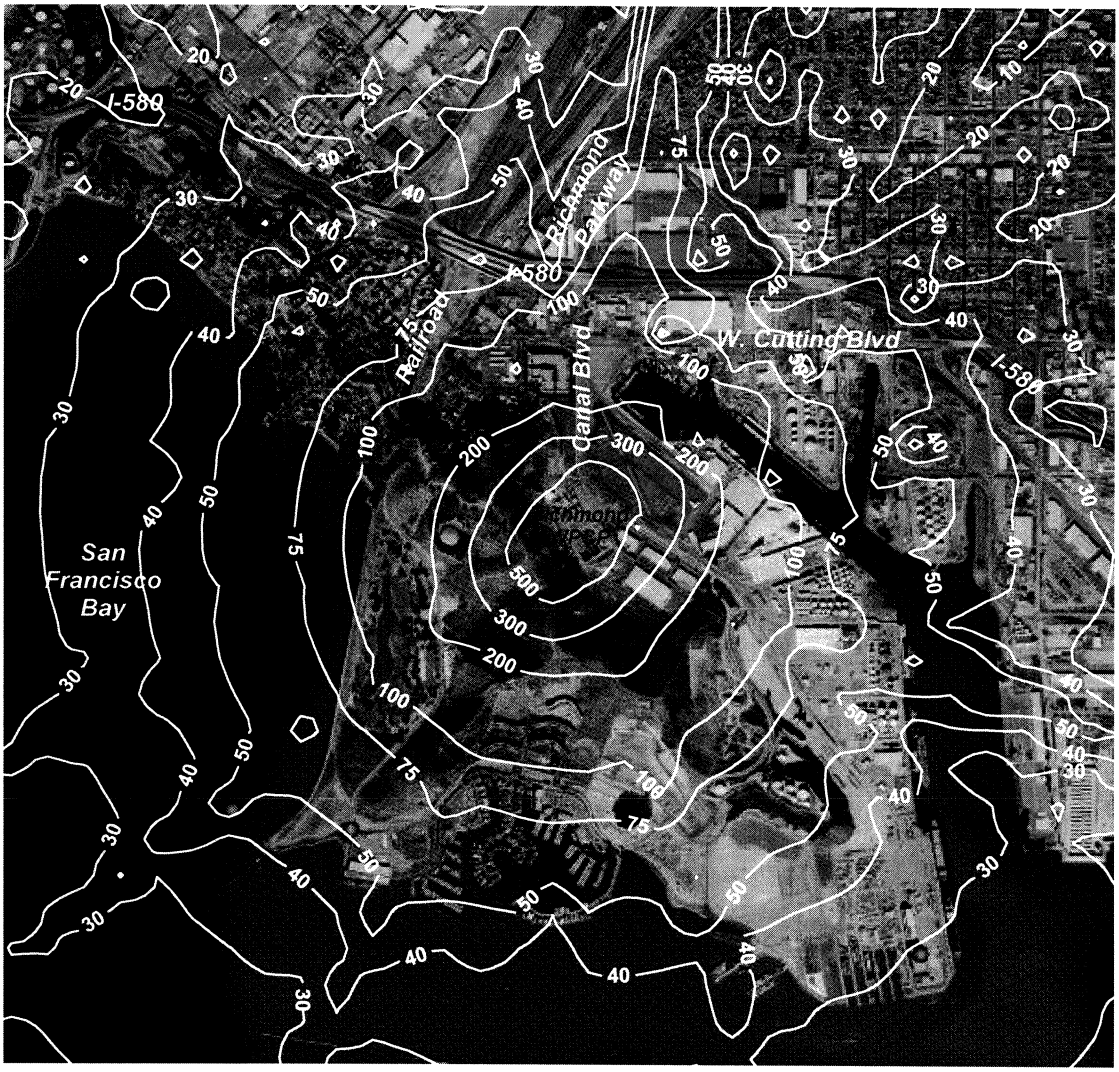
Figures 23 & 24 show the Peak DT and Odor Frequency contour maps for this scenario.

The model predicts significant improvements in both Peak DT and odor frequencies. The model predicts Peak DT levels reaching only 7 – 10 in all areas around the plant. These levels would be barely, if at all, detectable under worst case conditions. In addition, the odor frequency contours show that odors from the plant would rarely, less than 50 hours per year, exceed the 7 DT detection threshold in all areas around the plant.

Comparisons of All Scenarios

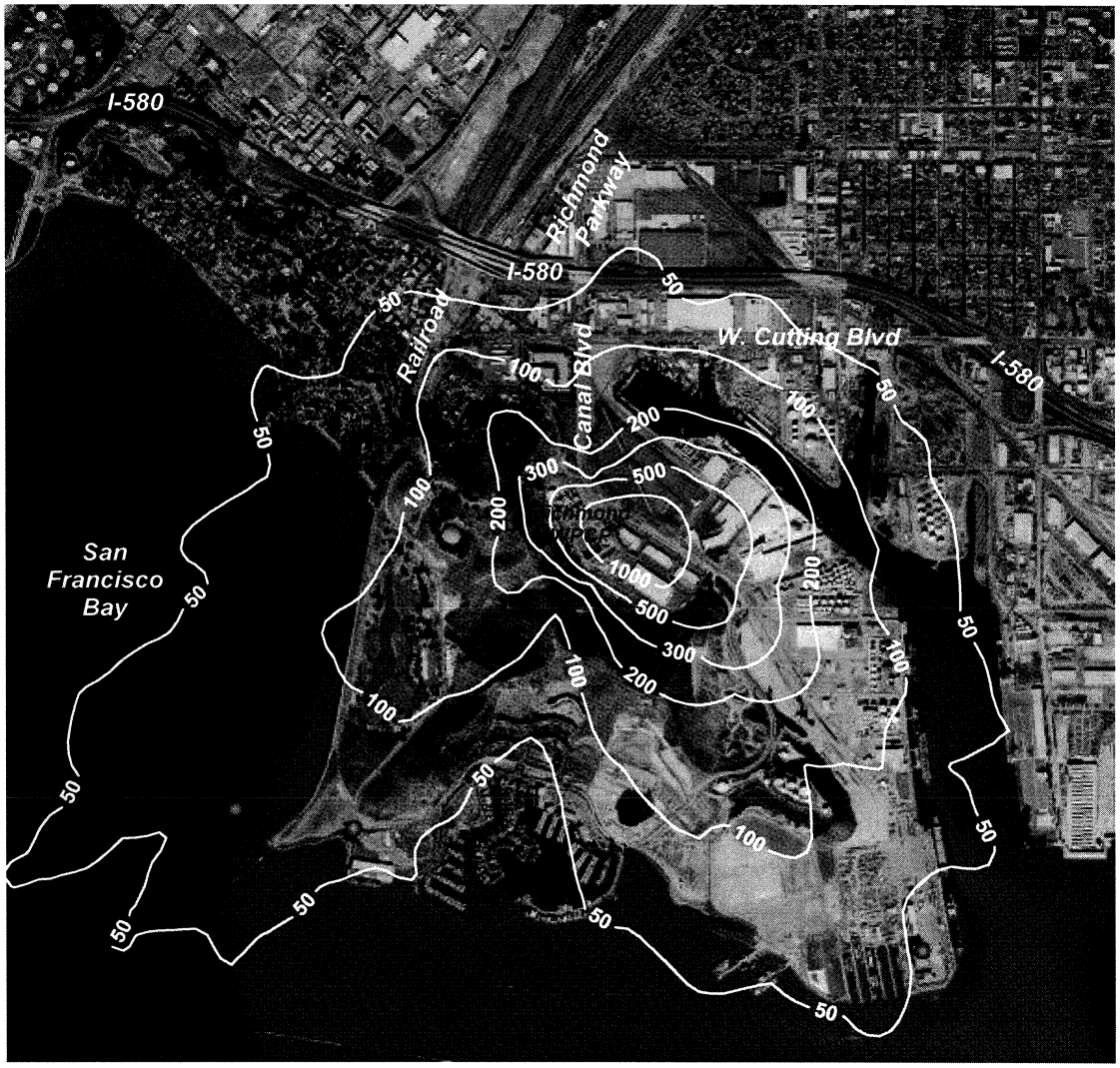
Figure 25 compares the 50 Peak DT contours for each modeling scenario.

Figure 26 compares the 50 Hour Frequency contours for each modeling scenario.



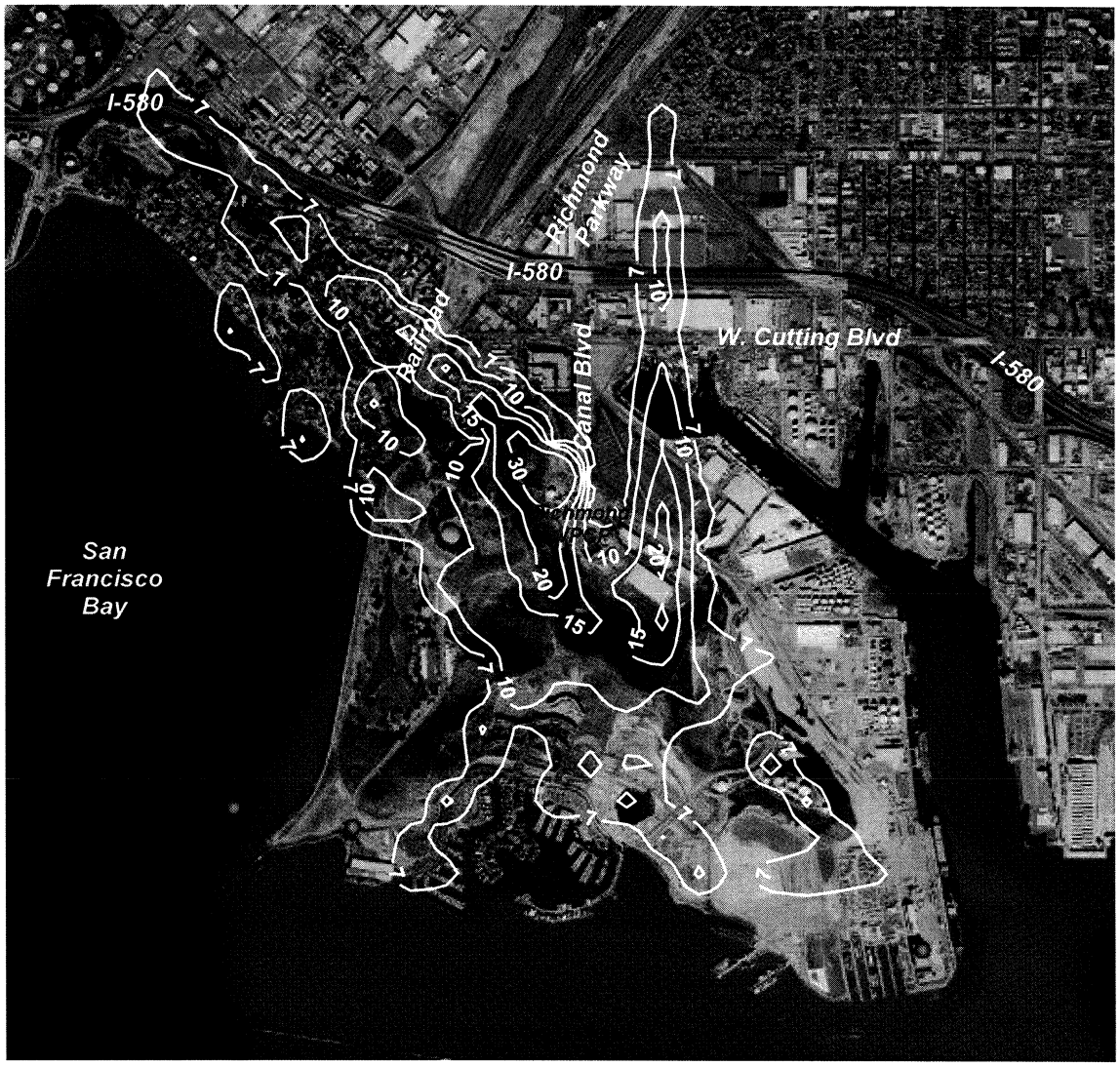
Richmond WPCP
With IPS & Grit Structure Odor Control System (OC2)
Peak DT Contours

Figure 21



Richmond WPCP
With IPS & Grit Structure Odor Control System (OC2)
Frequency Contours
(Hrs/Yr > 7 DT)

Figure 22



Richmond WPCP
With IPS & Grit Structure Odor Control System and Primary Clarifier Odor Control System (OC3)
Peak DT Contours

Figure 23

Richmond WPCP
With IPS & Grit Structure Odor Control System and Primary Sedimentation Odor Control System (OC3)
Frequency Contours
(Hrs/Yr > 7 DT)

Figure 24

Richmond WPCP
All Scenario Comparison
50 Peak DT Contours Only

Figure 25

Richmond WPCP
All Scenario Comparison
50 Frequency Contours Only
(Hrs/Yr > 7 DT)

Figure 26

5.0 SUMMARY OF CONCLUSIONS

The following is a summary of the primary conclusions from the odor evaluation and odor dispersion modeling study:

1. Odor emissions from the RWPCP are significant beyond the plant fence line under existing conditions. The modeling indicates odor levels can be moderately high under worst case conditions in all directions around the plant. The model indicates the plant odor detectability frequency is low to moderate in all directions around the plant.

2. The Influent Pump Station (IPS) odor sources (Wet Well Room exhaust and influent channels) and the Primary Sedimentation Tanks are the primary contributors to off-site odor emissions under existing conditions. The IPS odor sources account for over 54% of the total plant odor emissions, as tested during the odor evaluation. The Primary Sedimentation Tanks account for over 39% of the total plant odor emissions. The odor dispersion modeling shows the Primary Sedimentation Tanks have the highest odor impact on the surrounding community. The reason these tanks have a larger impact than the IPS odor sources is because they are large area sources and the air emissions do not disperse and dilute in the atmosphere as well as higher velocity point sources like the Wet Well Room exhaust.

3. The Grit Tanks and channels also contribute significantly to off-site odors, but to a much less degree than the IPS and Primary Sedimentation Tanks.

4. H_2S concentrations in the plant influent channels, wet wells, grit tanks and channels, and the primary sedimentation tanks can be high, with measurements in the 10 – 60 ppm range during the odor evaluation. H_2S, along with moderate concentrations of methyl mercaptan and dimethyl sulfide, are likely the primary compounds contributing to the high odor levels in these processes.

5. The landfill leachate pumped to the plant influent every other day does not increase plant odors, based on the data collected during this odor evaluation. The odor level was higher in the air sample collected from the screen channel during leachate pumping, but the odor levels in the air samples collected from the wet well room exhaust, grit tank surface and primary sedimentation tanks effluent troughs were actually lower during leachate pumping.

6. Odor levels measured in the aeration basins and DAF tank were low to moderate and do not contribute significantly to off-site odors.

7. Digester gas leaks can be odorous, however, there are no significant digester gas leaks and leak air volumes are low. Locations where digester gas leaks may occur include:

    - Dystor air level vents
    - Pressure relief valves
    - Minor cover leaks
    - Supernatant drains open to atmosphere (manhole in front of Admin Bldg)

    Since these potential leak locations are small in air volume and infrequent, they do not appear to contribute significantly to off-site odors.

8. A biosolids dewatering facility is planned for the RWPCP. The proposed dewatering processes will include centrifuges, biosolids conveyors, and a truck loading bay. With the odor control system proposed for the dewatering alternative that produces the highest air flow to be treated, this facility is not expected to contribute significantly to off-site odors.

9. The ventilation system for the screen channel well is not working. The purpose of this ventilation system is to provide for a safe and comfortable working environment, as well as mitigation of H_2S corrosion of equipment in this area.

10. The exhaust ductwork from the wet well room exhaust fan is badly corroded and leaking significantly. This is a likely source of H_2S and raw sewer odors detected by workers in the office areas in the IPS building. The HVAC system for the office area in the IPS building is also not functioning.

11. The HVAC system for the Administration Building and Laboratory is not functioning. No significant H_2S concentrations were measured in the office and lab areas during the odor evaluation, however, plant odors can be annoying to workers in these office and lab areas. In addition, the drains in this building terminate in a manhole in front of the Admin Bldg that also contains the digester supernatant drain. It is possible for the odorous air in this manhole to back up through the drain lines, if drain traps are not functioning properly.

12. Odor testing was also conducted at the WCWPCP drying beds where the RWPCP digested biosolids is pumped. This testing was conducted to follow-up on testing WEA conducted for the WCWD in 2003. Odors and H_2S concentrations in the pumped biosolids measured during the current odor evaluation were higher than measured during the 2003 WCWD odor evaluation.

6.0 ODOR CONTROL TECHNOLOGY ALTERNATIVES

Biological odor control technologies (Biofilters and/or Biotrickling Scrubbers) are recommended for new air treatment systems at the Richmond WPCP applications. Biological air treatment systems have the following advantages over chemical scrubbers and carbon adsorption in these applications:

- Proven effectiveness in treating the moderate to high H_2S concentrations and H_2S-related odors in the plant influent, grit tanks and channels, and primary sedimentation tanks. Also, proven effectiveness in treating odorous air from dewatering processes.
- Provide good pH and acid control even with higher H_2S concentrations
- Lower operating and maintenance costs, and lower overall life cycle costs, than chemical scrubbers
- Ease of operation and maintenance, especially compared to chemical scrubbers
- No ongoing chemical costs, storage or handling is required
- Current state-of-the-art medias last for a minimum of ten years before requiring replacement

While chemical scrubbers may have a slightly lower capital cost than the biological alternatives in these applications, the significantly lower costs for operating and maintaining the biological systems quickly makes up for the slightly higher capital cost in a life cycle cost comparison.

Detailed descriptions of the odor control technologies considered are included in **Appendix D**.

7.0 COST ESTIMATES

Table 5 shows the preliminary estimated capital, operating and life cycle costs for the three odor control scenarios described in the Odor Dispersion Modeling section of this report (Section 4.3.1). These estimates are based on equipment required for odor control systems only and do not include costs to improve the existing HVAC systems in the office areas.

The capital cost estimate for Odor Control Scenario 1 (OC1) is $727,000. The annual O&M cost estimate is $40,000. The total annual cost estimate is $103,000.

Table 5
Richmond WPCP
Odor Evaluation
Capital, Operating and Life Cycle Cost Estimates

Capital Costs	**OC1**	**OC2**	**OC3**
Equipment	$338,440	$620,706	$1,468,336
Installation (30%)	$101,532	$186,212	$440,501
Contractor Overhead & Profit (15%)	$65,996	$121,038	$286,326
Engineering (15%)	$75,895	$139,193	$329,274
Contingency (25%)	$145,466	$266,787	$631,109
Total Capital Cost	**$727,000**	**$1,334,000**	**$3,156,000**
Principal	$727,000	$1,334,000	$3,156,000
APR	6.0%	6.0%	6.0%
Years	20	20	20
Amortized Capital Costs	**$63,383**	**$116,304**	**$275,154**
Annual O&M Costs			
Electricity ($0.14/kWH)	$27,447	$36,596	$73,192
Water	$0	$0	$0
Nutrients	$0	$0	$0
Media Replacement (media cost only)	$2,587	$5,173	$10,346
Maintenance	$10,400	$13,000	$15,600
Total Annual O&M Costs	**$40,000**	**$55,000**	**$99,000**
Total Annual Costs	**$103,000**	**$171,000**	**$374,000**

Notes:
(1) Equipment costs include biotrickling scrubber odor control systems, ductwork, and all other equipment and materials necessary for a complete installation.
(2) Amortized Capital Costs are based on a 20 year life and a 6.0% APR.
(3) Water & nutrient costs assume secondary effluent used for biological systems irrigation.

The capital cost estimate for Odor Control Scenario 2 (OC2) is $1,334,000, which includes the improvements in OC1. The annual O&M cost estimate is $55,000. The total annual cost estimate is $171,000.

The capital cost estimate for Odor Control Scenario 3 (OC3) is $3,156,000, which includes the improvements in OC1 and OC2. The annual O&M cost estimate is $99,000. The total annual cost estimate is $374,000.

8.0 RECOMMENDATIONS

The following is a summary of the primary recommendations based on the odor evaluation and odor dispersion modeling study:

1. The City and Veolia should consider implementing Odor Control Scenario 3 (OC3) in order to effectively mitigate off-site odors from the RWPCP. This evaluation shows that OC1 & OC2 lessen the odor impacts both in strength and frequency in the communities surrounding the plant. However, the modeling indicates odors will still be detectable at nuisance levels in the surrounding communities in both the OC1 and OC2 scenarios. This evaluation shows that odors from the plant will rarely be at detectable levels in the surrounding communities in the OC3 scenario.

2. The IPS Building ventilation systems are in disrepair and the ventilation system in the screen channel well does not function at all. For reasons of worker safety and compliance with the ventilation requirements in the National Fire Protection Association Standard for Fire Protection in Wastewater Treatment And Collection Facilities (NFPA 820), these ventilation systems must be corrected. If a phased approach to implementing plant odor control systems is preferred, the OC1 scenario should be implemented first. This scenario provides improved ventilation in the IPS structure which will significantly improve worker safety in this building. Implementing this scenario will also lessen the odor impacts in the surrounding communities, as discussed above.

3. Odor mitigation should be considered during the design of the centrifuge dewatering facility. The recommended odor sources to be controlled in this facility include the centrate vents, biosolids conveyors, and truck loading bay.

4. Biological odor control technologies, such as biotrickling scrubbers and biofilters, should be considered for application at the RWPCP processes, including the future dewatering facility. Selection of a specific odor control system or systems would be made during the preliminary design process.

Advantages of biological odor control technologies compared to other odor control technologies include:

- Proven effectiveness in many wastewater treatment applications
- H_2S removal efficiencies typically greater than 99%
- Provides good pH and acid control, even with high H_2S concentrations
- Lower operating and maintenance costs, compared to chemical treatment technologies
- Ease of operation and maintenance, compared to chemical scrubbers
- No ongoing chemical costs, storage or handling required
- Long media life between replacements
- Biological air treatment is more environmentally friendly and safer than chemical treatment

Disadvantages of biological odor control technologies compared to other odor control technologies include:

- Higher capital costs, especially compared to carbon adsorbers and chemical feed systems
- Requires biological acclimation period for effective treatment
- May require ongoing nutrient addition, if secondary effluent does not contain sufficient nutrients

5. The HVAC systems for the Administration and Laboratory Building and the IPS Building office areas should be repaired or replaced to provide adequate heating, ventilation, and air conditioning for these office and lab areas. The improved ventilation will significantly improve the working environment in these areas by filtering plant odors from the make-up air.

6. The digested biosolids pumping to the WCWPCP should be discontinued as quickly as possible following the RWPCP dewatering facility installation to assist in mitigating the WCWPCP drying bed odors.

Appendix A

St. Croix Sensory, Inc. Reports

Columbia Analytical Services, Inc. Reports

St. Croix Sensory, Inc.

Webster Environmental

Richmond, CA

Odor Evaluation Report

Report No. 717805
06/27/07

Data Release Authorization:
Melissa McGinley

Melissa McGinley
Laboratory Associate

Reviewed and Approved:

Charles M. McGinley, P.E.
Technical Director

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Email: stcroix@fivesenses.com

St. Croix Sensory, Inc.

Odor Evaluation Report

Client: Webster Environmental

Project: Richmond, CA

Report No.: **717805**

Evaluation Date: 06/27/07

			ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		
#	Field No.	Sample Description	Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	Comments
1	1	Screen Channel	1,100	590					
2	2	Wet Well Exhaust	3,000	1,500					
3	3	Grit Tank Surface	9,200	5,800					
4	4	Primary Sed. Surface	16,000	11,000					
5	5	Primary Sed. Effluent Trough	15,000	9,700					
6	6	DAF Surface							**Sample bag was received without sample. Sample bag was split during shipment.**
7	7	WCWD Drying Bed	23,000	16,000					
8									
9									
10									

P.O. Box 313, 3549 Lake Elmo Ave. N., Lake Elmo, MN 55042 U.S.A. Tel:800-879-9231 Fax:651-439-1065 E-mail:stcroix@fivesenses.com Web:www.fivesenses.com

St. Croix Sensory, Inc.

CHAIN OF CUSTODY RECORD FOR ODOR SAMPLES

Page 1 of 1

Client: Webster Environmental | Sampled By: Buz Rush

Project Name: Richmond, CA | Sampling Date: 6/26/07

Comments: Thresholds Only

Odor Evaluations Requested: (X)

Line No.	Field No.	Sample Description	Sample Time	Field H_2S (ppm)	Odor Concentration* (Detection & Recognition Threshold)	Odor Intensity* (PPM 1-Butanol)	Odor Characterization (Hedonic Tone & Descriptors)	Odor Persistency (*Dose-Response**)	For Laboratory use Only: Odor Evaluation Report No. / Laboratory Sample No. LN	FN
1	1	Screen Channel	9:15a	0.12	X					
2	2	Wet Well Exhaust	10:15a	0.9	X					
3	3	Grit Tank Surface	10:35a	13	X					
4	4	Primary Sed. Surface	11:20a	15	X					
5	5	Primary Sed. Effluent Trough	11:45a	>50	X					
6	6	DAF Surface	12:30p	0.007	X					
7	7	WCWD Drying Bed	2:50p	>50	X					
8										
9										
10										
11										
12										

Transmittal

Number of Shipping Boxes 1

Relinquished By	Date	Time	Accepted By	Date	Time	Comments & Exceptions Noted
	6/26/07	4:00pm				
Received at St. Croix Sensory Laboratory			Matthew Kolodt	6/27/07	10:25	#6 split in box

*Odor Concentration: ASTM E679-04 and EN13725:2003 and Odor Intensity: ASTM E544-99(2004)

St. Croix Sensory, Inc. ♦ 3549 Lake Elmo Avenue North ♦ Lake Elmo, MN 55042 U.S.A.♦ Tel:800-879-9231 ♦ Fax:651-439-1065 ♦ Email:reports@fivesenses.com ♦ Web:www.fivesenses.com

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St. Croix Sensory, Inc.

Webster Environmental

Richmond, CA

Odor Evaluation Report

Report No. 717901
06/28/07

Data Release Authorization:
Melissa McGinley

Melissa McGinley
Laboratory Associate

Reviewed and Approved:

Charles M. McGinley, P.E.
Technical Director

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St. Croix Sensory, Inc. **Odor Evaluation Report**

Client: Webster Environmental

Project: Richmond, CA

Report No.: **717901**

Evaluation Date: 06/28/07

			ASTM E679 & EN13725		ASTM E544	PERSISTENCY	CHARACTERIZATION		
#	Field No.	Sample Description	Detection Threshold	Recognition Threshold	Intensity	Dose-Response Slope	Hedonic Tone	Principal Odor Descriptors	Comments
1	1	Aeration Tank	120	90					
2	2	DAF Surface	1,300	760					
3	3	WCWD Drying Bed #2	2,400	1,300					
4	4	Screen Channel #2	4,200	2,600					
5	5	Wet Well Exhaust #2	2,100	1,400					
6	6	Grit Tank Surface #2	3,700	2,600					
7	7	Primary Sed. Effluent Trough	4,500	3,000					
8	8	Manhole #2	4,200	2,600					
9									
10									

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St. Croix Sensory, Inc.

CHAIN OF CUSTODY RECORD FOR ODOR SAMPLES

Page 1 of 1

Client: Webster Environmental | Sampled By: Buz Rush

Project Name: Richmond, CA | Sampling Date: 6/27/07

Comments: #2 replaces sample from 6/26/07 (bag slit)

Odor Evaluations Requested: (X)

For Laboratory use Only

Odor Evaluation Report No.

Line No.	Field No.	Sample Description	Sample Time	Field H_2S (ppm)	Odor Concentration* (Detection & Recognition Threshold)	Odor Intensity* (PPM 1-Butanol)	Odor Characterization (Hedonic Tone & Descriptors)	Odor Persistency (~Dose-Response?)	Laboratory Sample No. LN	Laboratory Sample No. FN
1	1	Aeration Tank	9:15am	0.0	X					
2	2	DAF Surface	9:45am	0.15	X					
3	3	WCMD Drying Bed #2	10:45am	0.94	X					
4	4	Screen Channel #2	1:20pm	13	X					
5	5	Wet Well Exhaust #2	1:45pm	11	X					
6	6	Grit Tank Surface #2	2:15pm	15	X					
7	7	Primary Sed. Effluent Trough	2:55pm	26	X					
8	8	Manhole #2	3:40pm	8	X					
9										
10										
11										
12										

Transmittal

Number of Shipping Boxes: 1

Relinquished By	Date	Time	Accepted By	Date	Time	Comments & Exceptions Noted
JW Rudow	6/27/07	4:30pm				
Received at St. Croix Sensory Laboratory			Matthew Kolodziej	6/28/07	16:10	

*Odor Concentration: ASTM E679-04 and EN13725:2003 and Odor Intensity: ASTM E544-99(2004)

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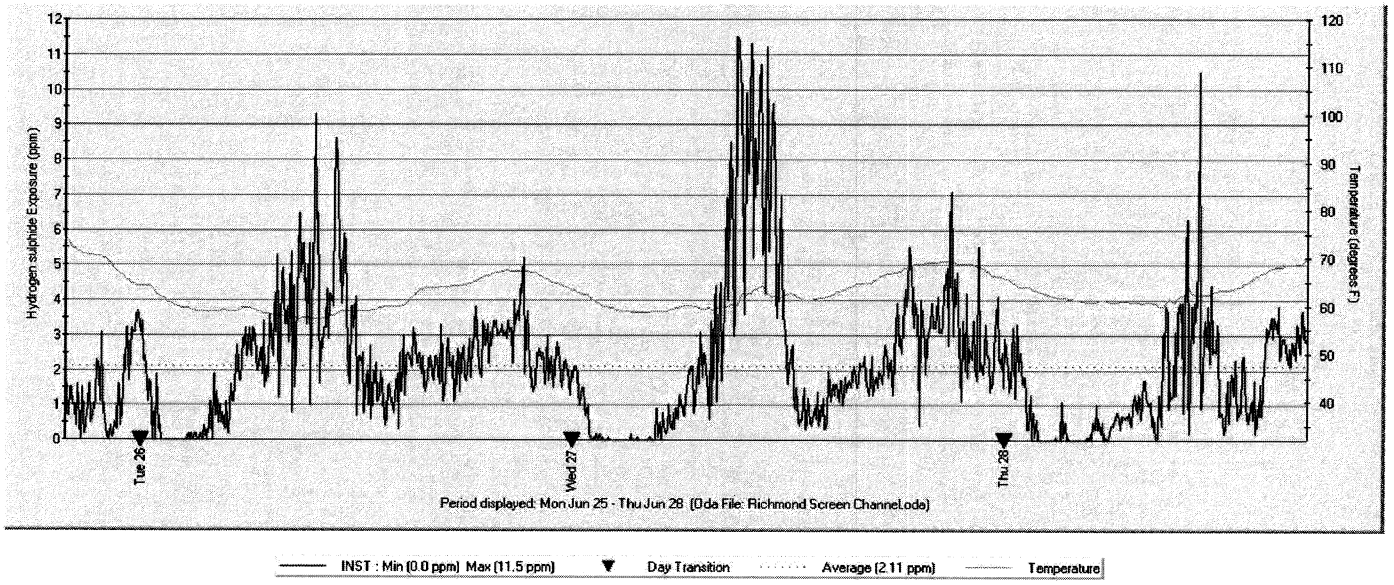
Appendix B

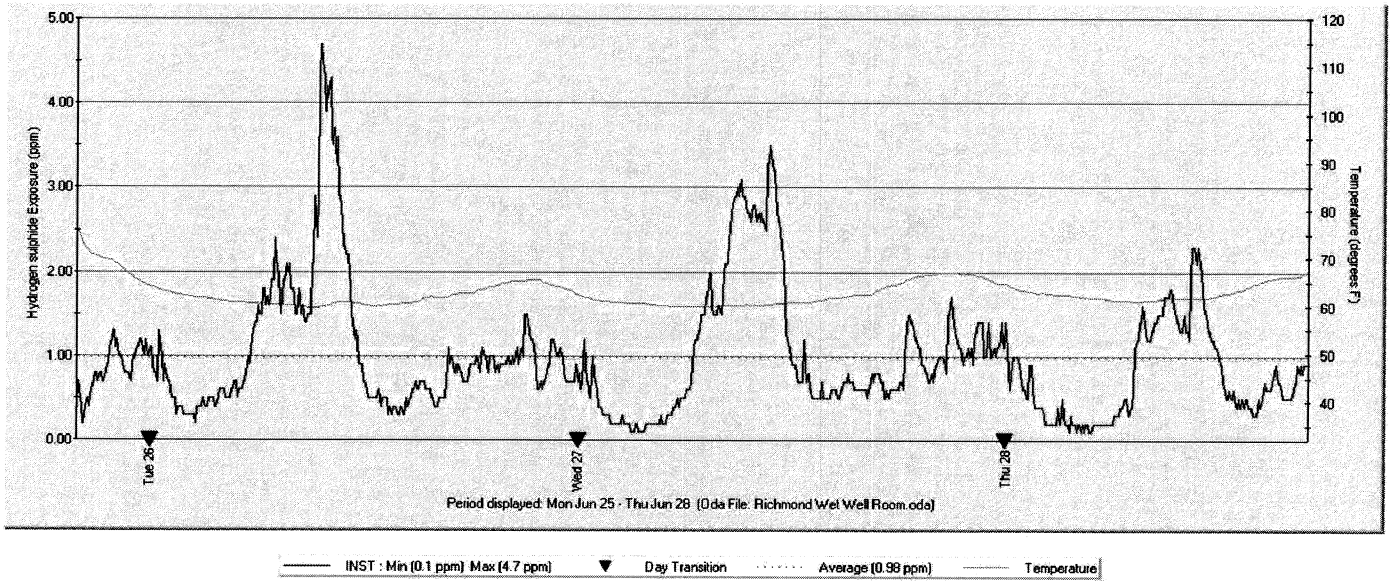
OdaLog Charts

Richmond, CA WPCP (OdaLog: OL45047495)



Screen Channel

Richmond, CA WPCP (OdaLog: OL05063145)



Wet Well Room

Appendix C

Odor Dispersion Modeling Data

Richmond, CA WPCP Odor Modeling Data 8/17/2007

Model: Base **Existing WPCP Processes As Tested**

Point Sources

ID #	Description	Easting UTM X Coord (m)	Northing UTM Y Coord (m)	above MSL Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T ($\mu g/m^3$)	OER (g/s)	OER (lb/hr)	above base Stack Height (ft)	Diameter (ft)	Temp (F)	Area (ft^2)	Vel fpm
WWExh	Wet Well Room Exhaust	554,637.62	4,197,151.65	auto	10,700	5.05	3,000	15,150	120,234	17.0	3.45	80	9	1,141
MH2	Manhole 2	554,615.71	4,197,151.81	auto	40	0.02	4,200	79	629	0.0	0.72	80	0.4	100
DigVent	Digester Cover Vent	554,547.06	4,197,151.20	auto	40	0.02	4,200	79	629	4.0	0.72	80	0.4	100
DAFTk1	DAF Tank 1	554,605.79	4,196,997.03	auto	81	0.04	1,300	50	394	8.0	35	80	962	0.08

Peak Factor: 15.49 **Use 15 second averaging period**
Odor Threshold for Frequency Contours = 7 **DT**
Flux Chamber air flow rate = 0.126 cfm/ft^2

Rectangular Area/Line Sources

ID #	Description	Easting UTM X Coord (m)	Northing UTM Y Coord (m)	above MSL Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T ($\mu g/m^3$)	OER (g/s)	OER (lb/hr)	OER/ft^2	above base Release Height (ft)	X Length (ft)	Y Length (ft)	Area (ft^2)
ScreenCh	Screen Channels	554,627.40	4,197,157.88	auto	24	0.01	4,200	48	381	1.98	0.0	8	24	192
GritTank	Grit Tank Influent Box, Tanks & Channels	554,663.90	4,197,097.59	auto	401	0.19	9,200	1,740	13,813	4.34	11.5	24	132	3,181
PriSedTk	Primary Sedimentation Tanks 1 & 2	554,633.13	4,197,038.39	auto	1,488	0.70	16,000	11,235	89,164	7.55	7.0	164	72	11,808
AerTk1	Aeration Tank 1	554,649.32	4,196,970.44	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075
AerTk2	Aeration Tank 2	554,663.44	4,196,981.13	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075
	WCWD Drying Bed #3 (during pumping)						23,000							
	WCWD Drying Bed #3 (day after pumping)						2,400							

Buildings/Structures

ID #	Description	Easting UTM X Coord (m)	Northing UTM Y Coord (m)	above MSL Base Elev (ft)	above base Height (ft)	X Length (ft)	Y Length (ft)	
InfPS	Influent PS Bldg	554,632.25	4,197,142.35	auto	16	44	51	-49°
Admin	Admin Bldg	554,598.41	4,197,126.81	auto	15	70	51	-49°
SecClar1	Secondary Clarifier 1	554,670.54	4,196,940.82	auto	6	114	114	-49°
SecClar2	Secondary Clarifier 2	554,698.33	4,196,960.08	auto	6	114	114	-49°
SecClar3	Secondary Clarifier 3	554,735.31	4,197,001.74	auto	6			
PriDig1	Primary Digester 1	554,571.02	4,197,131.86	auto	30	102		
PriDig2	Primary Digester 2	554,546.59	4,197,169.74	auto	30	102		
DigCtrl	Digester Control Bldg	554,556.35	4,197,146.34	auto	15	20	26	-49°

Richmond, CA WPCP Odor Modeling Data 8/28/2007

Model: BaseDW **Existing WPCP Processes with Dewatering Processes**

Point Sources

		Easting	Northing	above MSL						above base					
ID #	Description	UTM X Coord (m)	UTM Y Coord (m)	Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T ($\mu g/m^3$)	OER (g/s)	OER (lb/hr)	Stack Height (ft)	Diameter (ft)	Temp (F)	Area (ft^2)	Vel fpm	
WWExh	Wet Well Room Exhaust	554,637.62	4,197,151.65	auto	10,700	5.05	3,000	15,150	120,234	17.0	3.45	80	9	1,141	
MH2	Manhole 2	554,615.71	4,197,151.81	auto	40	0.02	4,200	79	629	0.0	0.72	80	0.4	100	use 40 cfm & 100 fpm
DigVent	Digester Cover Vent	554,547.06	4,197,151.20	auto	40	0.02	4,200	79	629	4.0	0.72	80	0.4	100	use 40 cfm & 100 fpm
DAFTk1	DAF Tank 1	554,605.79	4,196,997.03	auto	81	0.04	1,300	50	394	8.0	35	80	962	0.08	
DWOC1	Dewatering Facility OC System 1 (Inside Bldg)			auto	50,000	23.60	300	7,079	56,184	25.0	5	80	20	2,546.47	
DWOC2	Dewatering Facility OC System 2 (Outside)			auto	9,600	4.53	300	1,359	10,787	25.0	2.5	80	5	1,955.69	

Peak Factor: 15.49 **Use 15 second averaging period**
Odor Threshold for Frequency Contours = 7 **DT**
Flux Chamber air flow rate = 0.126 **cfm/ft^2**

Rectangular Area/Line Sources

		Easting	Northing	above MSL							above base				
ID #	Description	UTM X Coord (m)	UTM Y Coord (m)	Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T ($\mu g/m^3$)	OER (g/s)	OER (lb/hr)	OER/ft^2	Release Height (ft)	X Length (ft)	Y Length (ft)	Area (ft^2)	
ScreenCh	Screen Channels	554,627.40	4,197,157.88	auto	24	0.01	4,200	48	381	1.98	0.0	8	24	192	
GritTank	Grit Tank Influent Box, Tanks & Channels	554,663.90	4,197,097.59	auto	401	0.19	9,200	1,740	13,813	4.34	11.5	24	132	3,181	
PriSedTk	Primary Sedimentation Tanks 1 & 2	554,633.13	4,197,038.39	auto	1,488	0.70	16,000	11,235	89,164	7.55	7.0	164	72	11,808	
AerTk1	Aeration Tank 1	554,649.32	4,196,970.44	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075	
AerTk2	Aeration Tank 2	554,663.44	4,196,981.13	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075	
	WCWD Drying Bed #3 (during pumping)						23,000								3,700 in 2003
	WCWD Drying Bed #3 (day after pumping)						2,400								1,200 in 2003

Buildings/Structures

		Easting	Northing	above MSL	above base		
ID #	Description	UTM X Coord (m)	UTM Y Coord (m)	Base Elev (ft)	Height (ft)	X Length (ft)	Y Length (ft)	
InfPS	Influent PS Bldg	554,632.25	4,197,142.35	auto	16	44	51	-49°
Admin	Admin Bldg	554,598.41	4,197,126.81	auto	15	70	51	-49°
SecClar1	Secondary Clarifier 1	554,670.54	4,196,940.82	auto	6	114	114	-49°
SecClar2	Secondary Clarifier 2	554,698.33	4,196,960.08	auto	6	114	114	-49°
SecClar3	Secondary Clarifier 3	554,735.31	4,197,001.74	auto	6			
PriDig1	Primary Digester 1	554,571.02	4,197,131.86	auto	30	102		
PriDig2	Primary Digester 2	554,546.59	4,197,169.74	auto	30	102		
DigCtrl	Digester Control Bldg	554,556.35	4,197,146.34	auto	15	20	26	-49°

Richmond, CA WPCP Odor Modeling Data 8/21/2007

Model: OC1 **Odor Control for IPS**

Point Sources

ID #	Description	Easting UTM X Coord (m)	Northing UTM Y Coord (m)	above MSL Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T ($\mu g/m^3$)	OER (g/s)	OER (lb/hr)	above base Stack Height (ft)	Diameter (ft)	Temp (F)	Area (ft^2)	Vel fpm
MH2	Manhole 2	554,615.71	4,197,151.81	auto	40	0.02	4,200	79	629	0.0	0.72	80	0.4	100
DigVent	Digester Cover Vent	554,547.06	4,197,151.20	auto	40	0.02	4,200	79	629	4.0	0.72	80	0.4	100
DAFTk1	DAF Tank 1	554,605.79	4,196,997.03	auto	81	0.04	1,300	50	394	8.0	35	80	962	0.08
OC1	IPS OC System			auto	8,800	4.15	300	1,246	9,888	28.0	2.3	80	4	2,057.97

Peak Factor: 15.49 **Use 15 second averaging period**
Odor Threshold for Frequency Contours = 7 **DT**
Flux Chamber air flow rate = 0.126 cfm/ft^2

Rectangular Area/Line Sources

ID #	Description	Easting UTM X Coord (m)	Northing UTM Y Coord (m)	above MSL Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T ($\mu g/m^3$)	OER (g/s)	OER (lb/hr)	OER/ft^2	above base Release Height (ft)	X Length (ft)	Y Length (ft)	Area (ft^2)
GritTank	Grit Tank Influent Box, Tanks & Channels	554,663.90	4,197,097.59	auto	401	0.19	9,200	1,740	13,813	4.34	11.5	24	132	3,181
PriSedTk	Primary Sedimentation Tanks 1 & 2	554,633.13	4,197,038.39	auto	1,488	0.70	16,000	11,235	89,164	7.55	7.0	164	72	11,808
AerTk1	Aeration Tank 1	554,649.32	4,196,970.44	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075
AerTk2	Aeration Tank 2	554,663.44	4,196,981.13	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075
	WCWD Drying Bed #3 (during pumping)						23,000							
	WCWD Drying Bed #3 (day after pumping)						2,400							

Buildings/Structures

ID #	Description	Easting UTM X Coord (m)	Northing UTM Y Coord (m)	above MSL Base Elev (ft)	above base Height (ft)	X Length (ft)	Y Length (ft)	
InfPS	Influent PS Bldg	554,632.25	4,197,142.35	auto	16	44	51	-49°
Admin	Admin Bldg	554,598.41	4,197,126.81	auto	15	70	51	-49°
SecClar1	Secondary Clarifier 1	554,670.54	4,196,940.82	auto	6	114	114	-49°
SecClar2	Secondary Clarifier 2	554,698.33	4,196,960.08	auto	6	114	114	-49°
SecClar3	Secondary Clarifier 3	554,735.31	4,197,001.74	auto	6			
PriDig1	Primary Digester 1	554,571.02	4,197,131.86	auto	30	102		
PriDig2	Primary Digester 2	554,546.59	4,197,169.74	auto	30	102		
DigCtrl	Digester Control Bldg	554,556.35	4,197,146.34	auto	15	20	26	-49°

Richmond, CA WPCP Odor Modeling Data 8/21/2007

Model: OC2 Odor Control for IPS + Grit Tanks & Channels

Point Sources

ID #	Description	Easting UTM X Coord (m)	Northing UTM Y Coord (m)	above MSL Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T (ou_E/m^3)	OER (g/s)	OER (lb/hr)	above base Stack Height (ft)	Diameter (ft)	Temp (F)	Area (ft^2)	Vel fpm
MH2	Manhole 2	554,615.71	4,197,151.81	auto	40	0.02	4,200	79	629	0.0	0.72	80	0.4	100
DigVent	Digester Cover Vent	554,547.06	4,197,151.20	auto	40	0.02	4,200	79	629	4.0	0.72	80	0.4	100
DAFTk1	DAF Tank 1	554,605.79	4,196,997.03	auto	81	0.04	1,300	50	394	8.0	35	80	962	0.08
OC2a	IPS + Grit OC System			auto	6,150	2.90	300	871	6,911	28.0	2.0	80	3	1,957.60
OC2b	IPS + Grit OC System			auto	6,150	2.90	300	871	6,911	28.0	2.0	80	3	1,957.60

Peak Factor: 15.49 **Use 15 second averaging period**
Odor Threshold for Frequency Contours = 7 **DT**
Flux Chamber air flow rate = 0.126 **cfm/ft^2**

Rectangular Area/Line Sources

ID #	Description	Easting UTM X Coord (m)	Northing UTM Y Coord (m)	above MSL Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T (ou_E/m^3)	OER (g/s)	OER (lb/hr)	OER/ft^2	above base Release Height (ft)	X Length (ft)	Y Length (ft)	Area (ft^2)
PriSedTk	Primary Sedimentation Tanks 1 & 2	554,633.13	4,197,038.39	auto	1,488	0.70	16,000	11,235	89,164	7.55	7.0	164	72	11,808
AerTk1	Aeration Tank 1	554,649.32	4,196,970.44	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075
AerTk2	Aeration Tank 2	554,663.44	4,196,981.13	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075
	WCWD Drying Bed #3 (during pumping)						23,000							
	WCWD Drying Bed #3 (day after pumping)						2,400							

Buildings/Structures

ID #	Description	Easting UTM X Coord (m)	Northing UTM Y Coord (m)	above MSL Base Elev (ft)	above base Height (ft)	X Length (ft)	Y Length (ft)	
InfPS	Influent PS Bldg	554,632.25	4,197,142.35	auto	16	44	51	-49°
Admin	Admin Bldg	554,598.41	4,197,126.81	auto	15	70	51	-49°
SecClar1	Secondary Clarifier 1	554,670.54	4,196,940.82	auto	6	114	114	-49°
SecClar2	Secondary Clarifier 2	554,698.33	4,196,960.08	auto	6	114	114	-49°
SecClar3	Secondary Clarifier 3	554,735.31	4,197,001.74	auto	6			
PriDig1	Primary Digester 1	554,571.02	4,197,131.86	auto	30	102		
PriDig2	Primary Digester 2	554,546.59	4,197,169.74	auto	30	102		
DigCtrl	Digester Control Bldg	554,556.35	4,197,146.34	auto	15	20	26	-49°

Richmond, CA WPCP Odor Modeling Data **8/21/2007**

Model: OC3 **Odor Control for IPS + Grit Tanks & Channels + Primary Sedimentation Tanks**

Point Sources

		Easting	Northing	above MSL						above base				
ID #	Description	UTM X Coord (m)	UTM Y Coord (m)	Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T ($\mu g/m^3$)	OER (g/s)	OER (lb/hr)	Stack Height (ft)	Diameter (ft)	Temp (F)	Area (ft^2)	Vel fpm
MH2	Manhole 2	554,615.71	4,197,151.81	auto	40	0.02	4,200	79	629	0.0	0.72	80	0.4	100
DigVent	Digester Cover Vent	554,547.06	4,197,151.20	auto	40	0.02	4,200	79	629	4.0	0.72	80	0.4	100
DAFTk1	DAF Tank 1	554,605.79	4,196,997.03	auto	81	0.04	1,300	50	394	8.0	35	80	962	0.08
OC2a	IPS + Grit OC System			auto	6,150	2.90	300	871	6,911	28.0	2.0	80	3	1,957.60
OC2b	IPS + Grit OC System			auto	6,150	2.90	300	871	6,911	28.0	2.0	80	3	1,957.60
OC3a	Pri Sed OC System			auto	6,000	2.83	300	850	6,742	28.0	2.0	80	3	1,909.85
OC3b	Pri Sed OC System			auto	6,000	2.83	300	850	6,742	28.0	2.0	80	3	1,909.85

Peak Factor: 15.49 **Use 15 second averaging period**
Odor Threshold for Frequency Contours = 7 **DT**
Flux Chamber air flow rate = 0.126 **cfm/ft^2**

Rectangular Area/Line Sources

		Easting	Northing	above MSL							above base			
ID #	Description	UTM X Coord (m)	UTM Y Coord (m)	Base Elev (ft)	Air Flow (cfm)	Air Flow (m^3/s)	D/T ($\mu g/m^3$)	OER (g/s)	OER (lb/hr)	OER/ft^2	Release Height (ft)	X Length (ft)	Y Length (ft)	Area (ft^2)
AerTk1	Aeration Tank 1	554,649.32	4,196,970.44	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075
AerTk2	Aeration Tank 2	554,663.44	4,196,981.13	auto	1,143	0.540	120	65	514	0.057	8.0	55	165	9,075
	WCWD Drying Bed #3 (during pumping)						23,000							
	WCWD Drying Bed #3 (day after pumping)						2,400							

Buildings/Structures

		Easting	Northing	above MSL	above base			
ID #	Description	UTM X Coord (m)	UTM Y Coord (m)	Base Elev (ft)	Height (ft)	X Length (ft)	Y Length (ft)	
InfPS	Influent PS Bldg	554,632.25	4,197,142.35	auto	16	44	51	-49°
Admin	Admin Bldg	554,598.41	4,197,126.81	auto	15	70	51	-49°
SecClar1	Secondary Clarifier 1	554,670.54	4,196,940.82	auto	6	114	114	-49°
SecClar2	Secondary Clarifier 2	554,698.33	4,196,960.08	auto	6	114	114	-49°
SecClar3	Secondary Clarifier 3	554,735.31	4,197,001.74	auto	6			
PriDig1	Primary Digester 1	554,571.02	4,197,131.86	auto	30	102		
PriDig2	Primary Digester 2	554,546.59	4,197,169.74	auto	30	102		
DigCtrl	Digester Control Bldg	554,556.35	4,197,146.34	auto	15	20	26	-49°

Appendix D

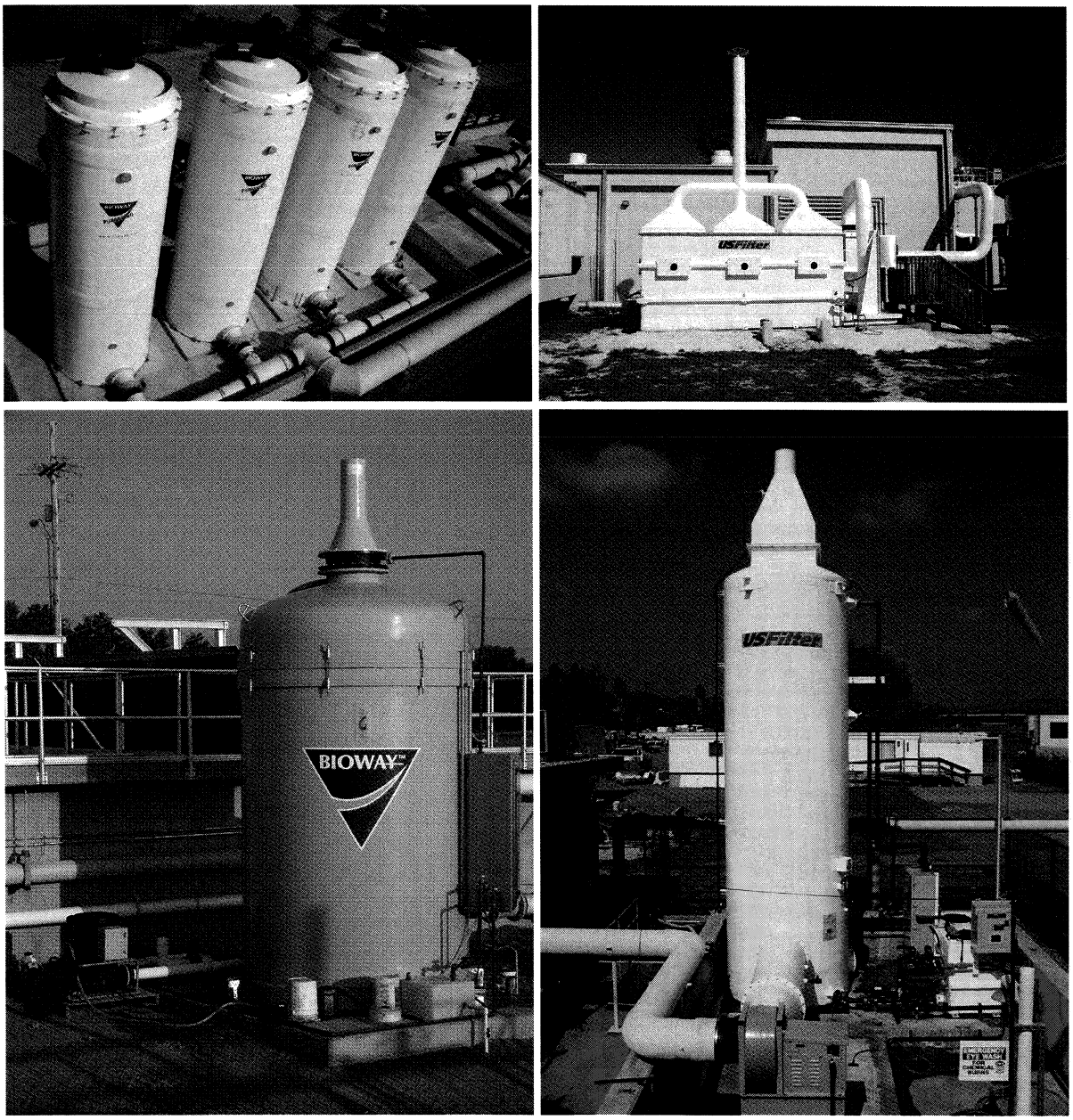
Odor Control Technology Descriptions

ODOR CONTROL TECHNOLOGY SUMMARY

Technology: BIOTRICKLING SCRUBBERS

Description:

Biotrickling Scrubbers are an odor treatment technology that utilizes biological processes, as opposed to chemical processes as their treatment mechanisms. They are similar to biofilters in this regard. Biotrickling scrubbers use artificial media and closed vessel construction, where biofilters often use natural media and open bed construction.



Biotrickling Scrubbers

Biotrickling scrubbers have been growing in popularity in the U.S. over the past several years, and have proven effective in wastewater treatment plant applications, even for high strength odorous air streams. There are now many biotrickling scrubber manufacturers in the U.S., providing for significant competition in the biotrickling scrubber market.

The process involves intermittent spraying or recirculating biologically active, nutrient-rich scrubbing solutions over an artificial media while odorous air is forced upward through the media bed. The process is similar to that used in wet scrubbers, except it involves biological treatment instead of chemical treatment. The media provide sites for biological colonization and promote mass transfer from the air to the water film on the biomass where the biological oxidation occurs.

Biotrickling scrubber treatment may fall into two categories, based on the biological population. Autotrophic organisms remove hydrogen sulfide and other inorganic compounds. Heterotrophic organisms remove volatile organic compounds (VOC's). The autotrophic organisms oxidize sulfides to either sulfate or elemental sulfur. The heterotrophic organisms remove the organic odors, but have little effect on hydrogen sulfide. The two systems may be combined into a two-stage system, where treatment of hydrogen sulfide and VOC's is required.

The systems normally use intermittent irrigation, with the biologically active solution trickled over the media bed to keep the biomass wet, to promote sloughing of the biomass, and to supply fresh nutrients to the biomass.

Applicable treatment processes include all liquid treatment plant and collection system processes and biosolids processing.

Advantages of Biotrickling Scrubbers compared to other odor control technologies include:

- Proven effectiveness in many wastewater treatment applications
- H_2S removal efficiencies typically greater than 99%
- Can provide VOC treatment with higher EBRTs
- Provides good pH and acid control, even with high H_2S concentrations
- Lower operating and maintenance costs, compared to chemical treatment technologies
- Ease of operation and maintenance, compared to chemical scrubbers
- No ongoing chemical costs, storage or handling required
- Small footprint requirement
- Long media life between replacements
- Biological air treatment is more environmentally friendly and safer than chemical treatment

Disadvantages of Biotrickling Scrubbers compared to other odor control technologies include:

- Higher capital costs, especially compared to carbon adsorbers and chemical feed systems
- Requires biological acclimation period for effective treatment

- May require ongoing nutrient addition
- Tower heights of larger systems can be aesthetically displeasing in some locations

ODOR CONTROL TECHNOLOGY SUMMARY

Technology: BIOFILTERS

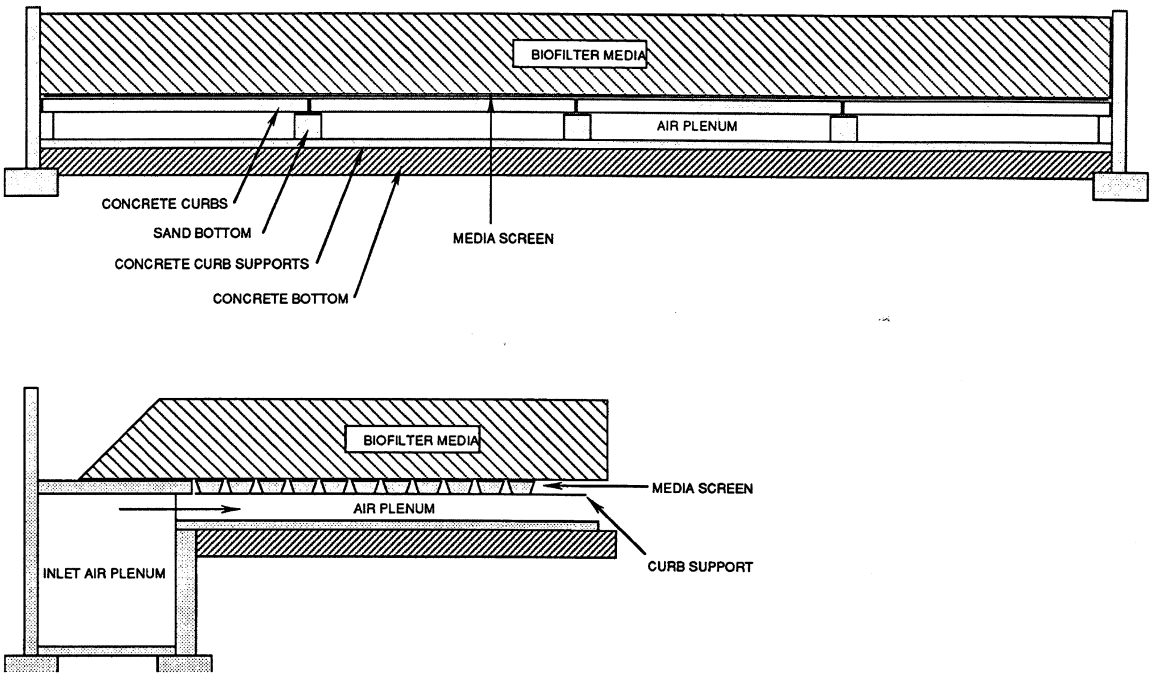
Description:

Biofilters are an odor treatment technology that utilizes biological processes as the treatment mechanism. Biofilters are considered to be a "green" approach to odor control, because they utilize microorganisms in media to oxidize odor and air emission compounds to carbon dioxide, water, biomass, and other benign by-products such as chloride and sulfate. The by-products are either emitted in the outlet air, drained from the biofilter, or consumed by the microorganisms. The biological activity in a biofilter is similar to the activities performed by the microorganisms in activated-sludge secondary wastewater treatment processes.

Biofilter (organic media)

Typical biofilter sections are shown below. Biofilters work by routing odorous air through a porous filter media. The media represents the contact surface area, on which the microorganisms live, where the biological oxidation described above can take place. The key to effective biofilter operation is maintaining a healthy environment for these microorganisms to thrive in. The most important parameters for maintaining a healthy environment is moisture content and

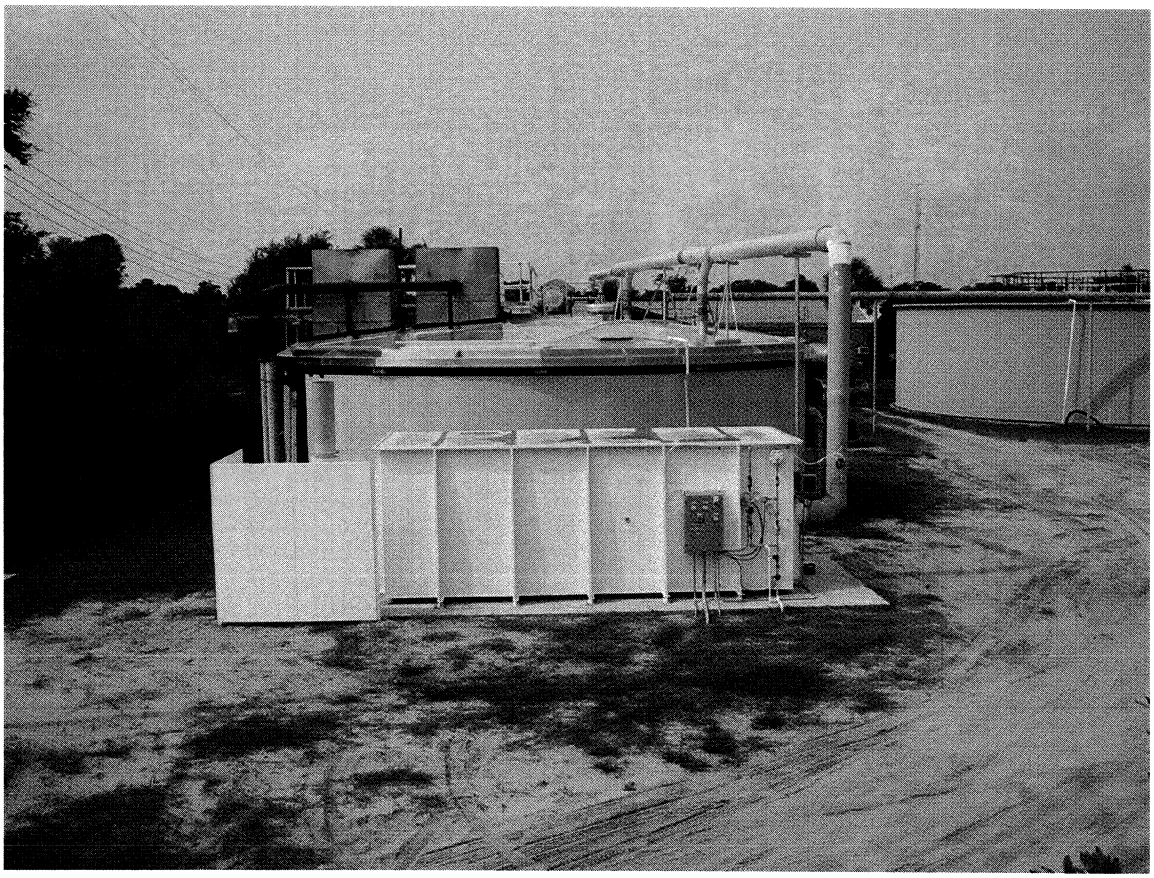
pH. The microorganisms need water to remain active, and the presence of water affects the transfer of the contaminants from the air to the media. The desired microorganisms thrive at neutral to moderately acidic pH levels.



Biofilter Sections

Biofilters are less control-dependent than chemical scrubbers, because the treatment system is more self-regulating. It is essentially a self-contained ecosystem, and is therefore likely to function longer, without excessive control. It is very important, however, to ensure moisture levels are controlled in the biofilter for it to function properly. Moisture content is assisted during dry periods by simple sprinkler systems and air humidification. The pH levels are often self-regulating within the ecosystem, and are assisted by proper choice of media. However, the reaction products in a biofilter treating hydrogen sulfide is sulfuric acid so preventing the formation of a very low pH is important and design should include corrosion protection on concrete and other materials.

Biofilters are typically good applications in dilute waste streams, like those typically found in wastewaters. The biggest drawback to this technology is the relatively large space requirement, compared to the technologies mentioned above. However, modular biofilter designs using synthetic, inorganic media require a much smaller footprint than the open-bed designs. Biofilters may also use more power than chemical scrubbers, but do not involve any chemical handling or storage.



Biofilter (modular, inorganic media)

Air streams with high concentrations of reduced sulfur compounds (RSC's) such as mercaptans, dimethyl sulfide, dimethyl disulfide, diphenyl sulfide, carbonyl sulfide, and carbon disulfide can be treated in biofilters but the loading rates must be much lower than those required to treat H_2S.

Biofilter media types include wood-chip/bark media, soil media, and inorganic synthetic media.

Wood-chip/bark media generally possess a large diversity and density of microorganisms, accepts moisture relatively well, has low initial costs, and is readily available. The normal lifetime for wood-chip/bark media is 2 – 4 years.

Soil media is a blended mix of soils, primarily sand-based. The primary advantage of soil media over wood-chip/bark media are their life expectancy. Soil has an estimated lifetime of over 30 years as a filter media. Soil is denser than wood-chip/bark media and therefore resists compaction, it resists acidification because of its inherent pH buffering properties, it is less difficult to rehydrate after drying out, and generally distributes the air more uniformly than wood-chip/bark media. The primary disadvantage is that it requires a smaller loading per square foot, and therefore may require a larger footprint and higher initial capital costs.

The inorganic synthetic media is newer to the market but well tested. It consists of strong, uniform sized gravel-like cores that do not compact as easily as organic media. This type of media may be used in the modular designs because it allows greater media depth and a smaller footprint. The cores are commonly coated with nutrient rich organic and inorganic adsorbents. The media typically comes with a 10 year life guarantee.

Applicable Treatment Processes:

All liquid treatment plant processes, pump stations, sludge thickening, sludge dewatering.

Typical Design Criteria:

Surface Loading (Wood-Chip media)	3 - 4 cfm per sf media
Surface Loading (Soil media)	2 cfm per sf media
Inorganic, synthetic media	10-12 cfm/ft^2
Media Bed Depth (Wood-chip/Soil media)	3 ft.
Media Bed Depth (Inorganic, synthetic media)	5 ft.
Detention Time (Wood-chip/Soil media)	$\geq$ 60 seconds
Detention Time (Inorganic, synthetic media)	20 - 30 seconds
Pressure Drop	6" – 12"
H_2S removal efficiency	99%

Major Design Considerations:

a. Methods of air flow distribution and media support:

Air flow through the biofilter may be distributed by several methods. The outer walls of the air plenum may be formed by earth berms, concrete walls, or other support mechanisms. A plenum lining provides for proper drainage of the biofilter. The air plenum below the media bed may be open air space formed by the walls with grating forming the top, with railroad ties forming the support and top of the plenum, or it could be formed with perforated air distribution piping buried in a coarse rock bed. If a rock bed is used, special consideration must be given to the type of rock. Limestone and other soft rock can not be used because it breaks down in the acidic environment and may obstruct air flow.

b. Media selection

Media may be purchased from manufacturers, or blended based on a recipe from locally available media constituents, such as wood chips, bark, and various soil media constituents. Media replacement frequency is affected by media selection, as mentioned above.

c. Moisture Control

Moisture control may be accomplished by pre-humidification of the air in a mist chamber with spray nozzles, with a packed tower humidification chamber, by keeping the media wet using soaker piping within the media bed, surface irrigation with spray nozzles, or a combination of these methods. Moisture sensors have not proven to be extremely reliable, therefore manual operator monitoring is typically used to ensure adequate moisture content.

d. Loadings

Loading of biofilters should be properly designed to prevent acid formation, corrosion problems, premature compaction of the media, short-circuiting the media bed, inadequate biological activity, and other problems which can result in sub-standard performance of the biofilter.

e. Corrosion Protection

Due to the formation of sulfuric acid as a byproduct in hydrogen sulfide treatment, the following corrosion protection should be included in the biofilter design:

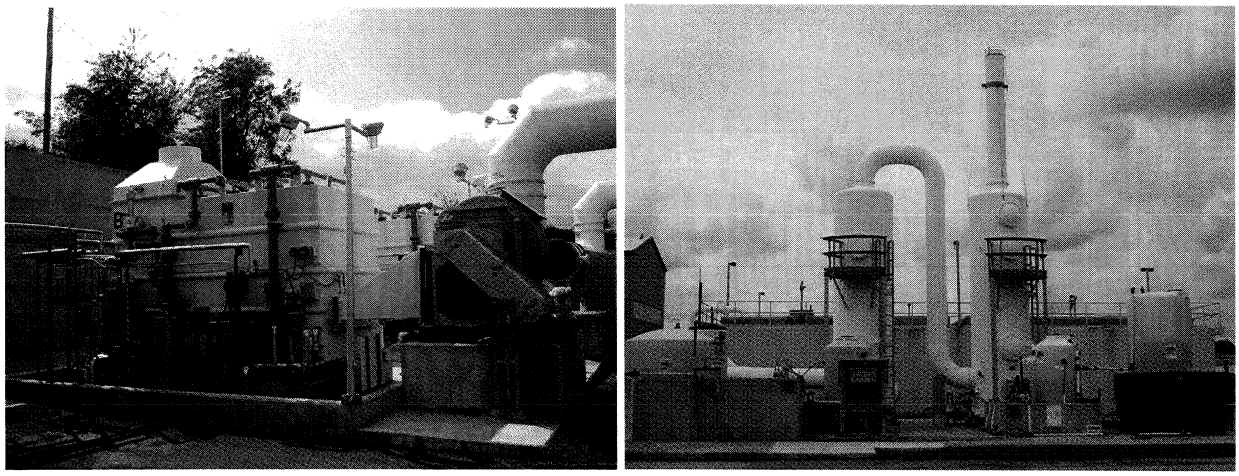
- Liners or protective coatings on concrete
- Installation of pH probes in drain water to measure pH

ODOR CONTROL TECHNOLOGY SUMMARY

Technology: CHEMICAL SCRUBBERS

Description:

Chemical scrubbers are a common odor control technology. The basic objective of a scrubber is to provide contact between odorous air, water, and chemicals to provide oxidation or entrainment of the odorous compounds. The odorous compounds are absorbed into the scrubber liquid, where they are oxidized and/or removed from the scrubber as an overflow or blowdown stream.



Chemical Scrubbers

The basic components of the scrubber are the vessel; packing material; liquid recirculation system with spray nozzles, recirculation pump, a sump; and a mist eliminator. A fan draws or pushes the odorous air into the scrubber. The air passes through the packing bed where it comes in contact and is absorbed into the liquid solution sprayed from nozzles above the packing bed. The liquid solution, after passing through the packing bed, falls into the sump, where it is recirculated or discarded. The air exits the packing bed and is routed through the mist eliminator to minimize liquid droplets from exiting the scrubber.

Typical chemicals used in the liquid solution to oxidize hydrogen sulfide and other reduced sulfur compounds include sodium hypochlorite (bleach) and sodium hydroxide (caustic). The oxidation reactions are dependent on pH, with the optimum scrubber solution pH being in the 9.5 – 10.5 range. In this range, hydrogen sulfide is absorbed into the recirculation liquid. As pH decreases below the optimum range, the hydrogen sulfide solubility decreases and is not effectively absorbed into the scrubber solution. As pH increases above the optimum range, more chemical is used than necessary, and more carbon dioxide is scrubbed from the air stream. The scrubber chemical concentrations

are typically automatically controlled by monitoring the liquid solution pH and ORP (Oxidation-Reduction Potential). A pH probe and controller maintain the proper pH by regulating the rate sodium hydroxide is added to the solution. An ORP probe and controller maintain the proper chlorine residual by regulating the rate sodium hypochlorite is added to the solution. Make-up water is continuously fed to the scrubber to force out contaminants that accumulate in the sump out the overflow.

Where removal of ammonia and other nitrogen compounds is required, a two-stage scrubber system using a dilute sulfuric acid solution in the first stage is typically used. The ammonia reacts with the sulfuric acid to form ammonium sulfate, a soluble, non-volatile salt, which is removed from the scrubber effluent through the overflow.

Wet scrubbers are a proven odor control technology which can remove up to 99.5% of hydrogen sulfide, even at high concentrations. They require a relatively small footprint, but require significant operational and maintenance attention, chemical handling and storage, and require disposal of scrubber effluent wastewater. Due to the special handling requirements of the chemicals involved, extensive training of operators of these systems is required. They are not considered to be effective for removal of volatile organic compounds (VOC's) and are also not effective where odorous organic compounds are to be treated.

Applicable Treatment Processes:

All liquid treatment plant processes, pump stations, sludge thickening, sludge dewatering.

Typical Design Criteria:

Air flow velocity	< 8.5 feet/sec (500 fpm)
Detention time (in packing)	1.5 - 2 sec

Packing depth 6 – 10 feet (dependent on contaminant loading)

H_2S removal efficiency	99%

Major Design Considerations:

a. Contaminants to be removed

Chemical treatment selection is based on contaminants to be removed. Hydrogen sulfide may be treated using a solution of sodium hypochlorite and sodium hydroxide. Ammonia may be treated using a dilute solution of sulfuric acid. VOC's are not effectively treated in wet chemical scrubber systems.

b. Number of stages required

A multiple stage scrubber system may be required for removal of multiple contaminants such as hydrogen sulfide and ammonia. Multiple stages may also be used for treatment of very high contaminant concentrations. Two and three stage systems are common.

c. Liquid solution controls

The liquid solution must be properly monitored and controlled to ensure proper pH and ORP levels are maintained in the scrubber solution for efficient operation. Liquid levels must also be monitored and controlled.

d. Packing material

Packing should possess high surface area to volume ratio and possess shapes and sizes to provide a tortuous path for adequate detention time, while minimizing pressure drop. Materials vary dependent on contaminants being treated and the temperature of the air.

ODOR CONTROL TECHNOLOGY SUMMARY

Technology: CARBON ADSORPTION

Description:

Carbon adsorbers are a common odor control technology. The basic objective of carbon adsorbers is to act as a dry adsorption filter for odorous air before emitting to the atmosphere. The odorous compounds are adsorbed to the surface of the carbon, which has a high surface-to-volume ratio. The carbon is then replaced or regenerated when it becomes saturated and odor breakthrough occurs. Carbon adsorbers are typically used for low concentration airstreams. They may be used either for primary odor control or for a polishing stage following a chemical scrubber or biological treatment system. They may be cost prohibitive for high concentration applications due to the high cost of carbon.

Carbon Adsorber

Carbon adsorbers typically include fiberglass vessels, which house carbon between perforated plates. A fan draws or pushes the air through the carbon adsorber.

The carbon can be impregnated with sodium hydroxide (caustic) for improved adsorption of hydrogen sulfide. The impregnated carbon can be regenerated with caustic when breakthrough occurs, but this is a very difficult process and is rarely done. Some manufacturers now offer a carbon that can be regenerated by washing with water. The carbon typically needs to be replaced after 4 – 5 regenerations.

Carbon adsorbers are easy to install and maintain, require no chemical storage or handling, require a relatively small footprint, and typically guarantee 99.9% hydrogen sulfide removal efficiencies. Disadvantages include the high cost of carbon and the required disposal of used carbon. Carbon is also not recommended with high moisture air, which saturates the carbon bed too quickly. Carbon is commonly used in remote locations such as pumping station wet wells.

Applicable Treatment Processes:

All liquid treatment plant processes, pump stations, sludge thickening, sludge dewatering.

Typical Design Criteria:

Air flow velocity	50 – 75 fpm
Detention time	3 - 4 sec
Carbon bed depth	3 feet
H_2S removal efficiency	> 99%

Major Design Considerations:

a. Carbon selection

The type of carbon should be selected based on the individual application.

b. Carbon bed depth

Bed depth is dependent on odorous compound concentrations. Dual beds may be designed for higher air flows where there are site size restrictions.

c. Vessel size

A 12 foot diameter vessel, the largest sized vessel that can economically be transported by truck, can effectively treat up to approximately 8,000 cfm in a single bed unit and up to 16,000 cfm in a dual bed unit.