Section 3: Regulatory Compliance Requirements

Section 3 addresses the detailed and wide-ranging regulations that affect the SWRS and the Discharge Compliance Project.

- Section 3.1 sets the context, including the regulating and permitting agencies; proposed and recent regulatory limitations that are likely to pose challenges for project compliance; and several strategies that may help gain compliance.

- Section 3.2 addresses NPDES permit requirements. It describes Laguna Plant operations and discharges, along with issues relating to the proposed April 2006 permit (Section 3.2.1); CTR compliance (Section 3.2.2); nutrient total maximum daily loads (TMDLs) (Section 3.2.3); and potential requirements for temperature and dissolved oxygen compliance (Section 3.2.4).

- Sections 3.3 and 3.4 discuss possible strategies to comply with the NPDES permit requirements: source control (reducing pollutant loadings); advanced membrane treatment of effluent; the use of metals translators and water effects ratios (a way to adjust CTR criteria for local conditions); and consideration of mixing zones (dilution for determining compliance with effluent limitations). Strategies to meet temperature and dissolved oxygen requirements, such as cooling and chilling, storage, and indirect discharge, are also discussed.

3.1 General

Surface-water quality is regulated to protect aquatic life and human health according to the provisions of the Federal Clean Water Act (and associated federal regulations) and the California Porter-Cologne Water Quality Control Act, referred to respectively as the federal and state Acts. The state Act established the nine Regional Water Quality Control Boards and the State Water Resources Control Board (State Board). In California, the discharge permitting provisions of the federal Act have been delegated by the U.S. EPA to the State and Regional Boards.

Surface-water discharge by the SWRS is permitted through the North Coast RWQCB through issuance of a NPDES permit and Waste Discharge Requirements (WDR). This permit contains limitations on effluent and receiving water that are designed to prevent impairment by the discharge of beneficial uses to the receiving water.

A proposed revision to the current NPDES permit for the SWRS was issued in April 2006. Recent regulatory changes (California Toxics Rule [CTR] and 303(d) listings, discussed below) have resulted in proposed new effluent limitations for copper, lead, nickel, cyanide, nitrate, total phosphorus, and total Kjeldahl nitrogen (TKN). Compliance with these proposed effluent limitations will be difficult. In addition, proposed changes to the objectives in the Regional Board's Water Quality Control Plan (Basin Plan) for temperature and dissolved oxygen may result in further compliance difficulties in the future. The RWQCB has indicated its intent to promulgate a nutrient total maximum daily load (TMDL), for nitrogen and phosphorus, in the Laguna, which would likely result in more stringent effluent limits than those currently proposed.

Several strategies may help the Discharge Compliance Project comply with the regulatory-driven effluent limitations, including strategies focusing on the following areas:

- Source control
- Advanced membrane treatment
- Metals translators
- Water effects ratio
- Mixing zones

These compliance strategies are discussed in Section 3.3.

3.2 NPDES Permit Requirements

3.2.1 General

The Laguna Plant provides tertiary treatment of recycled water collected by the cities of Santa Rosa, Rohnert Park, Cotati, and Sebastopol and from the South Park County Sanitation District. The Laguna Plant also treats septic waste from most of Sonoma County, as well as leachate from the County landfill.

Effluent discharges to surface waters from the Laguna Plant are restricted to the period from 1 October through 14 May, the allowable discharge season in the Russian River watershed, according to the Basin Plan. The discharge to the Laguna de Santa Rosa is regulated such that the daily discharge rate does not exceed 5 percent of the corresponding daily Russian River flow rate at the Hacienda Bridge (USGS Gage No. 11467000).

Effluent from the Laguna Plant is primarily discharged from Delta Pond into the Laguna near its confluence with Santa Rosa Creek. Discharge also occurs at Meadowlane Pond D to the Laguna at its confluence with Colgan Creek. Effluent is also permitted to be directly discharged from the Laguna Plant to the Laguna; however, such direct discharge has not occurred in recent years, and, although it is possible, it is not anticipated in the future. Other discharge locations that are allowed by the NPDES permit include these: Delta Pond to Santa Rosa Creek, Pond D to the Laguna upstream of the confluence with Colgan Creek, Arlington Pond, Brown Pond, LaFranconi Pond, West College Pond, and the Laguna Joint Wetlands.

The Laguna Plant is currently operating under NPDES permit no. CA0022764. The permit authorizes an average dry-weather flow of 21.34 mgd, with a portion of the effluent being delivered to the Geysers steamfield, a portion discharged to receiving waters, and a portion used to irrigate lands.

The permit proposed in April 2006 contains discharge prohibitions, effluent limitations, receiving-water limitations, and provisions governing the discharge of wastewater. The proposed permit contains several effluent limitations that were not in the previous discharge permit. The SWRS's ability to meet permit requirements is particularly challenged by the following limitations:

- Proposed effluent limitations in response to the promulgation of the CTR and the State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed

Bays, and Estuaries of California (SIP). These new limitations are discussed in Section 3.2.2.

- Proposed effluent limitations for phosphate and TKN in the 2006 NPDES permit. These limitations are discussed in Section 3.2.3.

- Receiving-water limitations for temperature and dissolved oxygen, which may be revised in response to a Basin Plan amendment proposed by the RWQCB regarding temperature and dissolved oxygen. These existing or proposed limitations are discussed in Section 3.2.4.

- Proposed effluent limitation for nitrate. The proposed permit contains an Average Monthly Effluent Limitation (AMEL) for nitrate of 10 milligrams of nitrogen per liter (mg-N/L) and a Maximum Daily Effluent Limitation (MDEL) of 15.4 mg-N/L. They are based on a drinking water Maximum Contaminant Level (MCL) for nitrate of 10 mg-N/L. While the drinking water standard is not new, the effluent limitation is new. Preliminary evaluation of discharge from the Laguna Plant indicates that the plant will frequently be out of compliance with the AMEL for nitrate.

3.2.2 California Toxics Rule (CTR) Compliance

Section 122.44(d) of 40 Code of Federal Regulations (CFR) requires that NPDES 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 or objective. The applicable water-quality criteria for priority pollutants for California are contained in the CTR. Compounds are considered priority pollutants because of their potential toxicity to aquatic organisms.

The SIP established a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency. The SIP includes procedures for determining the need for, and the calculation of, Water Quality Based Effluent Limitations (WQBELs, also called in this document “effluent limitations”) for the CTR priority pollutants and other regulated constituents. Following the SIP procedures, the RWQCB determined that the SWRS’s NPDES permit should include effluent limitations for copper, lead, nickel, and cyanide. Although the previous NPDES permit contained an effluent limitation for copper, the SIP procedures for determining AMELs and MDELs resulted in far more stringent copper effluent limitations in the proposed permit than those contained in the current permit.

Recognizing that effluent limitations for these four constituents would likely be contained in the new NPDES permit, the City did an Infeasibility Study to determine the feasibility of meeting the limitations for the four constituents. The City determined that to meet these effluent limitations at the time the permit would go into effect (currently expected to be September 2006) would be infeasible. In response to this Infeasibility Study, the proposed permit incorporated interim effluent limitations for copper, lead, and cyanide; these interim limitations are based on plant performance. The RWQCB staff disagreed with the City’s assertion of infeasibility to meet effluent limitations for nickel, so the new permit contained final effluent limitations for this constituent. The interim and final effluent limitations in the new NPDES permit are shown in Table 3.2-1.

Table 3.2-1 Interim and Final Effluent Limitations for Priority Pollutants

		Interim Limitations	Final Limitations[(a)]	
Constituent	**Unit**	**AMEL**	**AMEL**	**MDEL**
Copper	µg/l[(b)]	16.3	4.09	7.77
Lead	µg/l	5.6	1.17	2.36
Nickel	µg/l	---	26.8	45.3
Cyanide	µg/l	14.3	3.05	9.23

(a) The final limitations for copper, lead, and nickel are dependent on the hardness of the receiving water. The values shown are the limitations with a hardness of 53.5 mg/l as $CaCO_3$, which was the hardness used by the RWQCB for the Reasonable Potential Analysis.
(b) µg/l = micrograms per liter

Potential methods to gain compliance with the final effluent limitations are discussed in Section 3.3.

3.2.3 Nutrient TMDL

The 2002 303(d) list of impaired water bodies included the Laguna as impaired for the nutrients nitrogen and phosphorus. This listing for nutrients was made because of the low concentrations of dissolved oxygen that occur at times in the Laguna. The nutrient listing is likely the impetus for the new NPDES permit limitations for phosphorus and TKN, which are shown in Table 3.2-2. These limitations may be revised when the TMDL analysis for nutrients has been conducted and loads have been allocated to wastewater discharge. Also when the TMDL analysis has been conducted, the human health-based nitrate effluent limitation may be lowered to achieve the TMDL nutrient load allocation.

Table 3.2-2 Interim and Final Effluent Limitations for Nutrients

		Final Limitations	
Constituent	**Unit**	**AMEL**	**AMEL**
Total Phosphate	mg/l	3.0	4.5
Total Kjeldahl Nitrogen	mg/l	2.7	4.4

3.2.4 Temperature and Dissolved Oxygen Compliance Requirements

The NPDES permit has receiving-water limitations for temperature and dissolved oxygen designed to protect the beneficial uses of the Laguna as specified in the Basin Plan. RWQCB staff have proposed an amendment to the Basin Plan, however, that if adopted, will likely result in much more restrictive receiving-water limitations for temperature and dissolved oxygen.

The proposed amendment responds to potential deficiencies in the water-temperature and dissolved-oxygen Basin Plan objectives by establishing objectives that support the life stages of anadromous salmonids in compliance with the Endangered Species Act and the California Endangered Species Act. The proposed Basin Plan amendment provides numeric objectives for temperature and dissolved oxygen, as a baseline for protecting beneficial uses, and a narrative objective for dissolved oxygen, as a mechanism for addressing circumstances where the numeric objectives may be inappropriate. The narrative objective for dissolved oxygen would apply instead of the numeric objectives when the natural potential of a specific stream or stream reach makes the numeric objective not applicable. The proposed objectives apply to both the Laguna and the Russian River.

The proposed water-temperature numeric objectives, which vary with salmonid species and life stages, are shown in Table 3.23 (italics indicates material quoted from proposed Basin Plan amendment):

Table 3.2-3 Water-Temperature Numeric Objectives from Proposed Basin Plan Amendment

Life Stage	***Time Period (Estimated)***	***MWAT (°C/°F)***	***MWMT (°C/°F)***	***Inst. Max (°C/°F)***
Adult Migration	*August-July*	*15/59*	*17/62.6*	*21/69.8*
Adult Holding	*May-Dec.*	*14/57.2*	*16/60.8*	*21/69.8*
Spawning Salmonids	*Sept.-April*	*11/51.8*	*13/55.4*	*22/71.6*
Incubation/Emergence All Salmonids except Coho Salmon	*Nov.-May*	*11/51.8*	*13/55.4*	*22/71.6*
Incubation/Emergence Coho Salmon	*Nov.-March*	*10/50*	*12/53.6*	*22/71.6*
Juvenile Rearing	*Year-round*	*15/59*	*17/62.6*	*22/71.6*
Smoltification	*Jan.-June*	*12/53.6*	*14/57.2*	*22/71.6*

MWAT – maximum weekly average temperature: Defined as the highest 7-day moving average of equally spaced water temperature measurements for a given time period. In this application, the time period is the duration of the existing salmonid life stage.

MWMT – maximum weekly average of the daily maximum temperatures: Defined as the highest 7-day moving average of the daily maximum water temperatures for a given time period. The time period is the duration of the existing life stage.

The proposed numeric dissolved-oxygen objectives are as follows:

***Water-column objective year-round** – A 7-day moving average of the daily minimum concentrations equal to or greater than 8 mg/l.*

***Water-column objective during the incubation/emergence life stage** – A 7-day moving average of the daily minimum concentrations equal to or greater than 11 mg/l.*

***Intergravel objective during the incubation/emergence life stage** – A 7-day moving average of the daily minimum concentrations equal to or greater than 8 mg/l.*

To account for the loss of dissolved oxygen associated with its [note: the dissolved oxygen's] transfer to the spawning gravels, a higher water-column dissolved oxygen [concentration] is necessary during the incubation and emergence life stage. The Regional Board assumes that the difference between the water-column and intergravel concentrations is 3 mg/l. The water-column objective is subject to change if 1) site-specific research indicates a difference other than 3 mg/l and 2) intergravel dissolved oxygen concentrations are greater than 8 mg/l.

The proposed narrative dissolved-oxygen objective is as follows:

The natural potential dissolved oxygen concentration of a waterbody shall not be altered unless it can be demonstrated, to the satisfaction of the Regional Board, that such alteration does not adversely affect beneficial uses.

The proposed numeric temperature objectives do not take into account many streams' natural conditions; many portions of the North Coast region experience very hot temperatures as a normal condition in summer. Application of the proposed objectives to all Russian River tributaries means that the objectives designed to protect salmonid populations apply in reaches of streams that, due to naturally elevated water temperatures, likely never supported, nor will support in the future, a salmonid fishery. For example, the lower reaches of the Laguna de Santa Rosa are shallow and slow-moving in summer, yielding warm water temperatures, and the proposed temperature objectives will be impossible to attain, and quite possibly never in history would have been attained there.

In addition, because of the naturally occurring high temperatures in some reaches of streams in the North Coast region, the dissolved oxygen objective for the incubation/emergence life stage (7-day moving average of the daily minimum concentration equal to or greater than 11 mg/l) cannot be met at times because of the saturation capability of oxygen in the water. For example, from 8 through 14 May 2005, the temperature in the Laguna at Stony Point Road averaged 16°C. At this temperature, the saturation of dissolved oxygen (the maximum amount of oxygen that can dissolve in water) is approximately 9.5 mg/l. Thus, although salmonids do not spawn in the lower Laguna and likely never did, the tributary rule results in a proposed dissolved oxygen concentration that cannot be met under typical conditions.

Prior to the proposed Basin Plan amendments for temperature and dissolved oxygen, the Laguna was put on the State's 2002 303(d) list of impaired water bodies for dissolved oxygen and temperature. The Russian River was put on the 2002 303(d) list for temperature. Together, the 303(d) listings and the proposed Basin Plan amendment could have a great impact on the SWRS's discharge through likely changes to the receiving water limitations for temperature and dissolved oxygen. Discharge to the Laguna and Russian River may be required to meet receiving water limitations that, as described above, would not be met under typical conditions even without discharge.

3.3 NPDES Compliance Strategies

3.3.1 General

The U.S. EPA and State of California provide not only the regulatory limits for water quality, but also guidance on how compliance can be achieved. The City has previously reviewed these approaches with regard to the CTR constituents with effluent limitations. The effluent limitations in the proposed April 2006 NPDES permit for nitrate, total phosphorus, and TKN discussed above were unanticipated, so the City has not yet evaluated how to comply with them.

3.3.2 Source Control

Reducing pollutant loadings from industrial discharges through pretreatment was evaluated by the City to achieve compliance with the new effluent limitations for copper, lead, and cyanide, as described in *Technical Memorandum 17, Santa Rosa Incremental Recycled Water Program – Water Quality Improvement Technologies* (Tech Memo 17). Tech Memo 17 describes the changes in local limits for industrial dischargers (i.e., limits imposed on industrial dischargers to the SWRS service area that would be needed to achieve the final effluent limitations) for copper and lead. These changes are summarized below.

The majority of copper in Santa Rosa's wastewater originates from corrosion of household plumbing. The Sonoma County Water Agency (SCWA) has adjusted pH to reduce corrosion of household plumbing fixtures, as required by federal regulation. The copper local limit calculated based on the final MDEL is greater than the existing copper local limit. The copper local limit based on the final AMEL could not be calculated, however, because the residential background loading exceeds the maximum allowable headworks loading, leaving no allocation for industry. Therefore, compliance with the final copper limitation solely by reducing industrial copper loadings is not possible.

For lead and cyanide, the calculated local limits based on the final MDELs are greater than the existing local limits, but calculated local limits based on the final AMELs are 40 to 60 percent of the existing local limits. Therefore, inclusion of AMELS for lead and cyanide in Santa Rosa's NPDES permit could result in the need for Santa Rosa to impose new monthly average local limits for these pollutants. A recent study sponsored by the Water Environment Research Foundation (WERF) showed that cyanide can be formed during chlorination disinfection, and possibly also through ultraviolet irradiation disinfection, perhaps through the breakdown of thiocyanate, a relatively non-toxic form of cyanide that is not measured by conventional total cyanide tests. Evidence exists for such a formation of cyanide through Santa Rosa's treatment process. The Laguna Environmental Laboratory has evaluated cyanide concentrations at various stages in the treatment process.

Between 1996 and 2004, 34 paired measurements of influent and effluent cyanide were made. Of these, seven showed higher concentrations of cyanide in the final effluent than in the influent, indicating possible formation in the treatment process. This indicates that source control of thiocyanate may reduce effluent cyanide concentrations. More study by the City of this compliance strategy is planned.

3.3.3 Advanced Membrane Treatment

Advanced Membrane Treatment was previously evaluated during the IRWP Master Plan, and the results of this work are summarized in Technical Memorandum 17, dated 24 March 2003. TM 17 described various membrane technologies (microfiltration, ultra filtration and reverse osmosis) that can further treat recycled water to meet the future CTR water quality-based effluent limits described in this section. TM 17 was recently reviewed and updated to determine if any technology advancements or capital cost trends have occurred that would affect the findings of TM 17.

The treatment objective utilized for the update was based on the most stringent of final limitations on CTR priority pollutants. This objective was evaluated utilizing the final limitation AMELs and the highest historical levels found in either the recycled water or Delta Pond. Cyanide was found to require the highest level of treatment, 94 percent removal.

The review determined that the basic findings in TM 17 are still applicable; however, some new information appears pertinent to the project. The review confirmed that advanced membrane filtration is the only post-treatment alternative available to reliably treat CTR constituents in the recycled water to below final limitation AMEL levels.

Below is a summary of technology updates and processes that could improve the prior recommendations of TM 17:

- Pressurized microfiltration (MF)/ultrafiltration (UF) membranes
- Variety of manufacturers
- Side-stream partial treatment
- Coagulation upstream of MF/UF
- Reject recovery from the primary MF/UF system by a secondary MF/UF
- Brine recovery RO (BRRO) system
- Energy recovery equipment for relatively low-pressure RO (below 300 psi)

The major issues associated with advanced membrane filtration of recycled water for CTR compliance are brine (or salt) disposal and energy consumption. As the Laguna Plant is located inland, disposal of brine to the ocean is not economically feasible. The possible brine disposal options evaluated in TM 17 were zero liquid discharge and blending brine with recycled water prior to delivery to the Geysers steam fields.

Zero liquid discharge entails collection of the salts by drying the brine to the point of being solid, and then disposing the solid salts in an appropriate landfill. This disposal option is very costly and energy-intensive. By applying the above-mentioned technology updates, a smaller brine stream can be produced. The cost reduction from the update, in 2006 dollars, is approximately $300M versus $380M for capital costs and $33M versus $36M for annual O&M costs. Construction and operation of an AMT facility large enough to treat the entire discharge (i.e., up to 69 mgd) is, therefore, considered economically infeasible.

The strategy of using the Geysers pipeline for brine disposal was also reviewed and updated. The TDS level in water delivered to the Geysers is permitted by contract agreement to be up to 600 mg/l. TM 17 investigated alternatives that included other uses for water besides the Geysers steam fields. The recent update considered variables associated with water quality and quantity, as well as less stringent effluent limits based on ongoing aquatic life impact studies, including mixing zone policy, water effects ratios, and biotic ligand models. The feasibility of using the Geysers pipeline for brine disposal was developed using the following criteria and options:

- A current Geysers delivery of 12 mgd, and a possible future delivery of 16 mgd
- The most stringent treatment level of 94 percent removal for cyanide and a possible reduced treatment level of 50 percent removal of historical maximum concentrations of CTR priority pollutants found in the recycled water, if regulatory relief were granted due to ongoing studies

The updated feasibility analysis found that 3.9 mgd of Advanced Membrane Treatment could be provided and that the Geysers Pipeline could be used for brine discharge, assuming current contractual water quality and quantity levels and treatment to meet CTR requirements. If the CTR criteria were relaxed to 50% and the deliveries to the Geysers increased to 16 mgd, up to 9.9 mgd of AMT could be provided.

3.3.4 Metals Translators

CTR criteria for copper, nickel, and lead are expressed as the dissolved fraction of the metal and include a total-to-dissolved multiplier or translator. A default translator is available; however, regulations allow for development of a discharger-specific translator that would adjust the criterion to better reflect local conditions.

The default translator for copper is 0.96. For most wastewater treatment plant discharges, the discharger-specific translator for copper typically ranges between about 0.75 and 0.99, and it tends to be closer to the default value of 0.96 for tertiary-treated effluents. The discharger-specific range of values will adjust a numeric criterion only by as much as about 25 percent. For example, with the default translator of 0.96, the applicable total recoverable permit limitation associated with a dissolved copper criterion of 10 µg/L is 10.4 µg/L. In the event that a discharger-specific copper translator for the Laguna is found to be 0.75, this applicable permit limitation (associated with the same 10 µg/L criterion) becomes 13.3 µg/L, which is not sufficiently different from the default criterion to assure compliance in all cases. In addition, monitoring data for the Laguna suggests that dissolved copper comprises a majority of the total copper in the effluent, and that the default translator of 0.96 is likely representative of the actual discharge conditions.

Therefore, the use of a site-specifically derived translator is not a feasible strategy to help the City gain compliance with the proposed NPDES permit limitation for copper. Insufficient receiving water data are available to evaluate the potential for translators to achieve compliance with the nickel and lead effluent limitations. The City is in the process of collecting more data.

3.3.5 Water Effects Ratio

Trace metal (e.g., copper, nickel, and lead) toxicity to aquatic life varies with water chemistry. In general, at discharge sites, water concentrations of dissolved organic carbon, calcium, magnesium, sodium, alkalinity, and pH collectively have a large effect on toxicity by affecting the amount of total metal that is present in a form that is biologically available (i.e., bioavailable) for uptake by aquatic life. The bioavailable fraction of the total metal concentration that can be taken into the bodies of aquatic organisms is the portion of the metal present that can toxicologically affect aquatic life. The remainder of the metal that is part of large, strong complexes is not available for uptake by aquatic life, and thus is non-toxic to aquatic life.

To account for the collective effects of these water-quality parameters, and to promulgate metals criteria appropriate for the conditions under which they are applied (i.e., to regulate to the level of protection intended by the U.S. EPA at all sites), the U.S. EPA provided for the adjustment of the CTR's copper criteria (and the criteria for a number of other trace metals) through the Water Effects Ratio (WER) multiplier. The WER is a more comprehensive mechanism for addressing copper bioavailability than simply expression of the criteria in terms of the dissolved fraction.

Through the CTR, the U.S. EPA pre-authorized and established procedures for California to develop site-specific WERs on any scale (i.e., discharger-specific, entire water body, or watershed). Entire water body-specific or watershed site-specific WER-adjusted criteria require a Basin Plan amendment, while discharger-specific WER-adjusted criteria are intended to be addressed through the NPDES permitting process. The original language of the SIP addressed WERs only as water body- or watershed site-specific objectives and was silent on discharger-specific WER adjustments. The SIP was amended in February 2005 to clarify the State's position on this matter and to allow discharger-specific WER-adjusted criteria.

Preliminary evaluation for the Laguna and Russian River indicates that the concentrations of constituents that reduce the toxicity of copper are such that a WER-adjusted criterion for copper would likely significantly increase the copper effluent limitation, and that compliance with the limitation for discharge in both the Laguna and Russian River would thereby become feasible.

3.3.6 Mixing Zones

Another strategy that would help the City meet permit effluent limitations is recognition of dilution by the receiving water when the RWQCB assesses compliance with permit effluent limitation. Currently, the Basin Plan does not allow the determination of compliance to take into account dilution by the receiving water, and compliance must be met by undiluted "end-of-pipe" effluent concentrations. The SIP and other regulations, which supersede the Basin Plan, do allow dilution of effluent for determining compliance with effluent limitations, through the concept of mixing zones. A mixing zone is the area in a receiving stream in which wastewater is incompletely mixed with the ambient water. Effluent limit compliance based on dilution results in a limited zone near an outfall in which some CTR criteria would not at all times be attained. If the receiving water has sufficient

assimilative capacity, the resulting concentration in the receiving water outside the mixing zone may not exceed applicable water-quality criteria even though undiluted effluent exceeds criteria.

Federal and state mixing zone regulations require that "credit" for the dilution that occurs in the mixing zones can be allowed only if acute toxicity would not occur in the mixing zone. Consideration of mixing zones when deriving effluent limits for wastewater discharges is currently permitted under state and federal regulations, and this approach has been used elsewhere in California and around the nation.

While many publicly owned treatment works (POTW) have difficulty complying with the CTR numeric criteria as end-of-pipe limitations, those with dilution credits or mixing zones are generally able to meet the resulting effluent limitations. Preliminary analyses indicate that use of a mixing zone for the SWRS's discharge could help meet effluent limitations.

3.4 Strategies for T&O Compliance

Compliance strategies to meet existing regulatory limits include mechanical cooling, mechanical or passive aeration, storage, and indirect discharge.

Treatment methods to meet current temperature and dissolved oxygen (DO) limits are discussed in Section 4.4. Cooling recycled water by mechanical means aerates water and simultaneously treats the water for DO as well as temperature requirements. If DO limits solely need to be met, aeration of the recycled water can be performed by mechanical aeration using air compressors or passive aeration during discharge.

Storage of recycled water is an effective method of reducing the temperature to below regulatory limits during the discharge season. Incorporating temperature control into the management of recycled water is being considered; this would have impacts on other aspects of the IRWP.

Indirect discharge of recycled water is discussed in Sections 4 and 6. It is anticipated that indirect discharge will decrease temperature to well below current regulatory levels. Indirect discharge can decrease DO levels, and further investigations are needed to determine the impact of indirect discharge on DO compliance.