TOTAL DISSOLVED SOLIDS AND NITROGEN MANAGEMENT

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I. Background

The 1975 and 1983 Basin Plans for the Santa Ana River Basin reported that the most serious problem in the basin was the build--up of dissolved minerals, or salts, in the groundwater and surface waters. Sampling and computer modeling of groundwaters showed that the levels of dissolved minerals, generally expressed as total dissolved solids (TDS) or total filterable residue (TFR), were exceeding water quality objectives or would do so in the future unless appropriate controls were implemented. Nitrogen levels in the Santa Ana River, largely in the form of nitrate, were likewise projected to exceed water quality objectives. As was discussed in Chapter 4, high levels of TDS and nitrate adversely affect the beneficial uses of groundwater and surface waters. The mineralization of the Region's waters, and its impact on beneficial uses, remains a significant problem.

Each use of water adds an increment of dissolved minerals. Significant increments of salts are added by municipal and industrial use, and the reuse and recycling of the wastewater generated as it moves from the hydrologically higher areas of the Region to the ocean. Wastewater and recycled water percolated into groundwater management zones is typically pumped and reused a number of times before reaching the ocean, resulting in increased salt concentrations. Evaporation or evapotranspiration also can cause an increase in the The concentration of dissolved minerals. can also be increased by evaporation or evapotranspiration.

One of the principal causes of the mineralization problem in the Region is historical irrigated agriculture, particularly citrus, which in the past required large applications of water to land, causing large losses by evaporation and evapotranspiration. TDS and nitrate concentrations are increased both by this reduction in the total volume of return water and by the direct application of these salts in fertilizers. Dairy operations, which began in the Region in the 1950s and continue today, also contribute large amounts of salts to the basin.

The implementation chapters of the 1975 and 1983 Basin Plans focused on recommended salt management plans to address the mineralization problem. The 1975 Basin Plan initiated a total watershed approach to salt source control of salinity. Both 1975 and 1983 Basin Plans called for controls ofn salt loadings from all water uses including residential, commercial, industrial, and agricultural (including dairies). The salt management plans included the following elements: measures to improve water supply quality, including the import of high quality water from the State Water Project (SWP); waste discharge regulatory strategies (e.g., wasteload allocations, allowable mineral increments for uses of the water supply quality); and recharge projects and other remedial programs to correct problems in specific areas. The~~se~~ salt management ~~P~~plans also ~~include~~ carefully limited reclamation activities and the recycling of wastewaters in~~to~~ the local groundwater basins.

The~~se~~ salt management plans ~~were developed~~ ~~for~~in the 1975 and 1983 Basin Plans were developed by using a complex set of groundwater computer models and programs, known collectively as the Basin Planning Procedure (BPP). The modeling work focused on the TDS concentrations and loading into the upper Santa Ana River Basin and, to a lesser extent, on the San Jacinto Basin, where the BPP was less developed and refined. ~~The constituent modeled in those Plans was TDS.~~

~~For the salt management plan specified initially in the 1995 Basin Plan, when the Plan was adopted and approved in 1994 and 1995,~~ The TDS modeling for the salt management plan specified in the 1995 Basin Plan (adopted and approved in 1994 and 1995) was conducted with the BPP for both the upper Santa Ana and San Jacinto Basins. ~~However, m~~Most of the attention was again directed to the upper Santa Ana Basin, for which significant improvements to the BPP were made under a joint effort by the Santa Ana Watershed Project Authority (SAWPA), the Santa Ana River Dischargers Association (SARDA), the Metropolitan Water District of Southern California (MWDSC), and the Santa Ana Regional Water Quality Control Board (Regional Board). The most significant change to the BPP was the addition of a nitrogen modeling component so that projections of the nitrate-nitrogen ~~(nitrate)~~ quality of groundwater~~s~~ could be made, in addition to TDS groundwater quality. This enabled the development of a management plan for both nitrogen and~~, as well as~~ TDS.

The BPP has not been used to model groundwater quality conditions in the lower Santa Ana River Basin ~~(Orange County GMZ)~~. ~~For that Basin,~~Instead, the Regional Board's TDS and nitrogen management plans have relied, in large part, on the control of the quality of the Santa Ana River flows, which are a major source of recharge in the lower Basin ~~located in Orange County~~. As discussed in Chapter 4, most of the Santa Ana River baseflow (80-90%) is composed of municipal wastewater treatment plant discharges~~ed sewage effluent~~; it also includes nonpoint source inputs and rising groundwater. Baseflow generally provides 70% or more of the water recharged in the Orange County Groundwater Management Zone (GMZ).

In rare wet years, baseflow accounts for a smaller, but still significant, percentage (40%) of the recharge on an annual basis. Therefore, to protect Orange County groundwater, it is essential to control the quality of baseflow. To do so, baseflow TDS and ~~nitrate-~~total nitrogen water quality objectives are specified in this Plan for Reach 3 of the River. Wasteload allocations have been established and are periodically revised to meet applicable ~~the TDS, nitrate-nitrogen and ose and other~~ water quality objectives designated for the Santa Ana River and its tributaries, and the underlying GMZs~~objectives~~.

For the 1983 Basin Plan, QUAL-II, a surface water model developed initially by the

US EPA, was calibrated for the Santa Ana River (River) and used to make detailed projections of ~~R~~River quality (TDS and nitrogen) and flow. The model was used to develop wasteload allocations for TDS and nitrogen discharges to the River that were approved as part of that Plan. (Wasteload allocations are discussed in detail in Section III of this Chapter). An updated version of the model, QUAL-2e, was used to revise these wasteload allocations, which were included as part of the initial salt management plan in the 1995 Basin Plan.

The models were used to integrate the quantity and quality of inputs to the River from various sources, including the headwaters, municipal wastewater treatment plant discharges, and rising groundwater, based on the water supply and wastewater management plans used in the BPP. Data on rising groundwater quality and quantity were provided to the QUAL-II/2e models by the BPP. As with the BPP, the QUAL-II/2e model projections were used to identify the salinity and nitrogen water quality problems and to assess the effectiveness of changes in TDS and nitrogen management strategies.

II. Update of the Total Dissolved Solids/Nitrogen Management Plan in 2004

The studies conducted to update the TDS/Nitrogen Management Plans in the 1983 and 1995 Basin Plans were not designed to validate or revise the TDS or nitrate-nitrogen objectives for groundwater. Rather, the focus of the studies was to determine how best to meet those established objectives. During public hearings to consider adoption of the 1995 Basin Plan, a number of water supply and wastewater agencies in the region commented that the TDS and nitrate-nitrogen objectives for groundwater should be reviewed, considering the estimated cost of complying with them (several billion dollars). In response, the Regional Board identified the review of these objectives as a high Basin Plan triennial review priority, and stakeholders throughout the Region agreed to provide sufficient resources to perform the necessary studies. In December 1995, these agencies, under the auspices of ~~the Santa Ana Watershed Project Authority (~~SAWPA~~)~~, formed the Nitrogen/Total Dissolved Solids (TDS) Task Force (Task Force) to undertake a watershed-wide study (Nitrogen/TDS Study) to review the groundwater objectives and the TDS/Nitrogen Management Plan in the Basin Plan as a whole. SAWPA managed the study, and Risk Sciences and Wildermuth Environmental, Inc., served as project consultants.

Major tasks included review of the groundwater sub-basin boundaries, development of recommendations for revised boundaries, development of appropriate TDS and nitrate-nitrogen objectives for the sub-basins (management zones), and update of the TDS and TIN wasteload allocations to ensure compliance with both the established objectives for the Santa Ana River and its tributaries and the recommended groundwater quality objectives. A complete list of all tasks completed in Phases 1A & 1B, and 2A & 2B is included in the Appendix. The Task Force effort resulted in substantive proposed changes to the Basin Plan, including new groundwater management zones (Chapter 3) and new nitrate-nitrogen and TDS objectives for the management zones (Chapter 4). These changes necessitated the update and revision of the TDS/Nitrogen Management Plan, which is described below.

The Task Force studies, including the technical methods employed, are documented in a series of reports (Ref. 1-5). The Task Force studies differed from prior efforts to review the TDS and nitrogen management plans in that the BPP was not utilized. A revised model approach, not involving use of the QUAL-2e model, was used to update the wasteload allocations for the Santa Ana River. The Task Force concluded that the BPP no longer remained a viable tool for water quality planning purposes, and also concluded that the development of a new model was beyond the scope and financial capabilities of the Task Force. The efficacy of modeling to formulate and update salt management plans in this Region has been well demonstrated~~;~~. In 2004, the Regional Board directed that ~~in the future,~~ priority should be given to the development of a new model that would assist with future Basin Plan reviews.

III. TDS/Nitrogen Management Plan

TDS and nitrogen management in this Region involves both regulatory actions by the Regional Board and actions by other agencies to control and remediate excess salts and nitrogen ~~nutrients.~~ ~~problems.~~ Regulatory actions include the adoption of appropriate TDS and nitrogen limitations in requirements issued for waste disposal and municipal wastewater recycling, and the adoption of waste discharge prohibitions. These regulatory steps are described earlier in this Chapter. Actions by other agencies include projects to improve water supply quality and the construction of groundwater desalters and brine lines to remove highly saline wastes from the watershed. The following sections discuss these programs in greater detail.

A. Water Supply Quality

Water supply quality has a direct effect ~~affect~~ on the quality of discharges from municipal wastewater treatment plants, discrete industrial discharges, returns to groundwater from homes using septic tank systems, returns from irrigation of landscaping in sewered and unsewered areas, and returns to groundwater from commercial irrigated agriculture.

Water supply quality is an important determinant of the extent to which wastewater can be reused and recycled without resulting in adverse impacts on affected receiving waters. This is particularly true for TDS, since it is a conservative constituent, less likely than nitrogen to undergo transformation and loss as wastewater is discharged or recycled, and typically more difficult than nitrogen to treat and remove.

Water supplies cannot be directly regulated by the Regional Board; however, limitations in waste discharge requirements, including ~~National Pollutant Discharge~~

~~Elimination System (~~NPDES~~)~~ permits, may necessitate efforts to improve source water quality. These efforts may include drilling new wells, implementing alternative blending strategies, capturing stormwater and recharging to groundwater, importing higher quality water when it is available, and constructing desalters to create or augment water supplies.

Imported water supplies are an important part of salt management strategies in the region from both a quantity and quality standpoint. Imported water is needed by many agencies to supplement local sources and satisfy ever-increasing demands. The import of high quality ~~State Water Project~~ SWP water, with a long-term TDS average less than 300 milligram per liter (mg/L), is particularly essential. The use of ~~State Water Project~~ SWP water allows maximum ~~re~~use of other water supplies, including ~~and~~ recycled water, without aggravating the mineralization problem. It is also used for recharge and replenishment to improve the quality of local water supply sources, which might otherwise be unusable. Thus, the use of high quality SWP~~State Water Project~~ water in the Region has water supply benefits that extend far beyond the actual quantity of water imported.

In some cases, the TDS quality of available water supplies in a wastewater treatment service area may make it infeasible for the discharger to comply with TDS limits specified in waste discharge requirements. This is particularly true during prolonged drought conditions when the allocations of high quality, low TDS imported water, supplied by the SWP may become severely constrained. In other cases, the discharger may add chemicals that enable compliance with certain discharge limitations, but also result in TDS concentrations in excess of waste discharge requirements. The Board recognizes these problems and incorporates provisions in waste discharge requirements to address them. These and other aspects of the Board's regulatory program are described next.

B. TDS and Nitrogen Regulation

As required by the Water Code (Section 13263), the Regional Board must assure that its regulatory actions implement the Basin Plan. Waste discharge requirements must specify limitations that, when met, will assure that water quality objectives will be achieved. Where the quality of the water receiving the discharge is better than the established objectives, the Board must assure that the discharge is consistent with the state's antidegradation policy (SWRCB Resolution No. 68-16). The Regional Board must also separately consider beneficial uses, and where necessary to protect those uses, specify limitations more stringent than those required to meet established water quality objectives. Of course, these obligations apply not only to TDS and nitrogen but also to other constituents that may adversely affect water quality and/or beneficial uses.

As indicated previously, the Regional Board's regulatory program includes the adoption of waste discharge prohibitions. The Board has established prohibitions on discharges of excessively saline wastes and, in certain areas, on discharges from subsurface disposal systems (see "Waste Discharge Prohibitions," above). The Board has also adopted other requirements pertaining to the use of subsurface disposal system use, both to assure public health protection and to address TDS and nitrogen-related concerns. These include the Regional Board's "Guidelines for Sewage Disposal from Land Developments" [Ref. 6], which are hereby incorporated by reference, and the minimum lot size requirements for septic system use (see Nonpoint Source section of this Chapter). In 2012, the State Water Resources Control Board (State Water Board) adopted the Water Quality Control Policy for Siting, Design, Operation and Maintenance of Onsite Wastewater Treatment Systems (OWTS Policy), which is implemented by the Regional Board.

However, tThe principal TDS and nitrogen regulatory tool employed by the Regional Board is the issuance of appropriate discharge requirements, in conformance with the legal requirements identified above. Several important aspects of this permitting program warrant additional discussion:

1. Salt assimilative capacity
2. Mineral increments
3. Nitrogen loss coefficients
4. TDS and TINnitrogen wasteload allocations
5. Wastewater reclamation
6. Special considerations - subsurface disposal systems

1. Salt Assimilative Capacity

Some waters in the Region have assimilative capacity for additions of TDS and/or nitrate-nitrogen; that is, wastewaters with higher TDS/nitrate-nitrogen concentrations than the receiving waters are diluted sufficiently by natural processes, including rainfall or recharge, such that the TDS and nitrate-nitrogen objectives of the receiving waters are met. The amount of assimilative capacity, if any, varies depending on the individual characteristics of the waterbody in question and must be reevaluated over time.

The 2004 adoption of new groundwater management zone boundaries (Chapter 3) and new TDS and nitrate-nitrogen objectives for these management zones (Chapter 4), pursuant to the work of the Nitrogen/TDS Task Force, necessitated the re-evaluation of the assimilative capacity findings initially incorporated in the 1995 Basin Plan. To conduct this assessment, the Nitrogen-TDS study consultant calculated current ambient TDS and nitrate-nitrogen water quality using the same methods and protocols as were used in the calculation of historical ambient quality (see Chapter 4). The analysis focused on representing current water quality as a 20-year average for the period from 1978 through 1997. [Ref. 1]. For each groundwater management zone, current TDS and nitrate--nitrogen concentrations water quality were compared to water quality objectives (historical water quality)[1]. Assimilative

[1] As noted in Chapter 4, ammonia-nitrogen and nitrite-nitrogen data were also included in the analysis, where

capacity was also assessed relative to the "maximum benefit" objectives established for certain groundwater management zones. If the current ambient water quality water in of a groundwater management zone is the same as or poorer than the specified water quality objectives, then that groundwater management zone does not have assimilative capacity. If the current ambient water quality of the groundwater is better than the specified water quality objectives, then that groundwater management zone has assimilative capacity. The difference between the objectives and current ambient water quality is the amount of assimilative capacity available.

Since adoption of the 2004 Basin Plan amendment and per Basin Plan requirements, ambient water quality and assimilative capacity findings have been, and will continue to be, updated every three years. Following Regional Board acceptance approval at a duly noticed public meeting, Hearing, the updated findings of ambient water quality and assimilative capacity will be have been posted on the Regional Board's website and will be used for regulatory purposes, as applicable.

As described in Chapter 4 and later in this Chapter, the application of the "maximum benefit" objectives is contingent on the implementation of certain projects and programs by specific dischargers as part of their maximum benefit demonstrations. Assimilative capacity created by these projects/programs will be allocated to the party(-ies) responsible for implementing them.

Chapter 3 delineates the Prado Basin Management Zone (PBMZ), and Chapter 4 identifies the applicable TDS and nitrate total inorganic nitrogen objectives for the PBMZ this Zone (the objectives for the surface waters that flow in this Zone). No assimilative capacity exists in the PBMZ. is zone.

These assimilative capacity findings are significant from a regulatory perspective. If there is assimilative capacity in the receiving waters for TDS, nitrogen or other constituents, a waste discharge may be of poorer quality than the objectives for those constituents for the receiving waters, as long as the discharge does not cause violation of the objectives and provided that antidegradation requirements are met. However, if there is no assimilative capacity in the receiving waters, the numerical limits in the discharge requirements cannot exceed the receiving water objectives or the degradation process would be accelerated.[2] This rule was expressed clearly by the State Water Resources Control Board in a decision regarding the appropriate TDS discharge limitations for the Rancho Caballero Mobile Hhome park located in the Santa Ana Region (State Water BoardWRCB Order No. 73-4, the so called "Rancho Caballero decision") [Ref. 7]. However, this rule is not meant to restrict overlying

available. This occurred for a very limited number of cases and ammonia-nitrogen and nitrite- nitrogen concentrations were insignificant in groundwater.

[2] A discharger may conduct analyses to demonstrate that discharges at levels higher than the water quality objectives would not cause or contribute to the violation of the established objectives. See, for example, the discussion of wasteload allocations for discharges to the Santa Ana River and its tributaries (Section III. B. 4.) If the rRegional Board approves this demonstration, then the discharger would be regulated accordingly.

agricultural irrigation, or similar activities, such as landscape irrigation. Even in groundwater management zones without assimilative capacity, groundwater may be pumped, used for agricultural purposes in the area and returned to the groundwater management zone from which it originated.

In regulating waste discharges to waters with assimilative capacity, the Regional Board will proceed as follows. (see also Section III.B.6., Special Considerations - Subsurface Disposal Systems).

If a discharger proposes to discharge wastes that are at or below (i.e., better than) the current ambient TDS and/or nitrate-nitrogen water quality, then the discharge will not be expected to result in the lowering of water quality, and no antidegradation analysis will be required. TDS and nitrate-nitrogen objectives are expected to be met. Such discharges clearly implement the Basin Plan and the Regional Board can permit them to proceed. Of course, other pertinent requirements, such as those of the California Environmental Quality Act (CEQA) must also be satisfied, if applicable. For groundwater management zones, current ambient quality will be determined ~~every three years~~ periodically but no later than once every five years, pursuant to the detailed monitoring program to be conducted by dischargers in the watershed (see Section X in Chapter 5~~X~~).

Again, discharges to waters without assimilative capacity for TDS and/or nitrate-nitrogen must be held to the objectives of the affected receiving waters (with the caveat previously identified in footnote 2~~ previous page~~). In some cases, compliance with management zone TDS objectives for discharges to waters without assimilative capacity may be difficult to achieve. Poor quality water supplies or the need to add certain salts during the treatment process to achieve compliance with other discharge limitations (e.g., addition of ferric chloride) could render compliance with strict TDS limits very difficult. The Regional Board addresses such situations by providing dischargers with the opportunity to participate in TDS offset programs, such as the use of desalters, in lieu of compliance with numerical TDS limits. These offset provisions are incorporated into waste discharge requirements. Provided that the discharger takes all reasonable steps to improve the quality of the waters influent to the treatment facility (such as through source control or improved water supplies), and provided that chemical additions are minimized, the discharger can proceed with an acceptable program to offset the effects of TDS discharges in excess of the permit limits.

Similarly, compliance with the nitrate-nitrogen objectives for groundwater~~s~~ management zones specified in this Plan would be difficult in many cases. An o~~O~~ffset provision may apply to nitrogen discharges as well.

An alternative that dischargers might pursue in these circumstances is revision of the TDS or nitrate-nitrogen water quality objectives, through the Basin Plan amendment process. Consideration of less stringent objectives would necessitate comprehensive antidegradation review, including the demonstrations that beneficial uses would be protected and that water quality consistent with maximum benefit to the people of the State would be maintained. As discussed in Chapter 4 and later in this Chapter, a number of dischargers have pursued this "maximum benefit objective" approach, leading to the inclusion of "maximum benefit" objectives and implementation strategies in this Basin Plan. Discharges to areas where the "maximum benefit" objectives apply will be regulated in conformance with these implementation strategies. Any assimilative capacity created by the maximum benefit programs will be allocated to the parties responsible for implementing them.

2. Mineral Increments

The fundamental philosophy of TDS/Nitrogen management plans in Santa Ana Region Basin Plans to date has been to allow a reasonable use of the water, to treat the wastewater generated appropriately, and to allow it to flow downstream (or to lower groundwater basins) for reuse. "Reasonable use" is defined in terms of appropriate mineral increments that can be addedpplied to water supply quality in setting discharge limitations.

The California Department of Water Resources (DWR) has recommended values for the maximum use incremental additions of specific ions that should be allowed through use, based on detailed study of water supplies and wastewater quality in the Region [Ref. 8]. Their recommendations are as follows:

Sodium	70 mg/L
Sulfate	40 mg/L
Chloride	65 mg/L
TDS	250 mg/L
Total Hardness	30 mg/L

These mineral increments were incorporated into the 1983 Basin Plan. They will be incorporated into waste discharge requirements when appropriate and necessary. In general, it may not be necessary to incorporate mineral increment requirements when a water quality based effluent limitation for salinity imposed on a Publicly Owned Treatment Work (POTW) in accordance with an approved wasteload allocation for salinity.

3. Nitrogen Loss Coefficients

The Regional Board's regulatory program has long recognized that some nitrogen transformation and loss can occur when wastewater is discharged to surface waters, or reused for landscape irrigation, or allowed to with concomitant percolated intoion of treated wastewater to groundwater. For example, the Total Inorganic Nitrogen (TIN) wasteload allocation adopted for the Santa Ana River in 1991 included unidentified nitrogen losses in the surface flows in Reach 3 of the River. Historically, wWaste discharge requirements have allowed for nitrogen losses due to plant uptake when recycled water is used for crop or landscape irrigation.

One of the tasks included in the Nitrogen/TDS Task Force[3] studies leading to the 2004 update of the N/TDS/Nitrogen Management Plan was the consideration of subsurface transformation and loss of nitrogen. One objective of this task was to determine whether dischargers might be required to incur costs for additional treatment to meet the new groundwater management zone nitrate-nitrogen objectives (Chapter 4), or whether natural, subsurface nitrogen losses could achieve any requisite reductions. The second objective was to develop a conservative default nitrogen loss coefficient that could be used with certainty to develop appropriate limits for TIN nitrogen discharges throughout the Region.

To meet these objectives, the Nitrogen/TDS study consultant, Wildermuth Environmental, Inc. (WEI), evaluated specific recharge operations (e.g., the Orange County Water District recharge ponds overlying the Orange County Forebay), wastewater treatment wetlands (e.g., the Hidden Valley Wildlife Area, operated by the City of Riverside) and Santa Ana River recharge losses (for the Santa Ana River, water quality in reaches where recharge is occurring ("losing" reaches) was compared with local well data). In each case, WEI evaluated long-term (1954 to 1997) nitrogen surface water quality data and compared those values to long-term nitrogen data for adjacent wells.

Based on this evaluation, a range of nitrogen loss coefficients was identified. [Ref. 1] In light of this variability, the Nitrogen/TDS Task Force recommended that a conservative approach to be taken in establishing a nitrogen loss coefficient. The Task Force recommended that a region-wide default nitrogen loss of 25% be applied to all discharges that affect groundwater in the Region. The Task Force also recommended that confirmatory, follow-up monitoring be required when a discharger requested and was granted the application of a nitrogen loss coefficient greater than 25%, based on site-specific data submitted by that discharger.

The City of Riverside presented data to the Task Force regarding nitrogen transformation and losses associated with wetlands.[4] These data support a nitrogen loss coefficient of 50%, rather than 25%, for the lower portions of Reach 3 of the Santa Ana River that overlie the Chino South groundwater management zone. [Ref. 9]. In fact, the data indicate that nitrogen losses from wetlands in this part of Reach 3 can be greater than 90%. However, given the limited database, the Task Force again recommended a conservative approach, i.e., 50% in this area, with confirmatory monitoring. The Regional Board approved the Task Force recommendation in 2005 (Res. No. R8-2005-0063).

[3] SAWPA's Nitrogen/TDS Task Force was replaced by the Basin Monitoring Program Task Force in 2005. The former was responsible for developing the N/TDS Management Plan and the latter was responsible for coordinating implementation of that plan.

[4] Formerly the Hidden Valley Enhanced Wetlands Treatment Ponds

Eastern Municipal Water District (EMWD) also presented data that support a 60% nitrogen loss coefficient in the San Jacinto Basin [Ref 10F]. This 60% nitrogen loss is only applicable to discharges to the following management zones that overlie the San Jacinto Basin: Perris North, Perris South, San Jacinto Lower Pressure, San Jacinto Upper Pressure, Lakeview-Hemet North, Menifee, Canyon, and Hemet South. The Regional Board approved this site-specific nitrogen loss coefficient in 2014 (Res. R8-2014-0005).

The 25% and, where appropriate, 50% or 60% nitrogen loss coefficients will be used in developing ~~W~~waste ~~D~~discharge ~~R~~requirements for TIN. ~~nitrogen discharge limits.~~ These coefficients will be applied to discharges that affect groundwater management zones with and without assimilative capacity.

For discharges to groundwater management zones with assimilative capacity, the default TIN discharge limitation would be calculated as follows:

TIN Discharge Limit (mg/L) =

nitrate-nitrogen current ambient water quality in the GMZ ~~groundwater management zone~~

(1 - nitrogen loss coefficient)

The Regional Board also has the discretionary authority to ~~specify~~ adopt ~~will employ its discretion in specifying~~ a higher TIN limit that would allocate some of the available assimilative capacity provided that it exercises that discretion in accordance with the ~~s~~State Water Board's ~~a~~Antidegradation ~~p~~Policy (Res. 68-16).

For discharges to groundwater management zones without assimilative capacity, the TIN discharge limitation would be calculated as follows:

TIN Discharge Limit (mg/L) =

nitrate-nitrogen water quality objective in the ~~groundwater management zone~~GMZ

(1 - nitrogen loss coefficient)

These coefficients do not apply to discharges with effluent limitations that are based on ~~specifically addressed by~~ the TIN wasteload allocation, described in the next section, since surface and subsurface nitrogen losses were accounted for in developing this allocation.

4. TDS and Nitrogen Wasteload Allocations for the Santa Ana River

Wasteload allocations for regulating discharges of TDS and total inorganic nitrogen (TIN) to the Santa Ana River, and thence to groundwater management zones recharged by the River, are an important component of salt management for the Santa Ana Basin.

As described earlier, the Santa Ana River is a significant source of recharge to groundwater management zones underlying the River and, downstream, to the Orange County groundwater basin. The quality of the River thus has a significant effect on the quality of the Region's groundwater, which is used by more than 5 million people. Control of River quality is appropriately one of the Regional Board's highest priorities.

Sampling and modeling analyses conducted in the 1980's and early 1990's indicated that the TDS and total nitrogen water quality objectives for the Santa Ana River were being violated or were in danger of being violated. Under the Clean Water Act (Section 303(d)(1)(c); 33 USC 466 et seq.), violations of water quality objectives for surface waters must be addressed by the calculation of the maximum wasteloads that can be discharged to achieve and maintain compliance. Accordingly, TDS and nitrogen wasteload allocations were developed and included in the 1983 Basin Plan. The nitrogen wasteload allocation was updated in 1991; an updated TDS wasteload allocated was included in the 1995 Basin Plan when it was adopted and approved in 1994/1995.

The wasteload allocations distribute a share of the total TDS and TIN wasteloads to each of the discharges to the River or its tributaries. The allocations are implemented principally through TDS and nitrogen limits in waste discharge requirements issued to municipal wastewater treatment facilities (Publicly Owned Treatment Works or POTWs) that discharge to the River, either directly or indirectly.[5] Nonpoint source inputs of TDS and nitrogen to the River are also considered in the development of these wasteload allocations. Controls on these inputs are more difficult to identify and achieve and may be addressed through the areawide stormwater permits issued to the counties by the Regional Board or through other programs. For example, the Orange County Water District has constructed and operates more than 400 acres of wetlands ponds in the Prado Basin Management Zone to remove nitrogen in flows diverted from, and then returned to, the Santa Ana River.

Because of the implementation of these wasteload allocations, the Orange County Water District wetlands and other measures, the TDS and TIN water quality objectives for the Santa Ana River at Prado Dam are no longer being violated, as shown by annual sampling of the River at the Dam by Regional Board staff [Ref. 10A]. However, as part of the Nitrogen/TDS Task Force studies to update the TDS/nitrogen management plan for the Santa Ana Basin, a review of the TDS and TIN wasteload allocations initially contained in this Basin Plan was conducted. In part, this review was necessary in light of the new groundwater management zones and TDS and nitrate-nitrogen objectives for those zones recommended by the Nitrogen/TDS Task Force (and now incorporated in Chapters 3 and 4). The wasteload allocations were evaluated and revised to ensure that the POTW discharges would assure compliance with established surface water objectives and would not cause or contribute to violation of the groundwater

[5] With some exceptions that may result from groundwater pumping practices, the ground and surface waters in the upper Santa Ana Basin (upstream of Prado Dam) eventually enter the Santa Ana River and flow through Prado Dam. Discharges to these waters will therefore eventually affect the quality of the River and must be regulated so as to protect both the immediate receiving waters and other affected waters, including the River.

management zone objectives. The Task Force members also recognized that this evaluation was necessary to determine the economic implications of assuring conformance with the new management zone objectives. Economics is one of the factors that must be considered when establishing new objectives (Water Code Section 13241).

WEI performed the wasteload allocation analysis for both TDS and TIN [Ref. 3, 5]. In contrast to previous wasteload allocation work, the QUAL-2e model was not used for this analysis. Further, the Basin Planning Procedure (BPP) was not used to provide relevant groundwater data. Instead, WEI developed a projection tool using a surface water flow/quality model and a continuous-flow stirred-tank reactor (CFSTR) model for TDS and TIN. The surface water Waste Load Allocation Model (WLAM) is organized into two major components - RUNOFF (RU) and ROUTER (RO). RU computes runoff from the land surface and RO routes the runoff estimated with RU through the drainage system in the upper Santa Ana watershed. Both the RU and RO models contain hydrologic, hydraulic and water quality components.

To ensure that all hydrologic regimes were taken into account, hydrologic and land use data from 1950 through 1999 were used in the analysis. The analysis took into account the TDS and nitrogen quality of wastewater discharges, precipitation and overland runoff, instream flows and groundwater. Off-stream and in-stream percolation rates, rising groundwater quantity and quality, and the 25% and 50% nitrogen loss coefficients described in the preceding section were also factored into the analysis. The purpose of the modeling exercise was to estimate discharge, TDS and TIN concentrations in the Santa Ana River and tributaries and in stream bed recharge. These data were then compared to relevant surface and groundwater quality objectives to determine whether changes in TDS and TIN regulation were necessary.

Discharges from POTWs to the Santa Ana River or its tributaries were the focus of the analysis. POTW discharges to percolation ponds were not considered. The wasteload allocation analysis assumed, correctly, that these direct groundwater discharges will be regulated pursuant to the management zone objectives, findings of assimilative capacity and nitrogen loss coefficients identified in Chapter 4 and earlier in this chapter.

The surface waters evaluated included the Santa Ana River, Reaches 3 and 4, Chino Creek, Cucamonga/Mill Creek and San Timoteo Creek. Management zones that are directly under the influence of these surface waters and that receive wastewater discharges were evaluated. These included the San Timoteo, Riverside A, Chino South, and Orange County Management Zones. In addition, wastewater discharges to the Prado Basin Management Zone were also evaluated.

WEI performed three model evaluations in order to assess wasteload allocation scenarios through the year 2010. These included a "baseline plan" and two alternative plans ("2010-A" and "2010-B"). The baseline plan generally assumed the TDS and TIN limits and design flows for POTWs specified in waste discharge requirements as of 2001. These limits implemented the wasteload allocations specified in the 1995 Basin

Plan when it was approved in 1995. A TDS limit of 550 mg/L was assumed for the Rapid Infiltration and Extraction Facility (RIX) and the analysis assumed a 540 mg/L TDS for the City of Beaumont. The baseline plan also assumed reclamation activities at the level specified in the 1995 Basin Plan, when it was approved. The purpose of the baseline plan assessment was to provide an accurate basis of comparison for the results of evaluation of the two alternative plans. For alternative 2010-A, it was generally assumed that year 2001 discharge effluent limits for TDS and TIN applied to POTW discharges, but projected year 2010 surface water discharge amounts were applied. TDS limits of 550 mg/L and 540 mg/L were again assumed for RIX and the City of Beaumont discharges. The same limited reclamation and reuse included in the baseline plan was assumed (see R8-2014-0001, 2004 Salt Plan Amendments, Table 5-7 in Section III.B.5.). For alternative 2010-B, POTW discharges were also generally limited to the 2001 TDS and TIN effluent limits (RIX was again held to 550 mg/L and Beaumont to 540 mg/L). However, in this case, large increases in wastewater recycling and reuse were assumed (R8-2014-0001, 2004 Salt Plan Amendments Table 5-7), resulting in the reduced surface water discharges projected for 2010.

Analysis of the model results demonstrated that the TDS and nitrogen objectives of affected surface waters would be met and that water quality consistent with the groundwater management zone objectives would be achieved under both alternatives. It is likely that water supply and wastewater agencies will implement reclamation projects with volumes that are in the range of the two alternatives. The wasteload allocations would be protective throughout the range of surface water discharges identified. The year 2010 flow values are not intended as limits on POTW flows; rather, these flows were derived from population assumptions and agency estimates and are used in the models for quality projections. Surface water discharges significantly different than those projected will necessitate additional model analyses to confirm the propriety of the allocations. The Regional Board has relied on this model to derive appropriate waste discharge requirements for TIN and TDS from 2004 through 2021.

The wasteload allocations are periodically updated to reflect the best available science and data.

SAWPA's Basin Monitoring Program Task Force, which includes Regional Board staff, began updating the WLAM in 2017. As part of that process, a number of significant improvements were made to the 4th generation WLAM developed by Geoscience Support Services, Inc. (Geoscience). Wildermouth Environmental Inc.'s proprietary model was replaced with an open-source Hydrologic Simulation Program Fortran (HSPF) program endorsed by both EPA and USGS.[6] The 2004 model domain, which originally ended at Prado Dam, was expanded to include Reaches 1 and 2 of the Santa Ana River overlying the Orange Country groundwater management zone. In addition, the model was extended to Reaches 1 through 6 of Temescal Creek overlying the

[6] See https://www.epa.gov/ceam/hydrological-simulation-program-fortran-hspf.

Upper Temescal Valley groundwater management zone. The range of probable precipitation conditions was expanded from a 50--year historical record to 67--year historical record. A number of new quantitative metrics were employed to evaluate accuracy and precision during the model calibration process. In addition, output from Geosciences' new WLAM were compared to outputs produced by the existing WLAM, for Reaches 3 and 4 of the Santa Ana River (above MWD Crossing), to ensure that the results from the HSPF model were comparable to Wildermuth Environmental Inc.'s proprietary model before proceeding to develop the HSPF version for the entire watershed. Following a long and rigorous calibration process, the update process was completed in June of 2020.[7,8] The Task Force concluded that the new HSPF model was performing as well or better than the WLAM previously approved by the Regional Board in 2004.

The calibrated HSPF model was used to assess three different volume-based discharge assumptions (m~~M~~aximum e~~E~~xpected, ~~M~~minimum e~~E~~xpected and ~~M~~most ~~L~~likely) for the municipal wastewater treatment plants under two different land use conditions (2020, 2040). Daily river flows and TDS/TIN concentrations were estimated for all six of these scenarios using 67 years of historical precipitation data from numerous rain gages throughout the watershed. Results from these modeling simulations were used to determine if the existing effluent limits and waste discharge requirements for municipal wastewater treatment facilities would continue to assure compliance with the applicable water quality objectives for ~~N~~nitrate-~~N~~nitrogen and TDS water quality objectives in each groundwater management zones ~~basin~~ beneath the Santa Ana River. During the six simulation runs, TIN and TDS concentrations in wastewater discharged from all ~~Publicly-Owned Treatment Works (~~POTWs~~)~~ were assumed to be equal to the maximum permitted concentration allowed in each facility's current NPDES permit. This ~~very~~ conservative assumption was designed to provide a margin-of-safety around the model estimates and is the same procedure previously approved by the Regional Board for the 2004 WLAM.

In order to determine whether the proposed wasteload allocation would achieve its intended purpose, the volume-weighted 10-year average concentration of TIN and TDS percolating through the streambed was compared to the relevant water quality objectives and current ambient qualiti~~y~~es in each groundwater management zone. A 10-year volume weighted average concentration was selected as the compliance metric because it was considered conservative as compared to existing objectives, which are based on a 20-year volume weighted average. Shorter averaging periods were applied to evaluate compliance with the volume-weighted 5-year average for TDS concentration in Reach 2 and to evaluate compliance with the base flow objectives for TIN and TDS at

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7 Geoscience Support Services, Inc. Santa Ana River Waste Load Allocation Model Update Summary Report. June 19, 2020.

8 As part of calibration for the new HSPF model, Geosciences relied on the Army Corps of Engineers operating rules for both 7 Oaks Dam and Prado Dam. Notably, the operating rules for Prado Dam define ranges of flow rates, not a specific flow rate, that can be released from the dam. As such, it is not possible to achieve "perfect" calibration of the model.

Prado Dam.[9]

The updated WLAM demonstrated that continued reliance on existing effluent limits for TIN and TDS would not cause an exceedance of related water quality objectives in groundwaters affected by recharge~~s~~ from treated municipal wastewater;~~.~~ nor is it expected to result in significant lowering of existing water quality~~.~~ ~~[10]~~e The wasteload allocations for TDS and TIN are specified in Table 5-5.

The WLAM does not evaluate off channel discharges of treated wastewater or off-channel uses of recycled water for landscape or crop irrigation, and thus the wasteload allocations in Table 5-5 are not directly applicable to such discharges. The wasteload allocations in Table 5-5 will be applied only to the surface water discharges of these POTWs to the Santa Ana River and its tributaries. Except as identified in Table 5-5, the results from the updated WLAM as articulated in the June 2020 report may not be used to support new permits or changes to existing effluent limits until the updated WLAM is further validated using actual precipitation data and actual discharge data from water years 2017, 2018, 2019, and 2020, to compare WLAM projections to actual observations at Prado Dam. Results from the WLAM for each major segment of the Santa Ana River~~,~~ and key tributaries~~,~~ are discussed in greater detail in the Staff Report.

Implementation of Waste Load Allocations in Waste Discharge Requirements

For discharges governed by an NPDES permit, the effluent limits for TIN and TDS shall be set no higher than the concentrations shown in Table 5-5 (below) unless the Regional Board authorizes an alternative compliance mechanism through an approved offset program. The Regional Board retains authority and discretion to impose effluent limits that are more stringent than those shown in Table 5-5 when it is necessary to protect beneficial uses or prevent significant water quality degradation.

Effluent limits that are imposed for the purpose of implementing the approved wasteload allocation for TIN shall require dischargers to demonstrate compliance based on a 12-month volume-weighted running average that is updated every month.[11]

Effluent limits that are imposed for the purpose of implementing the approved wasteload allocation for TDS shall generally require dischargers to demonstrate compliance based on a 60-month running average. The Regional Board may consider imposing effluent

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[9] A summary of the simulation results for all six scenarios can be found in the Staff Report as well as in Tables ~~24 and 25~~X and X of Geosciences Final Santa Ana River Waste Load Allocation Model Update – Supplemental Report ~~WLAM Report~~ dated ~~June~~September X, 2021 ~~19, 2020~~ (see pages ~~337 and 338 of 959~~ in the PDF file).

~~[10] See Tables 24 & 25 in Geoscience's Final WLAM Report dated June 19, 2020 (pages 316 & 317 of 959 in PDF file).~~

[11] As part of the 2004 wasteload allocation process, it was determined that effluent limits associated with ensuring compliance with the nitrate-nitrogen water quality objectives in the Basin Plan would be expressed as Total Inorganic Nitrogen (TIN). This decision was done in an effort to be conservative and to provide a small safety factor. In general, the amount of nitrate-nitrogen in TIN is about 85%. Thus, the TIN effluent limits are more conservative than if they were expressed as nitrate-nitrogen.

limitations for TDS identified in Table 5-5 (below) using shorter or longer averaging periods (not to exceed an averaging period of 120-months as a volume-weighted running average) based on case-by-case evaluation that considers the dischargers ongoing actions and activities that are being implemented to address and/or avoid long-term salinity impacts.[12]

For discharges not otherwise identified in Table 5-5 (below), effluent limits for TIN and TDS shall be set no higher than the applicable water quality objective for the relevant receiving stream or groundwater basin, whichever is lower. If the current ambient quality is better (i.e. lower concentration) than the applicable water quality objective, the discharger may request an allocation of assimilative capacity by making the demonstrations mandated in the ~~s~~State Water Board's Antidegradation Policy (Res. 68-16). The Regional Board is not obligated to allocate assimilative capacity but may elect to do so at its discretion.[13]

5. Implementation of Other Salinity-related Water Quality Objectives

In addition to the TDS objectives in the Basin Plan, Table 4-1 also specifies water quality objectives for certain individual salt ions (sodium, chloride, sulfate, hardness, etc.) for several stream segments. These other salinity objectives were developed based on limited sampling data collected in the early 1970's for the purpose of implementing the ~~s~~State Water Board's Antidegradation Policy (Res. 68-16). The objectives for sodium, chloride, sulfate, and hardness (shown in Table 4-1) are intended to represent baseline water quality as it existed back then and are not intended to define use-impairment thresholds.

The history of the Basin Plan also shows that such individual salt ion objectives were established for the intervening period to preserve baseline water quality until such time that appropriate water quality objectives designed to protect beneficial uses could be developed and adopted by the Regional Board. Under Porter-Cologne, the term “water quality objectives” is actually defined to mean “the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specified area.”[14] Thus, “traditional” water quality objectives should represent use-impairment thresholds rather than baseline water quality. Exceedances of objectives developed from limited sampling data that was designed to represent baseline water quality may indicate that water quality degradation is occurring but should not automatically be construed as evidence that beneficial uses are threatened or impaired.

In 2010, the Regional Board determined that it was not necessary to impose separate waste discharge requirements for all of the other individual salt ions if an NPDES permit

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[12] This provision of the Basin Plan is not intended to change or amend other Basin Plan provisions that apply to dischargers subject to Maximum Benefit Implementation Plans for Salt Management that are specified in Chapter 5, TDS/Nitrogen Management Plan, Section VI.

[13] CA Water Code §13263(b).

[14] CA Water Code, §13050(h).

already contained effluent limits for TDS. This determination is supported by the fact that these effluent limits were intended to serve the same regulatory purpose for protecting existing high quality waters from increases in salinity through implementation of the ~~s~~State Water Board's Antidegradation Policy (Res. 68-16).[15] The State Water Board has also stated that the Regional Board has discretion to impose separate effluent limits for TDS and various individual ions or through application of a single effluent limit.[16] Thus, the Regional Board may impose effluent limits for both TDS and the individual salt ions that make up TDS but is not required to do so.

The WLAM described above (§III-B-4) focuses exclusively on how combined discharges to the Santa Ana River are likely to affect overall salinity (TDS) in the underlying groundwater basins. The WLAM does not evaluate any of the individual salt ions.

Compliance with the wasteload allocation and related effluent limits for TDS are deemed sufficient to demonstrate compliance with the water quality objectives for individual salt ions shown in Table 4-1 in Chapter 4. In addition, the water quality objectives for individual salt ions (chloride, sodium, sulfate, and hardness) shown in Table 4-1 were established for the purpose of specifying the existing baseline quality and maintaining existing water quality until such time that traditional water quality objectives associated with use impairment could be develop and adopted into the Basin Plan. These levels were believed to be better than necessary to protect the designated beneficial uses at the time they were established. The water quality objectives for individual salt ions were not designed or intended to protect any specific beneficial use such as WARM, COLD, WILD, RARE, AGR or MUN.

6. Future Planning Priorities

Dischargers identified in Table 5-5 (below) are required to prepare and submit an updated wasteload allocation to the Regional Board approximately every 10 years - commencing from the effective date of the wasteload allocation most recently approved by the Regional Board. Dischargers may elect to undertake and complete this task individually or by participating in a collaborative project like those previously sponsored by SAWPA's Basin Monitoring Program Task Force. The wasteload allocation update shall evaluate compliance with existing water quality objectives and the state Antidegradation Policy for a period of not less than 20 years and shall take into consideration changes in land uses, receiving water quality for both surface water and groundwaters, changes in the volume or quality of discharges from point and non-point sources, variations in precipitation, new or revised regulatory requirements, and any other factors specified by the Regional Board.

On December 11, 2018, the State Water Board adopted a revised Water Quality Control Policy for Recycled Water, which became effective on April 8, 2019 (2019 Recycled Water Policy). The 2019 Recycled Water Policy requires the Regional Board to evaluate

[15] Santa Ana Water Board Res. No. R8-2010-0012 (March 18, 2010).

[16] State Water Board Order No. 82-5; In the Matter of the Petition of Chino Basin Municipal Water District for Review of Orders 81-27 and 81-28, NPDES Permits Nos. CA0105279 and CA0105287.

Salt and Nutrient Management Plans adopted as a Basin Plan Amendment prior to April 8, 2019 by April 8, 2024. The TDS-/Nitrogen Management Plan as included in the Basin Plan was adopted prior to April 8, 2019, and must be evaluated by the Regional Board prior to April 8, 2024. From this review, the Regional Board, in consultation with stakeholders, must update basin evaluations of available assimilative capacity, projected trends, and concentrations of salts and nutrients in groundwater, then determine whether potential updates or revisions to the TDS/Nitrogen Management Plan may be warranted, or to make the plan consistent with the provisions of the 2019 Recycled Water Policy.

The Regional Board, in consultation with the Basin Monitoring Program Task Force, will conduct the review as required by the 2019 Recycled Water Policy. This review will include evaluating the current surface and groundwater monitoring and reporting provisions of the Basin Plan to determine what updates may need to occur to ensure that the Basin Plan is consistent with the 2019 Recycled Water Policy.

Table 5-5: Waste Load Allocations for TDS and TIN in the 2020 - 2040 Permitting Period[17]

Permittee & Discharges	Primary Receiving Water(s)		Discharge *(mgd)*[18]		TDS *(mg/L)*	TIN *(mg/L)*
	Surface Stream(s)	Groundwater MZ(s)	2020	2040		
City of Beaumont[19]	Noble Cr, Cooper's Cr. to San Timoteo Cr.-R4[20]	Beaumont & San Timoteo	3.8 (1.8)	6.3 (1.8)	300 (400)	3.6 (6.0)
Yucaipa Valley Water District[21]	San Timoteo Cr.-R3	San Timoteo	8.0	8.0	400	5.5
City of San Bernardino: Geothermal Discharges	East Twin Cr. & Warm Cr. to SAR-R5	Bunker Hill-A & B	1.0	1.0	264	0.7
City of Rialto	SAR-R4	Riverside-A	7.2	18.0	490	10.0
RIX (Cities of Colton & San Bernardino)	SAR-R4	Riverside-A	34.5	30.1	550	10.0
City of Riverside-RWQCP[22]	SAR-R3	Chino-South[23]	33.8	46.0	650	10.0[24]
City of Corona: WWTP-1	Temescal Cr.-R1A	N/A (PBMZ)	11.5	15.0	700	10.0
Inland Empire Utilities Agency: [25] RP1, RP4, RP5, & CC	Chino Cr. & Cucamonga Cr.	Chino-North (or PBMZ)[26]	85	107.0	550	8.0
Western MWD: WRCRWA	SAR-R3	N/A (PBMZ)	12.0	15.3	625	10.0
Western MWD: Arlington Desalter	Temescal Cr.-R1A	N/A (PBMZ)	7.25	7.25	260	4.4
Temescal Valley Water District-TVWRF	Temescal Cr.-R2	Upper Temescal Vly.	2.3	2.3	650	10.0[27]
Elsinore Valley MWD: RWWRF-DP001	Temescal Cr.-R5	Upper Temescal Vly.	8.0	12.0	700	10.0[28]
Eastern MWD: SJV, MV, PV, SC, TV	Temescal Cr.-R5[29]	Upper Temescal Vly.	52.5	52.5	650	10.0

Source: Geoscience Support Services, Inc. Santa Ana River Wasteload Allocation Model Update – Summary Report. June 19, 2020 (see Table 20) and Santa Ana River Waste Load Allocation Model Update – Supplemental Report. September X, 2021 (see Table X).

[17] WLA is reviewed and revised approximately every ten 10 years; next WLA update, for the 2030-2050 planning period, is scheduled to occur in 2030.
[18] Maximum Authorized Discharge = average daily flow discharged to surface waters (expressed as an annualized average).
[19] Effluent limits revert to 320 mg/L for TDS and 4.1 mg/L for TIN if Reg. Bd. determines that Beaumont failed to comply with Maximum Benefit conditions.
[20] Higher effluent limits apply only to first 1.8 mgd. Lower effluent limits apply to discharges greater than 1.8 mgd.
[21] Effluent limits revert to 320 mg/L for TDS and 4.1 mg/L for TIN if Reg. Bd. determines that YVWD failed to comply with Maximum Benefit conditions.
[22] Includes the City's planned discharges to Anza Drain, Old Farm Rd. Channel, Tequesquite Arroyo & Evans Drain (all are tributary to SAR-R3).
[23] No significant streambed percolation occurs in the upper segment of SAR-R3 overlying the Riverside-A GMZ (i.e. the Riverside Narrows area).
[24] Effluent limit for TIN is more stringent than the 2004 WLA but is consistent with the requirements of Order No. R8-2013-0016 and current plant performance.
[25] Compliance with the applicable effluent limit is evaluated collectively based on the volume-weighted average of all four POTW (aka "bubble permit").
[26] The Prado Basin Management Zone (PBMZ) is a surface water feature where no significant groundwater storage or streambed percolation occurs.
[27] Effluent limit for TIN is more stringent than the 2004 WLA and is based on Best Practicable Treatment or Control for TIN by POTWs in the region.
[28] Effluent limit for TIN is more stringent than the 2004 WLA and based on the treatment plant's design and demonstrated performance.
[29] Discharge occurs only in years where average annual rainfall is greater than the long-term median value and only in the wettest 6 months of those years.

4. TDS and Nitrogen Wasteload Allocations for the Santa Ana River

Wasteload allocations for regulating discharges of TDS and total inorganic nitrogen (TIN) to the Santa Ana River, and thence to groundwater management zones recharged by the River, are an important component of salt management for the Santa Ana Basin. As described earlier, the Santa Ana River is a significant source of recharge to groundwater management zones underlying the River and, downstream, to the Orange County groundwater basin. The quality of the River thus has a significant effect on the quality of the Region's groundwater, which is used by more than 5 million people. Control of River quality is appropriately one of the Regional Board's highest priorities.

Sampling and modeling analyses conducted in the 1980's and early 1990's indicated that the TDS and total nitrogen water quality objectives for the Santa Ana River were being violated or were in danger of being violated. Under the Clean Water Act (Section 303(d)(1)(c); 33 USC 466 *et seq.),* violations of water quality objectives for surface waters must be addressed by the calculation of the maximum wasteloads that can be discharged to achieve and maintain compliance. Accordingly, TDS and nitrogen wasteload allocations were developed and included in the 1983 Basin Plan. The nitrogen wasteload allocation was updated in 1991; an updated TDS wasteload allocated was included in the 1995 Basin Plan when it was adopted and approved in 1994/1995.

The wasteload allocations distribute a share of the total TDS and TIN wasteloads to each of the discharges to the River or its tributaries. The allocations are implemented principally through TDS and nitrogen limits in waste discharge requirements issued to municipal wastewater treatment facilities (Publicly Owned Treatment Works or POTWs) that discharge to the River, either directly or indirectly[30]. Nonpoint source inputs of TDS and nitrogen to the River are also considered in the development of these wasteload allocations. Controls on these inputs are more difficult to identify and achieve and may be addressed through the areawide stormwater permits issued to the counties by the Regional Board or through other programs. For example, the Orange County Water District has constructed and operates more than 400 acres of wetlands ponds in the Prado Basin Management Zone to remove nitrogen in flows diverted from, and then returned to, the Santa Ana River.

Because of the implementation of these wasteload allocations, the Orange County Water District wetlands and other measures, the TDS and TIN water quality objectives for the Santa Ana River at Prado Dam are no longer being violated, as shown by annual sampling of the River at the Dam by Regional Board staff [Ref. 10A]. However, as part of the Nitrogen/TDS Task Force studies to update the

[30] With some exceptions that may result from groundwater pumping practices, the ground and surface waters in the upper Santa Ana Basin (upstream of Prado Dam) eventually enter the Santa Ana River and flow through Prado Dam. Discharges to these waters will therefore eventually affect the quality of the River and must be regulated so as to protect both the immediate receiving waters and other affected waters, including the River.

TDS/nitrogen management plan for the Santa Ana Basin, a review of the TDS and TIN wasteload allocations initially contained in this Basin Plan was conducted. In part, this review was necessary in light of the new groundwater management zones and TDS and nitrate-nitrogen objectives for those zones recommended by the N/TDS Task Force (and now incorporated in Chapters 3 and 4). The wasteload allocations were evaluated and revised to ensure that the POTW discharges would assure compliance with established surface water objectives and would not cause or contribute to violation of the groundwater management zone objectives. The Task Force members also recognized that this evaluation was necessary to determine the economic implications of assuring conformance with the new management zone objectives. Economics is one of the factors that must be considered when establishing new objectives (Water Code Section 13241).

WEI performed the wasteload allocation analysis for both TDS and TIN [Ref. 3, 5]. In contrast to previous wasteload allocation work, the QUAL-2e model was not used for this analysis. Further, the Basin Planning Procedure (BPP) was not used to provide relevant groundwater data. Instead, WEI developed a projection tool using a surface water flow/quality model and a continuous-flow stirred-tank reactor (CFSTR) model for TDS and TIN. The surface water Waste Load Allocation Model (WLAM) is organized into two major components - RUNOFF (RU) and ROUTER (RO). RU computes runoff from the land surface and RO routes the runoff estimated with RU through the drainage system in the upper Santa Ana watershed. Both the RU and RO models contain hydrologic, hydraulic and water quality components.

To ensure that all hydrologic regimes were taken into account, hydrologic and land use data from 1950 through 1999 were used in the analysis. The analysis took into account the TDS and nitrogen quality of wastewater discharges, precipitation and overland runoff, instream flows and groundwater. Off-stream and in-stream percolation rates, rising groundwater quantity and quality, and the 25% and 50% nitrogen loss coefficients described in the preceding section were also factored into the analysis. The purpose of the modeling exercise was to estimate discharge, TDS and TIN concentrations in the Santa Ana River and tributaries and in stream bed recharge. These data were then compared to relevant surface and groundwater quality objectives to determine whether changes in TDS and TIN regulation were necessary.

Discharges from POTWs to the Santa Ana River or its tributaries were the focus of the analysis. POTW discharges to percolation ponds were not considered. The wasteload allocation analysis assumed, correctly, that these direct groundwater discharges will be regulated pursuant to the management zone objectives, findings of assimilative capacity and nitrogen loss coefficients identified in Chapter 4 and earlier in this chapter.

The surface waters evaluated included the Santa Ana River, Reaches 3 and 4, ChinoCreek, Cucamonga/Mill Creek and San Timoteo Creek. Management zones that are directly under the influence of these surface waters and that receive wastewater discharges were evaluated. These included the San Timoteo, Riverside A, Chino South, and Orange County Management Zones[31]. In addition, wastewater discharges to the Prado Basin Management Zone were also evaluated.

WEI performed three model evaluations in order to assess wasteload allocation scenarios through the year 2010. These included a "baseline plan" and two alternative plans ("2010-A" and "2010-B"). The baseline plan generally assumed the TDS and TIN limits and design flows for POTWs specified in waste discharge requirements as of 2001. These limits implemented the wasteload allocations specified in the 1995 Basin Plan when it was approved in 1995. A TDS limit of 550 mg/L was assumed for the Rapid Infiltration and Extraction Facility (RIX) and the analysis assumed a 540 mg/L TDS for the City of Beaumont. The baseline plan also assumed reclamation activities at the level specified in the 1995 Basin Plan, when it was approved. The purpose of the baseline plan assessment was to provide an accurate basis of comparison for the results of evaluation of the two alternative plans. For alternative 2010-A, it was generally assumed that year 2001 discharge effluent limits for TDS and TIN applied to POTW discharges, but projected year 2010 surface water discharge amounts were applied. TDS limits of 550 mg/L and 540 mg/L were again assumed for RIX and the City of Beaumont discharges. The same limited reclamation and reuse included in the baseline plan was assumed (see R8-2014-0001, 2004 Salt Plan Amendments, Table 5-7 in Section III.B.5.). For alternative 2010-B, POTW discharges were also generally limited to the 2001 TDS and TIN effluent limits (RIX was again held to 550 mg/L and Beaumont to 540 mg/L). However, in this case, large increases in wastewater recycling and reuse were assumed (R8-2014-0001, 2004 Salt Plan Amendments Table 5-7), resulting in the reduced surface water discharges projected for 2010.

Analysis of the model results demonstrated that the TDS and nitrogen objectives of affected surface waters would be met and that water quality consistent with the groundwater management zone objectives would be achieved under both alternatives. It is likely that water supply and wastewater agencies will implement reclamation projects with volumes that are in the range of the two alternatives. The wasteload allocations would be protective throughout the range of surface water discharges identified. The year 2010 flow values are not intended as limits on POTW flows; rather, these flows were derived from population assumptions and agency estimates and are used in the models for quality projections. Surface water discharges significantly different than those projected will necessitate additional model analyses to confirm the propriety of the allocations.

The wasteload allocations for TDS and TIN are specified in Table 5-5. Allocations

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[31] The City of Beaumont discharges to Coopers Creek in a subunit of the Beaumont Management Zone. However, for analytical and regulatory purposes, it is considered a discharge to the San Timoteo Management Zone since it enters that Management Zone essentially immediately. Recharge of wastewater discharges by YVWD and Beaumont in downgradient management zones that may be affected by surface water discharges (e.g., Bunker Hill B, Colton) is not expected to be significant. Therefore, these management zones were not evaluated as part of the wasteload allocation analysis.

based on the 2010-A and 2010-B alternatives are shown for both TDS and TIN to reflect the expected differences in surface water discharge flows that would result from variations in the amount of wastewater recycling actually accomplished in the Region. As shown in this Table, irrespective of these differences, the TDS and TIN allocations remain the same.

It is essential to point out that the wasteload allocations in Table 5-5 will be not be used to specify TDS and TIN effluent limitations for wastewater recycling (reuse for irrigation) and recharge by the listed POTWs, but will be applied only to the surface water discharges by these POTWs to the Santa Ana River and its tributaries. TDS and TIN limitations for wastewater recycling and recharge by these POTWs will be based on the water quality objectives for affected groundwater management zones or, where appropriate, surface waters. These limitations are likely to be different than the wasteload allocations specified in Table 5-5.

For most dischargers, the allocations specified in Table 5-5 are the same as those specified in the prior 1995 Basin Plan TDS and TIN wasteload allocations. However, for certain dischargers, two sets of TDS and TIN wasteload allocations are shown in Table 5-5. One set is based on the assumption that the "maximum benefit" objectives defined in Chapter 4 for the applicable groundwater management zones are in effect. The other set of wasteload allocations applies if maximum benefit is not demonstrated and the antidegradation objectives for these management zones are therefore in effect. Maximum benefit implementation is described in Section VI. of this Chapter.

In addition, in contrast to the prior wasteload allocations, a single wasteload allocation for TDS and TIN that would be applied on a flow-weighted average basis to all of the treatment plants operated by the Inland Empire Utilities Agency as a whole is specified. These allocations are based on the water quality objectives for Chino Creek, Reach 1B (550 mg/L TDS and 8 mg/L TIN), to which the IEUA discharges occur, directly or indirectly. As described in Section VI, IEUA proposes to implement a "maximum benefit" program to support the implementation of the "maximum benefit" TDS and nitrate- nitrogen objectives for the Chino North and Cucamonga Management Zones. Separate "maximum benefit" and "antidegradation" wasteload allocations are not necessary for IEUA, as they are for YVWD and Beaumont. This is because the IEUA wasteload allocations are based solely on the Chino Creek objectives and are not contingent on "maximum benefit" objectives or implementation. The IEUA surface water discharges do not affect the groundwater management zones for which "maximum benefit" objectives are to be implemented.

Finally, the TDS wasteload allocation for the RIX facility is less stringent (550 mg/L) than the prior wasteload allocation. The new allocation will assure beneficial use protection and will not result in a significant lowering of water quality. As such, it is consistent with antidegradation requirements. Given this, the less stringent effluent limitation can be specified pursuant to the exception to the prohibition against backsliding established in the Clean Water Act, Section 303(d)(4)(a).

In most cases, the surface water discharges identified in Table 5-5 will affect or have the potential to affect groundwater management zones without assimilative capacity for TDS and/or nitrogen. As discussed earlier in this section, the lack of assimilative capacity normally dictates the application of the water quality objectives of the affected receiving waters as the appropriate waste discharge limitations. However, as shown in Table 5-5, the TIN and, in some cases, TDS wasteload allocations for these discharges exceed the objectives for these management zones. This is because the wasteload allocation analysis conducted by WEI demonstrated that POTW discharges at these higher-than-objective levels will not result in violations of the TDS and nitrate-nitrogen objectives of the affected management zones, or surface waters. Accordingly, these wasteload allocations will be used for surface water discharge regulatory purposes, rather than the underlying groundwater management zone objectives. if the extensive monitoring program to be conducted by the dischargers (see Salt Management Plan - Monitoring Program Requirements, below) indicates that this strategy is not effective, then this regulatory approach will be revisited and revised accordingly.

Table 5-5

Alternative Wasteload Allocations through 2010 based on "Maximum Benefit" or "Antidegradation" Water Quality[32]

Publicly Owned Treatment Works (POTW)	Alternative 2010A - Reclamation in 1995 Basin Plan			Alternative 2010B - Reclamation Plans Advocated by		
	Surface Water Discharge	TDS (mg/L)	TIN (mg/L)	Surface Water Discharge	TDS (mg/L)	TIN (mg/L)
Beaumont - "max benefit" [33]	2.3	490	6.0	1.0	490	6.0
Beaumont - "antideg" [2 3]	2.3	320[34]	4.1[3]	1.0	320[3]	4.1[3]
YVWD - Wochholz - "max benefit"	5.7	540	6.0	0.0	540	6.0
YVWD - Wochholz - "antideg"[3]	5.7	320[3]	4.1[3]	0.0	320[3]	4.1[3]
Rialto	12.0	490	10.0	10.0	490	10.0
RIX	49.4	550	10.0	28.2	550	10.0
Riverside Regional WQCP	35.0	650	13.0	26.1	650	13.0
Western Riverside Co. WWTP	4.4	625	10.0	3.3	625	10.0
EMWD[35]	43	650	10.0	6.0	650	10.0
EVMWD - Lake Elsinore Regional	7.2	700	13.0	2.0	700	13.0
Lee Lake WRF	1.6	650	13.0	1.6	650	13.0
Corona WWTP # 1	3.6	700	10.0	2.0	700	10.0
Corona WWTP # 2	0.2	700	10.0	0.5	700	10.0
Corona WWTP # 3	2.0	700	10.0	0.5	700	10.0
IEUA Facilities [36]	80.0	550	8.0	37.4	550	8.0

32 "Antidegradation" wasteload allocation is the default allocation if the Regional Board determines that "maximum benefit" commitments are not being met.

33 Beaumont discharges to Coopers Creek, a tributary of San Timoteo Creek, Reach 4, it is a de facto discharge to San Timoteo Creek/San Timoteo Management Zone.

34 "Antidegradation" wasteload allocations for City of Beaumont and YVWD based on additional model analysis performed by WEI (WEI, October 2002).

35 EMWD discharges are expected to occur only during periods of wet weather.

36 IEUA facilities include the RP#1, Carbon Canyon WRP, RP#4 and RP#5; These facilities are to be regulated as a bubble (see text).