

CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR
DISCHARGES FROM IRRIGATED LANDS WITHIN THE LOS ANGELES REGION



REVIEW OF CONDITIONAL WAIVER ORDER R4-2005-0080
AND RECOMMENDATIONS FOR WAIVER RENEWAL

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

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TABLE OF CONTENTS

1.	INTRODUCTION.....	4
2.	SUMMARY OF 2005 CONDITIONAL WAIVER REQUIREMENTS	4
3.	CURRENT ENROLLMENT STATUS.....	5
4.	SUMMARY OF CONDITIONAL WAIVER IMPLEMENTATION.....	7
4.1.	EDUCATION REQUIREMENTS	7
4.2.	VENTURA COUNTY MONITORING RESULTS	7
4.3.	LOS ANGELES COUNTY MONITORING RESULTS	9
5.	SUMMARY OF WQMPs.....	11
5.1.	VCAILG WQMP	11
5.2.	NGA – LAILG WQMP	12
6.	ENFORCEMENT	14
7.	NITRATE GROUNDWATER ANALYSIS	15
7.1.	ANALYSIS OF DATA FROM THE GROUNDWATER AMBIENT MONITORING AND ASSESSMENT (GAMA) PROGRAM.....	15
7.2.	ANALYSIS OF DATA FROM THE VENTURA COUNTY WATERSHED PROTECTION DISTRICT (VCWPD) PROGRAM.....	17
7.3.	ANALYSIS OF DATA FROM UNITED WATER CONSERVATION DISTRICT (UWCD)....	18
8.	COST CONSIDERATIONS	19
8.1.	VCAILG COST	19
8.2.	NGA-LAILG COST	20
8.3.	ESTIMATED BMP IMPLEMENTATION COSTS	21
8.3.1.	NUTRIENT MANAGEMENT	22
8.3.2.	PESTICIDE MANAGEMENT.....	22
8.3.3.	SEDIMENT AND EROSION MANAGEMENT.....	22
8.3.4.	IRRIGATION MANAGEMENT	23
8.3.5.	GROSS ANNUAL CROP VALUES	24
9.	CONCLUSIONS AND RECOMMENDATIONS FOR CONDITIONAL WAIVER RENEWAL.	24
9.1.	PROPOSED INCORPORATION OF TMDL LOAD ALLOCATIONS AS WATER QUALITY BENCHMARKS	24
9.2.	CONCLUSION REGARDING NEED FOR GROUNDWATER MONITORING	26
10.	REFERENCES	27

LIST OF FIGURES

Figure 1 Percentage of sites exceeding water quality benchmarks, Calleguas Creek Watershed.....	8
Figure 2 Percentage of sites exceeding water quality benchmarks, Santa Clara River Watershed.....	8
Figure 3 Percentage of sites exceeding water quality benchmarks, Los Angeles River Watershed.....	10
Figure 4 Percentage of sites exceeding water quality benchmarks, San Gabriel River Watershed.....	10

LIST OF TABLES

Table 1 Irrigated acres enrolled in VCAILG	6
Table 2 Sampling sites in Los Angeles County watersheds.....	9
Table 3 Summary of VCAILG WQMP Implementation Tasks and Timeline	11
Table 4 Summary of NGA-LAILG WQMP Implementation Tasks and Timeline	13
Table 5 Summary of nitrate MCL exceedances in the past 10 years in groundwater from wells in the GAMA Program (2000-2010)	16
Table 6 Summary of nitrate MCL exceedances in groundwater from wells in the VCWPD Program (2007-2009).....	17
Table 7 Summary of VCAILG costs.....	20
Table 8 NGA-LAILG member fees.....	20
Table 9 Summary of NGA-LAILG costs	21
Table 10 Comparison of BMP costs with five-year average annual gross crop values...	22
Table 11 Effective TMDLs with load allocations assigned to irrigated agriculture, listed by pollutant category.....	25

1. INTRODUCTION

Pursuant to California Water Code section 13269, the California Regional Water Quality Control Board Los Angeles Region (Regional Board) adopted a Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Order No. R4-2005-0080) on November 3, 2005. The objectives of the program are to monitor the water quality impacts from irrigated agriculture discharges and mitigate those impacts as necessary. Agricultural activities can generate pollutants such as sediment, pesticides, and nutrients that upon discharge to receiving water bodies can degrade water quality, impair beneficial uses and cause nuisance conditions. The intent of the Conditional Waiver program is to attain water quality benchmarks¹ in receiving waters by regulating the discharges from irrigated agriculture lands within the Los Angeles Region. In accordance with California Water Code section 13269(2), the Conditional Waiver for Irrigated Lands is effective for five years. This report presents a review of the Conditional Waiver for Irrigated Lands program over the last five years and, based on the review, provides recommendations for the proposed renewal.

2. SUMMARY OF 2005 CONDITIONAL WAIVER REQUIREMENTS

The Los Angeles Region Conditional Waiver for Irrigated Lands was adopted for five years. These five years were divided into two phases: (1) an administrative phase and (2) an implementation phase consisting of monitoring, implementation of best management practices (BMPs), and completion of education requirements. Year one, the administrative year, included nine months (November 3, 2005 – August 3, 2006) for dischargers to prepare enrollment documents. There are two options for dischargers to enroll under the Conditional Waiver: as a member of a Discharger Group or as an Individual Discharger. In order to comply with the conditions of the waiver, dischargers (either individually or as part of a group) are required to submit a Notice of Intent (NOI), a Monitoring and Reporting Program (MRP) Plan and a Quality Assurance Project Plan (QAPP). These documents are necessary for enrollment in the program and are the instructional documents under which water quality monitoring is conducted. The

¹ "Water quality benchmark" means a requirement established by the Regional Board Basin Plan (including discharge prohibitions and narrative or numeric water quality objectives), a requirement established by an applicable Statewide plan or policy, criteria established by USEPA (including those in the California Toxics Rule and the applicable portions of the National Toxics Rule), and load allocations established pursuant to a total maximum daily load (TMDL) (whether established in the Basin Plan or other lawful means). Water quality benchmarks for discharges from irrigated lands are identified in Appendices 2 and 3 of this Order.

remaining three months (September – November 2006) of year one provided the time necessary for Regional Board staff to review and approve enrollment documents.

The implementation phase began in year two. Water quality monitoring is a key requirement of the Conditional Waiver. Water quality monitoring was conducted in 2007, 2008, 2009, and 2010 (2010 Annual Monitoring Report due in February 2011). The general constituents monitored include pollutants associated with agriculture operations such as nutrients, pesticides, and sediment. Toxicity testing is also required as part of the monitoring program. The monitoring results are compared to water quality benchmarks listed in the waiver. In the case that the monitoring results show an exceedance of one or more water quality benchmarks, the discharger must prepare a Water Quality Management Plan (WQMP). The WQMP outlines the strategy to identify pollutant sources and implement in a targeted fashion new and/or revised BMPs to reduce and alleviate the impacts of waste discharges. Additionally, the WQMP documents the implementation and maintenance of BMPs and verifies BMP effectiveness in attaining water quality benchmarks.

3. CURRENT ENROLLMENT STATUS

There are currently two approved Discharger Groups participating in the Conditional Waiver for Irrigated Lands. The Ventura County Agricultural Irrigated Lands Group (VCAILG) represents growers in Ventura County and the Nursery Growers Association – Los Angeles Irrigated Lands Group (NGA-LAILG) represents growers in Los Angeles County.

The VCAILG was formed in 2006 with the express purpose of acting as a county-wide Discharger Group for compliance with the Conditional Waiver. VCAILG is overseen by a Steering Committee and Executive Committee. These committees are comprised of agricultural organization representatives, agricultural water district representatives, and landowners and/or growers from the three primary watersheds in Ventura County (Calleguas Creek, Santa Clara River, and Ventura River). Because the VCAILG is an unincorporated organization, the Farm Bureau of Ventura County acts as the responsible entity for the collection of funds, contracting, and other business and/or fiscal matters. Currently, there are 88,003 acres enrolled in the Conditional Waiver

program through membership in the VCAILG (Table 1). Regional Board staff estimates that there are approximately 93,000 irrigated acres in Ventura County; thus, 95 % of the irrigated acreage in the county is enrolled in the Conditional Waiver program.

Table 1 Irrigated acres enrolled in VCAILG

Watershed	Enrolled Irrigated Acres
Calleguas Creek	48,321
Oxnard Coastal	3,865
Santa Clara River	29,830
Ventura River	5,987
Total	88,003

The NGA-LAILG also formed in 2006 to act as a Discharger Group under the Conditional Waiver and represent Los Angeles County growers within our region. NGA is a non-profit association with the purpose of encouraging the development of nursery stock and promoting matters pertaining to the interests of nursery growers. This group currently has 167 members with 1,649 acres enrolled throughout Los Angeles County; it is estimated that this represents about 22% of the total irrigated acreage in Los Angeles County within Region 4.

Since it was formed in 2006, the NGA-LAILG has been confronted with unique challenges such as the small amount of irrigated acreage in the Region 4 portion of Los Angeles County and difficulties identifying and communicating with small growers (< 5 acres). Additionally, due to economic hardship, many small nursery operators did not continue NGA-LAILG membership in 2009. This caused considerable financial burden on the remaining NGA-LAILG members and NGA itself. In response to these challenges, Regional Board staff is working with NGA-LAILG representatives to address their concerns and ensure that the Conditional Waiver requirements are implemented in a cost effective and equitable manner.

4. SUMMARY OF CONDITIONAL WAIVER IMPLEMENTATION

4.1. EDUCATION REQUIREMENTS

The Conditional Waiver also requires that growers and/or farm managers participate in eight hours of educational training. The educational training focuses on typical agricultural practices, potential risks to water quality, and BMPs designed to mitigate those risks. Over the term of this waiver, the Regional Board Executive Officer approved fifty different workshops providing growers opportunities to obtain the required education credit. VCAILG members have been active in participating in education workshops; 90% of VCAILG members have completed 8 hours or more of educational training. The majority of NGA-LAILG members have not completed the required educational training. Staff is assisting the NGA-LAILG to ensure that members meet the education requirements. For example, staff is currently managing a 319(h) grant that will provide educational workshops for growers in Los Angeles County

4.2. VENTURA COUNTY MONITORING RESULTS

The VCAILG conducts monitoring at 25 locations throughout Ventura County; 15 sites are located in the Calleguas Creek Watershed, 8 in the Santa Clara River Watershed, and 2 in the Ventura River Watershed. Sample locations were selected to characterize agricultural inputs to surface waters and are generally located at the lower end of mainstem tributaries. Monitoring was conducted in 2007, 2008, and 2009; the 2010 monitoring is currently underway. Figures 1 and 2 present the percentage of sites exceeding water quality benchmarks in the Calleguas Creek and Santa Clara River Watersheds. Water quality benchmark exceedances are consistently reported for organochlorine pesticides, organophosphate pesticides, and nitrogen in both watersheds. Additionally, the toxicity benchmark is regularly exceeded in samples collected from the Santa Clara River Watershed. In the Calleguas Creek Watershed, 15% of the sites reported toxicity in 2007 and 23% of the sites reported toxicity in 2008; there was no toxicity detected in 2009.

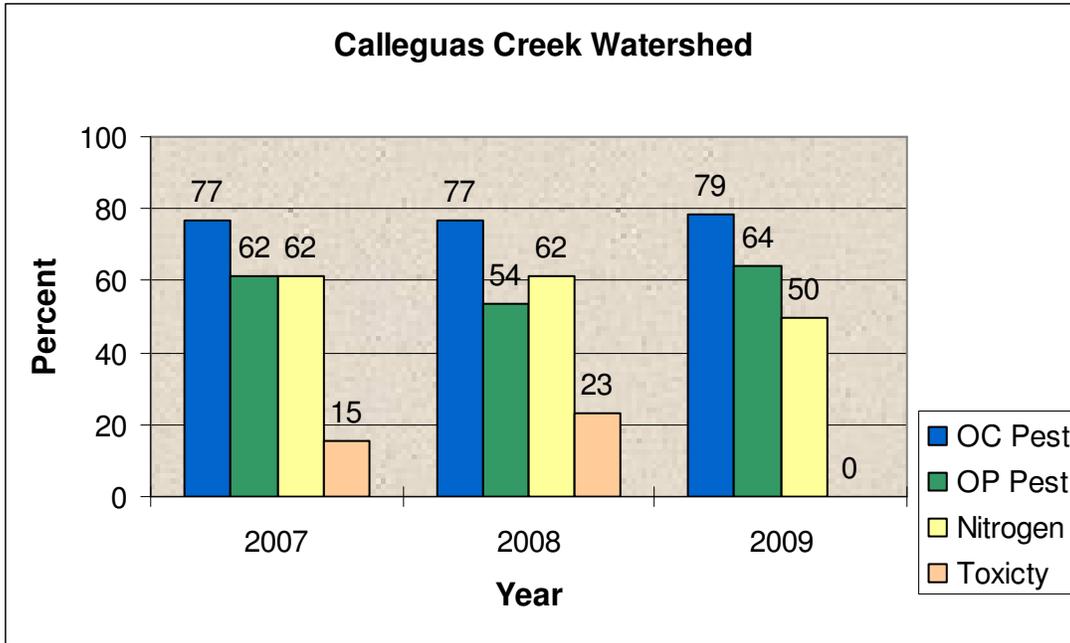


Figure 1 Percentage of sites exceeding water quality benchmarks, Calleguas Creek Watershed

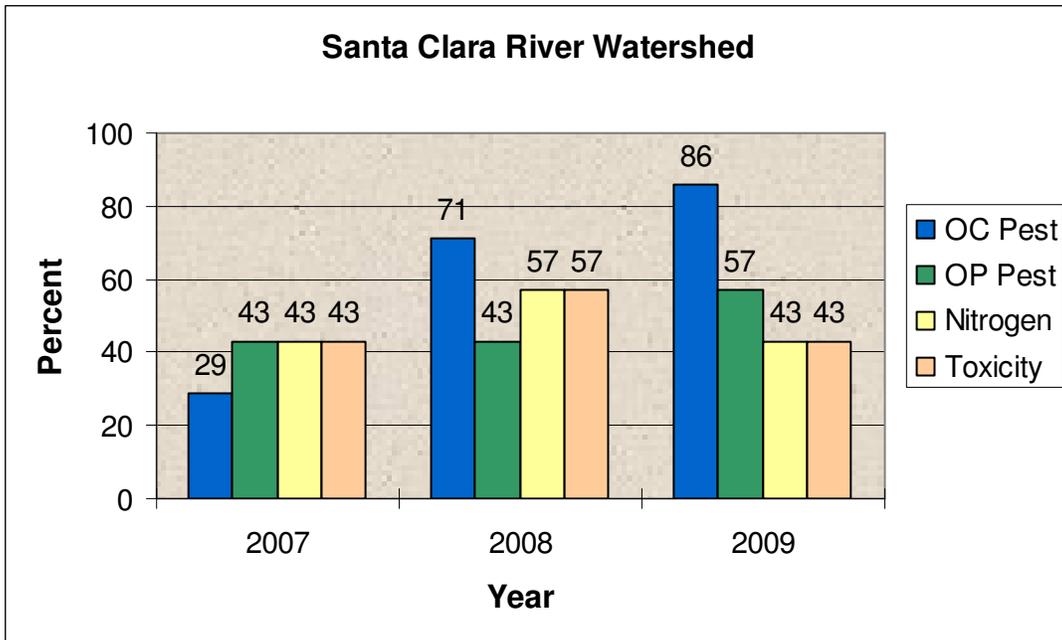


Figure 2 Percentage of sites exceeding water quality benchmarks, Santa Clara River Watershed

There has only been one water quality benchmark exceedance for organochlorine pesticides in the Ventura River Watershed in 2008. In 2007 and 2009, there was insufficient flow for sample collection in either dry or wet weather; therefore, samples were not collected.

4.3. LOS ANGELES COUNTY MONITORING RESULTS

The NGA-LAILG monitors 18 sampling sites throughout Los Angeles County (Table 2).

Table 2 Sampling sites in Los Angeles County watersheds

Watershed	Number of Sampling Sites
Los Angeles River	6
San Gabriel River	7
Dominguez Channel	2
Santa Monica Bay	3

Sites were selected to represent the NGA-LAILG group as a whole based on various crop types, water practices, fertilizer and pesticide use, management practices and locations. Samples are collected edge of field to exclude contributions from other discharges to the stormdrain system. Monitoring was conducted in 2007 and 2008. In 2009, sampling sites were visited during the dry season; however, no runoff was observed and no samples were collected; wet season sampling was not conducted. 2010 sampling is currently planned. Figures 3 and 4 present the percentage of sites exceeding water quality benchmarks in Los Angeles River and San Gabriel River Watersheds. In the Los Angeles River Watershed, a similar percentage of sites exceeded water quality benchmarks for organochlorine pesticides, nitrogen, and toxicity in 2007 and 2008. In 2008, 50% of the sites exceeded the organophosphate pesticides water quality benchmark, whereas in 2007 there were no organophosphate pesticides exceedances in the watershed. Sites in the San Gabriel River Watershed demonstrated a similar trend, with exceedances documented for each pollutant class, although a greater number of sites exceeded water quality benchmarks in 2008 as compared to 2007.

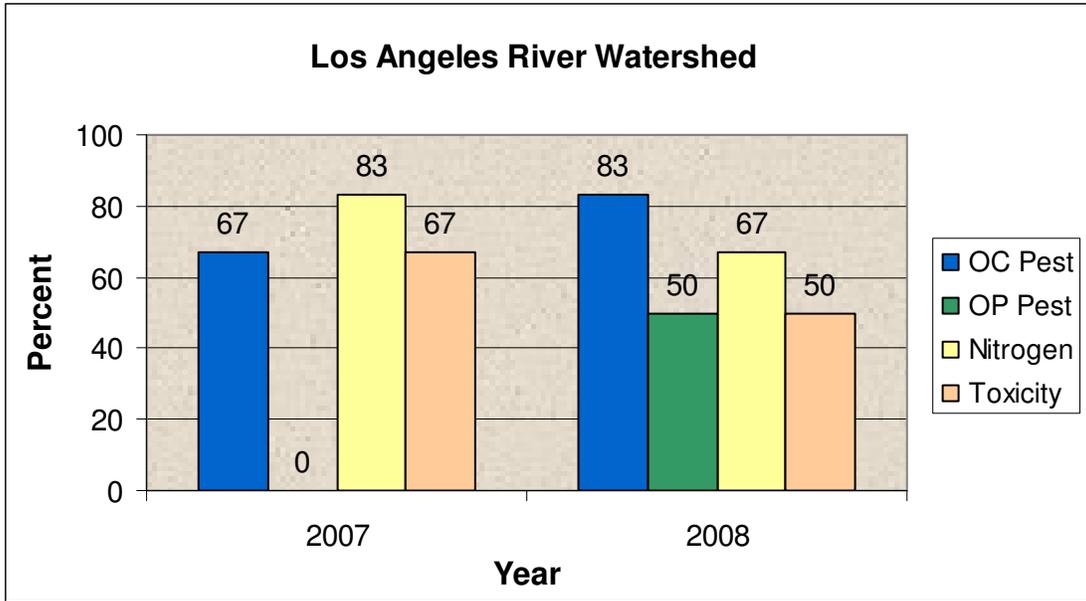


Figure 3 Percentage of sites exceeding water quality benchmarks, Los Angeles River Watershed

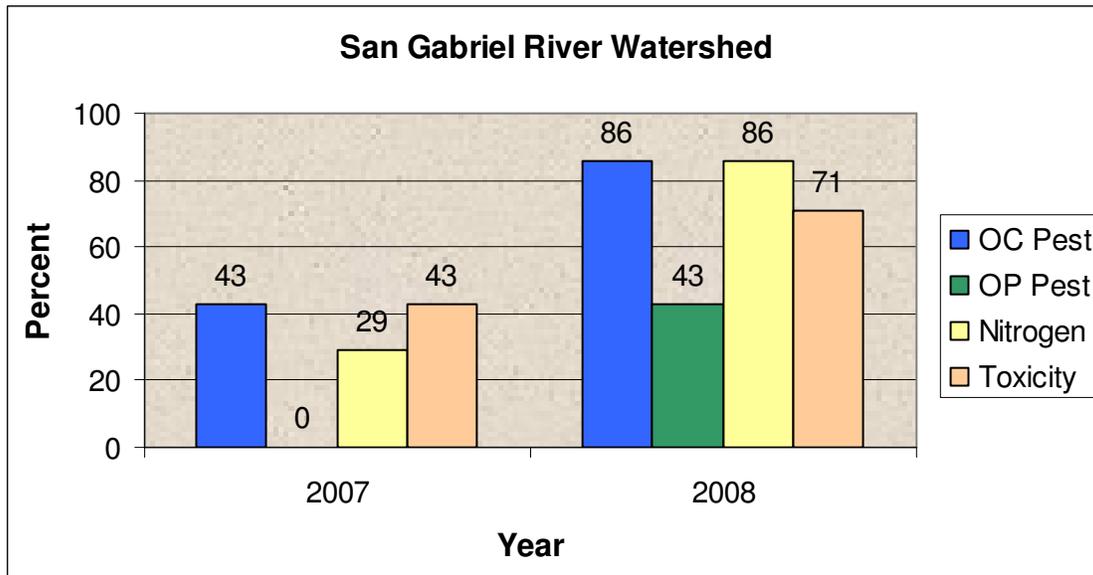


Figure 4 Percentage of sites exceeding water quality benchmarks, San Gabriel River Watershed

There are two sampling sites in the Dominguez Channel Watershed. In 2007, water quality benchmark exceedances were reported at one site for organophosphate pesticides and toxicity. In 2008, both sites in the watershed exceeded the water quality benchmark for organochlorine pesticides and toxicity and one site exceeded the water quality benchmark for organophosphate pesticides and nitrogen. There have only been two water quality benchmark exceedances reported in the Santa Monica Bay Watershed: one for sulfate and one for total dissolved solids (TDS).

5. SUMMARY OF WQMPs

The monitoring results presented above document water quality benchmark exceedances. Therefore, both the VCAILG and NGA-LAILG have developed WQMPs. The sections below provide a summary of each discharger group's WQMP.

5.1. VCAILG WQMP

The VCAILG WQMP outlines the WQMP implementation process and identifies BMPs to address water quality benchmark exceedances. The table below summarizes the WQMP implementation tasks and timeline.

Table 3 Summary of VCAILG WQMP Implementation Tasks and Timeline

Task Number	Task	Timeline
1	Identify priority drainage areas	2007 WQMP, updated based on additional monitoring
2	Survey growers regarding current and planned BMPs	Jan. - Feb. 2009 1 st tier priority areas
		Sept. - Oct. 2009 2 nd tier priority areas
		Sept. - Oct. 2010 3 rd tier priority areas and all remaining areas
		Results submitted as part of WQMPs
3	Targeted BMP outreach	Mar. - June 2009 1 st tier priority areas
		Oct. 2009 - Mar. 2010 2 nd tier priority areas
		Sept. 2010 - Nov. 2010 3 rd tier priority areas and all remaining areas
4	Implement BMPs and track BMP implementation	April 2009 - November 2010

Task Number	Task	Timeline
		Results submitted as part of WQMPs
5	Evaluate monitoring data and BMP effectiveness	2010 Results submitted in 2010 Annual Monitoring Report and WQMP
6	Assess additional BMP implementation and/or next steps	2010, if continued water quality benchmark exceedances are observed.

BMP outreach and implementation is prioritized in drainage areas with multiple water quality benchmark exceedances and/or TMDLs (Task 1). This approach allows VCAILG to strategically target BMP implementation and address the most egregious water quality impairments. Outreach meetings in each priority area alert growers to the water quality benchmark exceedances in their area and BMP surveys are used to assess the established BMPs growers are currently using and those planned for future implementation (Tasks 2 and 3). A database has been created to track established, new, and planned BMPs (Task 4).

The WQMP implementation was designed to coordinate with the existing VCAILG monitoring program. Therefore, the existing monitoring program will be utilized to determine if BMP implementation is effective in addressing water quality benchmark exceedances (Task 5 and 6). Coordinating both water quality data collection and BMP data collection builds a powerful long term dataset that can be used to evaluate the quality of agriculture discharges and expected water quality improvement. As shown in Table 3, BMP implementation was initiated in spring 2009 and is continuing through 2010; thus, water quality data collected in 2007 – 2009 did not reflect the efforts of strategic BMP implementation. It is expected that the 2010 monitoring results will report water quality improvements in the 1st tier priority areas.

5.2. NGA – LAILG WQMP

The NGA-LAILG WQMP presents the strategy for BMP implementation to address water quality benchmark exceedances. The table below summarizes the WQMP implementation tasks and timeline.

Table 4 Summary of NGA-LAILG WQMP Implementation Tasks and Timeline

Task Number	Task	Timeline
1	Implement BMPs at sampling site locations	January 2009 - ongoing
2	Implement housekeeping / operational practice BMPs at non-sampling site locations	July 2009 – ongoing
3	Grower Educational Seminars ▪ Includes BMP survey	
	Sites > 5 acres	September – October 2009
	Sites 2.5 – 5 acres	October 2009 – January 2010
	Sites < 2.5 acres	November 2009 - May 2010
4	Additional BMP Implementation and Tracking at all sites (as needed)	September 2009 – November 2010 Results submitted in 2010 Annual Monitoring Report
5	Evaluate monitoring data and BMP effectiveness	2010 Results submitted in 2010 Annual Monitoring Report and WQMP
6	Assess additional BMP implementation and/or next steps	2010, if continued water quality benchmark exceedances are observed.

Operations that are NGA-LAILG sampling sites are the first sites to implement BMPs. This is followed by all sites implementing housekeeping and general operational practice BMPs (Task 2). Housekeeping and operational practice BMPs are generally inexpensive, simple to implement, and applicable to operations of different sizes and crop types. Additional BMP implementation and outreach is prioritized based on the size of the operation (Task 3). The monitoring results demonstrated that operations greater than five acres generally have the most water quality benchmark exceedances. Therefore, these sites are prioritized for educational seminars and BMP surveys. The results of BMP surveys and targeted educational seminars are used to direct additional BMP implementation (Task 4). The WQMP relies upon the existing monitoring to evaluate the BMP effectiveness in addressing water quality benchmark exceedances. As presented above, targeted BMP education and implementation was scheduled to start in summer 2009 and continue through the end of this waiver (Task 3 and 4); thus,

potential improvements in water quality are expected to be reported in the 2010 Annual Monitoring Report.

6. ENFORCEMENT

Compliance with Regional Board regulatory programs is essential and enforcement actions have been taken against Dischargers who have not enrolled in the Conditional Waiver program. The objective of enforcement actions is to encourage compliance with the Conditional Waiver program and ensure that irrigated agriculture operations are meeting their legal responsibilities to protect water quality. Moreover, in order to preserve the long term success of the program, it is necessary to respect the compliance of currently enrolled growers and discourage noncompliance by properly exercising enforcement authorities.

In conducting enforcement actions, Regional Board staff followed the State Water Resources Control Board guidelines for progressive enforcement. The first enforcement action taken by Regional Board staff was to issue a notice of violation (NOV) to growers who had not enrolled in the Conditional Waiver program. On November 15, 2007, staff sent NOVs to approximately 400 growers in Ventura County for failure to enroll under the Conditional Waiver program. The notices of violation generated positive feedback from the stakeholder community and approximately 12,000 additional acres were enrolled in the Conditional Waiver program. Staff sent NOVs to approximately 700 growers in Los Angeles County on March 13, 2008. The NOVs were followed by hundreds of phone calls with growers in Los Angeles County who received the NOVs. As a result, enrollment in the NGA-LAILG increased and staff was able update their database based on corrected land use information provided by property owners.

Regional Board staff proceeded with Administrative Civil Liabilities (ACLs) against nine irrigated agricultural landowners and/or growers who did not respond to the NOV. ACLs were issued on May 5, 2009 and February 18, 2010 to agriculture landowners and/or growers for failure to enroll under the Conditional Waiver. Four ACL cases are still in progress; staff is working with the ACL recipients to settle the complaints. Five other ACL cases have been completed. Staff plans to continue enforcement actions, as necessary, to ensure the integrity and success of the Conditional Waiver program.

7. NITRATE GROUNDWATER ANALYSIS

The purpose of this section is to analyze available groundwater monitoring data for nitrate and evaluate the potential impacts of irrigated agriculture on groundwater quality and the potential need for additional, routine groundwater monitoring under the Conditional Waiver, based on the extent of exceedances of the maximum contaminant level (MCL) for drinking water (45 mg/L) for nitrate.

The approach of this data analysis is to collect groundwater monitoring data from various sources, determine if there are exceedances, and evaluate the extent of exceedances in different groundwater basins underlying irrigated agriculture land uses. The occurrence of extensive exceedances in groundwater basins underlying irrigated agriculture land uses, especially when those basins contain unconfined aquifers, implies that agriculture has an impact on groundwater quality.

7.1. ANALYSIS OF DATA FROM THE GROUNDWATER AMBIENT MONITORING AND ASSESSMENT (GAMA) PROGRAM

The GAMA Program is California's comprehensive groundwater quality monitoring program. GAMA integrates, standardizes, and provides tools to analyze several datasets, including data from the State and Regional Water Boards, California Department of Public Health, Department of Pesticide Regulation, Department of Water Resources, United States Geological Survey, and Lawrence Livermore National Laboratory. A summary of nitrate exceedances for the last 10 years in groundwater basins is provided in Table 5. The groundwater basins in Table 5 have at least 1% overlying irrigated agricultural land use and have representative groundwater wells. The highest percentages of exceedances of the nitrate MCL were found in the Arroyo Santa Rosa Valley Basin (41.8%) and the Ventura River Valley Upper Basin (28.1%). The percentage of exceedances in Ventura County groundwater basins is 8.2%. The percentage of exceedances in Los Angeles County groundwater basins is 10.9%. The overall percentage of exceedances in Region 4 is 11%.

Table 5 Summary of nitrate MCL exceedances in the past 10 years in groundwater from wells in the GAMA Program (2000-2010)

DWR Basin No.	Groundwater Basin	Percent Overlying Irrigated Agriculture Land Use	Max NO ₃ Observed (mg/L)	No. of Samples	No. of Samples > 45 mg/L	Percent Samples > 45 mg/L	Condition of Groundwater Occurrence
4-1	Upper Ojai Valley	16.8%	40.7	1	0	0%	Unconfined
4-2	Ojai Valley	29.9%	56.9	277	23	8.3%	Mostly Unconfined
4-3.01	Ventura River Valley Upper	9.0%	97	1287	362	28.1%	Unconfined
4-3.02	Ventura River Valley Lower	7.6%	25.9	15	0	0%	Unconfined
4-4.03	Santa Clara River Valley - Mound	18.1%	172.4	722	84	11.6%	Confined and Unconfined
4-4.04	Santa Clara River Valley - Santa Paula	40.7%	103.5	651	46	7.1%	Mostly Unconfined
4-4.05	Santa Clara River Valley-Fillmore	57.0%	99.9	151	3	2.0%	Mostly Unconfined
4-4.06	Santa Clara River Valley - Piru	52.4%	33.3	59	0	0%	Mostly Unconfined
4-4.07	Santa Clara River Valley - East	2.6%	160	1514	20	1.3%	Confined and Unconfined
4-5	Acton Valley	2.2%	56	319	17	5.3%	Unconfined
4-17	Lockwood Valley	3.2%	17.8	10	0	0%	Unconfined
4-4.02	Santa Clara River Valley - Oxnard	46.2%	2745	6314	228	3.6%	Confined and Unconfined
4-6	Pleasant Valley	39.7%	279	197	13	6.6%	Confined
4-7	Arroyo Santa Rosa Valley	53.5%	146	282	118	41.8%	Mostly Unconfined
4-8	Las Posas Valley	49.2%	44.3	324	0	0%	Confined and Unconfined
4-15	Tierra Rejada	20.6%	61.1	39	1	2.6%	Mostly Unconfined
4-16	Hidden Valley	1.9%	12.8	13	0	0%	Unconfined
4-22	Malibu Valley	2.0%	20.7	75	0	0%	Unconfined
4-13	San Gabriel Valley	1.0%	207	29301	2946	10.1%	Confined and Unconfined

7.2. ANALYSIS OF DATA FROM THE VENTURA COUNTY WATERSHED PROTECTION DISTRICT (VCWPD) PROGRAM

The VCWPD Groundwater Section Annual Reports provide an annual overview of the groundwater conditions for Ventura County. Data from the 2007, 2008, and 2009 reports are summarized and provided in Table 6. The reports found that nitrate concentrations exceed the MCL for drinking water in the Arroyo Santa Rosa Basin, Simi Valley Basin, Oxnard Plain Forebay Basin, Fillmore Basin, Tierra Rejada Basin, Las Posas Basin, Pleasant Valley Basin, Oxnard Plain Pressure Basin, Ojai Valley Basin, and Piru Basin, and hypothesized that this was due to extensive use of fertilizers and septic system discharges.

Table 6 Summary of nitrate MCL exceedances in groundwater from wells in the VCWPD Program (2007-2009)

Groundwater Basin	Max NO ₃ Observed	No. of Samples	No. of Samples > 45 mg/L	% Samples > 45 mg/L	Condition of Groundwater Occurrence
Upper Ojai Valley	44.6	5	0	0%	Unconfined
Ojai Valley	49.1	42	3	7.1%	Mostly Unconfined
Ventura River - Upper	41.6	9	0	0%	Unconfined
Ventura River - Lower	0.6	8	0	0%	Unconfined
Mound	40.9	14	0	0%	Confined and Unconfined
Santa Paula	38.2	13	0	0%	Mostly Unconfined
Fillmore	152	19	5	26.3%	Mostly Unconfined
Piru	47.1	34	2	5.9%	Mostly Unconfined
Lockwood Valley	21.4	11	0	0%	Unconfined
Oxnard Plain Pressure	114	97	9	9.3%	Confined and Unconfined
Oxnard Plain Forebay	70.1	9	3	33.3%	Confined and Unconfined
Gillibrand/Tapo	11.4	6	0	0%	Mostly Unconfined
Simi Valley	57.6	12	5	41.7%	Mostly Unconfined
Pleasant Valley	100	27	3	11.1%	Confined

Groundwater Basin	Max NO ₃ Observed	No. of Samples	No. of Samples > 45 mg/L	% Samples > 45 mg/L	Condition of Groundwater Occurrence
Arroyo Santa Rosa	112	26	18	69.2%	Mostly Unconfined
Las Posas - West	170	14	3	21.4%	Confined and Unconfined
Las Posas - East	73.5	20	3	15.0%	Confined and Unconfined
Las Posas - South	28.2	9	0	0%	Unconfined
Tierra Rejada Valley	71.2	24	7	29.2%	Mostly Unconfined
Thousand Oaks	0	5	0	0	Unconfined
Sherwood (Including Hidden Valley)	3.4	10	0	0%	Unconfined

7.3. ANALYSIS OF DATA FROM UNITED WATER CONSERVATION DISTRICT (UWCD)

The UWCD project report “Modifying Agricultural Practices, Nutrients and Pesticides, Calleguas Creek and Santa Clara River” (Grant Agreement No. 04-073-554-1), funded by the State Water Resources Control Board, summarized lysimeter monitoring results in and below the root zone. Lysimeters (soil-moisture samplers) were used to collect percolating waters at one foot and six feet below ground. Nutrients detected at one foot below ground are generally available for crop uptake. Nutrients detected at six feet below ground have passed through the active root zone and are generally unavailable for crop uptake. The UWCD study collected more than 520 lysimeter samples over three and one-half years. Over 900 nutrient samples were collected from shallow and deep soils in the study area. Overall, more sites have nitrate plus nitrite as nitrogen concentrations higher in six-foot lysimeters than in one-foot lysimeters. When nutrient concentrations are higher in deep soils, percolation of irrigation water and rainfall has driven nutrients below the crop’s root zone. In areas with unconfined aquifers, this can result in agricultural waters percolating unimpeded to underlying aquifers. Nitrate plus nitrite was found in the lysimeters at levels exceeding the MCL for nitrate plus nitrite as nitrogen (10 mg/L) by an order of magnitude at both the one-foot and six-foot depths. These high detections are corroborated by the presence of high nitrates in some areas

of unconfined aquifers (Tables 5 and 6), such as the Oxnard Plain Forebay Basin, where the percolating agricultural water can reach the aquifer.

The percolation of nutrients beyond the root zone can be reduced by proper application of fertilizers and improved irrigation efficiency to prevent over-watering of crops. The UWCD study included lysimeter sampling at two sites where irrigation was controlled by real-time soil moisture measurements. At these sites, the nutrient concentrations were among the lowest in the study at both the one-foot and six-foot lysimeter depths. Thus, improved irrigation efficiency is an effective BMP to prevent groundwater contamination by agriculture.

Based on this analysis, irrigated lands may impact groundwater but such impacts can be effectively mitigated through improved irrigation efficiency and proper fertilizer application, which are also used to address surface water discharges. In addition, the analysis shows that there are sufficient data and understanding of the linkage between irrigation and fertilizer practices and groundwater quality such that the need for additional monitoring requirements for groundwater under the Conditional Waiver are unnecessary.

8. COST CONSIDERATIONS

8.1. VCAILG COST

As presented in Section 3, VCAILG is an approved discharger group, which administers the Conditional Waiver enrollment, monitoring, and reporting requirements for its landowner members. Landowners are billed for services on a per acre basis. Average per acre costs are presented in Table 7. Administrative costs, such as report processing and overhead, are shared equally among all VCAILG members, whereas monitoring costs vary between watershed due to differences in the number of monitoring sites and analysis required. In addition to administering the Conditional Waiver, VCAILG is also the mechanism by which TMDL monitoring and reporting costs are recovered from agriculture landowners. For example, in 2008, VCAILG members in the Calleguas Creek Watershed were billed for both Conditional Waiver and TMDL compliance costs. As TMDL requirements become effective in other watersheds, landowners in those areas will also be billed for both Conditional Waiver costs and TMDL compliance costs.

Table 7 summarizes the total VCAILG program costs over the last five years. This cost information was provided to Regional Board staff by the VCAILG. Based on the budget for 2010-11, complying with the Conditional Waiver enrollment, monitoring, and reporting requirements and TMDLs will cost Ventura County growers approximately \$23 per acre/year.

Table 7 Summary of VCAILG costs

Year	VCAILG Budget	Enrolled Acreage	Average Cost per Acre
2006-07	\$628,320	74,366	\$8.45
2007-08	\$623,084	84,867	\$7.34
2008-09 ¹	\$1,461,709	85,327	\$17.13
2009-10 ²	\$1,625,990	85,156	\$19.09
2010-11 ³ (expected costs)	\$2,026,179	87,172	\$23.24

1 \$690,648 Conditional Waiver costs, \$771,060 TMDL costs
 2 \$681,234 Conditional Waiver costs, \$944,756 TMDL costs
 3 \$898,527 Conditional Waiver costs, \$1,127,652 TMDL costs

8.2. NGA-LAILG COST

Similarly, the NGA-LAILG administers the Conditional Waiver enrollment, monitoring, and reporting requirements for its members. NGA-LAILG cost information was provided to Regional Board staff by representatives of NGA-LAILG. All members of NGA-LAILG are also required to be members of NGA and must pay annual NGA dues. Annual NGA dues are \$750 for growers grossing greater than \$1 million per year and \$375 for growers grossing less than \$ 1 million per year. In addition to NGA dues, members are billed a base fee and a per acre fee (Table 8). In July 2006 – June 2008 members were billed for a base fee only. In July 2008 – November 2010 members were billed for a base fee and per acre fee (Table 8).

Table 8 NGA-LAILG member fees

Year	Member Fees
July 2006 – June 2008	Sites > 10 acres \$1,450
	Sites < 10 acres \$950
July 2008 – August 2009	\$600 per site and \$100 per acre
September 2009 – November 2010	\$1,000 per site and \$150 per acre

Per acre fees are capped at 100 acres per member

Table 9 summarizes the NGA-LAILG budget over the term of this Conditional Waiver. Conditional Waiver monitoring and reporting costs are approximately \$100,000 per year. Based on the current enrollment of 1,649 acres, this results in \$61 per acre/year. The increased costs in July 2008 – June 2009 reflect the development of the WQMP and additional wet-season lab analysis. The NGA-LAILG is only administering the Conditional Waiver program; these costs do not include any TMDL compliance costs.

Table 9 Summary of NGA-LAILG costs

Year	NGA-LAILG Budget
June 2006 – June 2007	\$83,569
July 2007 – June 2008	\$103,648
July 2008 – June 2009	\$249,656
July 2009 – June 2010	\$106,155

8.3. ESTIMATED BMP IMPLEMENTATION COSTS

BMP implementation is fundamental to the success of the Conditional Waiver program and protection of water quality. Therefore, in order to estimate the implementation costs of the Conditional Waiver program, the costs of four BMP categories (nutrient management, pesticide management, erosion management, and irrigation management) were estimated on a per acre/year basis. BMP cost information is based on estimates from the Natural Resources Conservation Service (NRCS) Field Office Technical Guides (FOTG). Growers will likely need to implement BMPs from all four categories in order to comply with the water quality benchmarks specified in the waiver. The particular BMP implemented from each category will be unique to the type of crop. Thus, the costs for each BMP category are summed by five common crop types in the Los Angeles Region, and the total BMP cost is compared to the five-year average annual gross crop value (Table 10).

Table 10 Comparison of BMP costs with five-year average annual gross crop values

Crop	Crop Value (per acre-year)	BMP Cost (per acre-year)				Total BMP Cost (per acre-year)	BMP Cost/ Crop Value
		Nutrient Management	Pesticide Management	Erosion Management	Irrigation Management		
Strawberry	\$33,495	\$55	\$66	\$2	\$30	\$153	0.5%
Celery	\$13,211	\$55	\$66	\$2	\$30	\$153	1%
Nursery Stock	\$55,003	\$55	\$66	\$2	\$30	\$153	0.3%
Lemon	\$10,371	\$55	\$66	\$208	*	\$329	3%
Avocado	\$2,995	\$55	\$66	\$208	*	\$329	11%

*Irrigation management BMP is the same as erosion management BMP for these crop types.

8.3.1. Nutrient Management

Nutrient management plans are applicable to all crop types. The NRCS cost estimate for a nutrient management plan is \$55 per acre-year.

8.3.2. Pesticide Management

Pesticide management plans are applicable to all crop types. The NRCS cost estimate for a pesticide management plan is \$66 per acre-year.

8.3.3. Sediment and Erosion Management

Staff assumed two types of erosion management BMPs to estimate costs: mulching and filter strips. These BMPs were selected because they are effective BMPs to address sediment and erosion management and are reasonably expected to be implemented by growers. For orchard crops (avocado and lemon), the most applicable erosion control BMP is mulching. For strawberry, celery, and nursery crops, the most applicable erosion control BMP is filter strips.

Filter Strips

NRCS estimates that filter strips planted with native plant material are \$1031 per acre of filter strip installed. Staff estimated a ratio of treated agricultural land area to filter strip area of 60:1 using design methods described in *Design of Stormwater Filtering Systems* (CWP, 1996) and assuming a 99% pervious drainage area, a 1-inch storm, a minimum filter strip length of 25 feet, a berm height of six inches, and a 150-foot by 150-foot drainage area.

The calculated 60:1 ratio is consistent with the NRCS Conservation Practice Standard for Filter Strips (Code 393), which specifies that the ratio of the drainage area to filter strip area shall be less than 60:1 in regions with RUSLE-R (Revised Universal Soil Loss Equation- Rainfall-Erosivity) factor values of 35-175 (RUSLE-R factor values for California range from 60-100).

Assuming a ratio of treated agricultural land area to filter strip area of 60:1, the cost of filter strips is \$17 per acre of agricultural land treated. According to Code 393, filter strips should be designed to have a 10-year lifespan. Assuming a 10-year lifespan and a 5 percent discount rate, the equivalent annual cost of filter strips is \$2 per acre-year.

Mulching

NRCS estimates that mulching costs \$808 per acre of mulch applied. The NRCS Conservation Practice Standard for Mulching (Code 484) specifies that mulching should be applied at a rate to achieve a minimum of 70 percent ground cover to provide erosion control. Therefore, the cost of mulching is \$566 per acre of agricultural land treated.

According to the Mulching FOTG, the reported lifespan for this practice is one year, but local NRCS staff has reported that woody mulch can last two to three years and mulch residue can last up to five years. Assuming a lifespan of three years and a 5% discount rate, the equivalent annual cost of mulching is \$208 per acre-year.

8.3.4. Irrigation Management

Staff assumed two types of irrigation management BMPs to estimate costs: mulching and irrigation tailwater recovery. For orchard crops (avocado and lemon), mulching is an effective irrigation management practice in addition to being an effective erosion control

practice. For strawberry, celery, and nursery crops, the most applicable irrigation management BMP is tailwater recovery.

NRCS estimates that tailwater recovery systems for cropland less than 100 acres cost \$309 per acre of cropland treated. According to the Tailwater Recovery System FOTG, the reported lifespan for this practice is 15 years. Assuming a 5% discount rate, the equivalent annual cost of a tailwater recovery system is \$30 per acre-year.

8.3.5. Gross Annual Crop Values

The gross annual crop values for five common crops in the Los Angeles Region range from \$2,995 to \$55,003 per acre-year. Based on this costs analysis, BMP costs range from 0.3% to 11% of the crop value per acre.

9. CONCLUSIONS AND RECOMMENDATIONS FOR CONDITIONAL WAIVER RENEWAL

The implementation of the Conditional Waiver program over the last five years has resulted in extensive water quality monitoring, ongoing grower education and outreach, and implementation of new and/or improved BMPs. These activities represent significant strides toward the improvement and protection of water quality. Additionally, since targeted BMP implementation was only recently initiated in 2009, future monitoring results are expected to demonstrate improvements in water quality and validate the success of the program. Therefore, staff finds that the continuation of similar activities and requirements under the proposed Conditional Waiver renewal with the addition of requirements to implement TMDL load allocations (described below) is the appropriate approach for continued regulation of discharges from irrigated lands.

9.1. PROPOSED INCORPORATION OF TMDL LOAD ALLOCATIONS AS WATER QUALITY BENCHMARKS

A significant addition to the proposed Conditional Waiver is the incorporation of effective TMDL load allocations as water quality benchmarks. Like all other water quality benchmarks in the waiver, if TMDL load allocation benchmarks are exceeded, BMPs

must be implemented to address the exceedances. This is an enforceable condition of the Waiver.

The TMDLs listed in the table below assign load allocations to agricultural dischargers. All TMDLs listed in the table have an interim and/or final load allocations compliance deadline during the term of the proposed waiver. As proposed, the TMDL load allocations will be implemented through the Conditional Waiver as water quality benchmarks. The interim and final numeric TMDL load allocations are presented in Appendix 3.

Table 11 Effective TMDLs with load allocations assigned to irrigated agriculture, listed by pollutant category

Pesticides and PCBs	
Calleguas Creek Watershed and Mugu Lagoon Organochlorine Pesticides, PCBs, and Siltation TMDL (Resolution No. R05-010)	
Calleguas Creek Watershed and Mugu Lagoon Toxicity, Chlorpyrifos, and Diazinon TMDL (Resolution No. R05-009)	
Nutrients	
Santa Clara River Nitrogen Compounds TMDL (Resolution No. R03-011)	
Calleguas Creek Watershed Nitrogen Compounds and Related Effects TMDL	(Resolution No. R08-009)
Malibu Creek Watershed Nutrients TMDL (U.S. EPA-established TMDL)	
Trash	
Ventura River Estuary Trash TMDL (Resolution No. R07-008)	
Revolon Slough and Beardsley Wash Trash TMDL (Resolution No. R07-007)	
Metals	
Calleguas Creek Watershed and Mugu Lagoon Metals and Selenium TMDL	(Resolution No. R06-012)
Salts	
Calleguas Creek Watershed Boron, Chloride, Sulfate, and TDS (Salts) TMDL	(Resolution No. R07-016)
Upper Santa Clara River Chloride TMDL, Revisions (Resolution No. R08-012)	

Additionally, the Santa Clara River Estuary is identified on the 1998, 2002 and 2006 Clean Water Act Section 303(d) list of impaired water bodies as impaired due to Chem A and toxaphene in fish tissue. Approved 303(d) listings require the development of a TMDL in most cases. Regional Board staff has prepared a detailed technical document that provides the factual basis and analysis supporting a TMDL for toxaphene in fish tissue in the Santa Clara River Estuary, including a problem statement, numeric targets, source analysis, linkage analysis, load allocations, a margin of safety, and a consideration of seasonal variations and critical conditions. Based on the source analysis, the Regional Board finds that the implementation of the TMDL for toxaphene in fish tissue can effectively focus on source control and reduction of sediment loading from irrigated agriculture dischargers in the TMDL subwatershed area. According to the “Water Quality Control Policy for Addressing Impaired Waters” (State Water Board Resolution 2005-0050), “[i]f the solution to an impairment can be implemented with a single vote of the regional board, it may be implemented by that vote ... there is no legal requirement to first adopt the plan [TMDL] through a basin plan amendment. The plan [TMDL] may be adopted directly in that single regulatory action” (p. 5). Regional Board staff has determined, based on the technical documentation, that a single regulatory action through the Conditional Waiver can be used to implement this TMDL. Therefore, as proposed, the waiver renewal contains water quality benchmarks based upon the TMDL load allocations for water and the numeric target for fish tissue, and additional requirements for water and fish tissue monitoring in the Santa Clara River Estuary and its subwatershed to determine whether these benchmarks are achieved. Based on these requirements and other requirements in this order, the Conditional Waiver will implement the Santa Clara River Estuary toxaphene TMDL.

9.2. CONCLUSION REGARDING NEED FOR GROUNDWATER MONITORING

Also, as presented in Section 7, there is extensive groundwater monitoring currently being conducted throughout the Region. Staff finds that this monitoring is adequate to assess broad changes in groundwater quality over time as a result of BMPs implemented under the Conditional Waiver. Therefore, it is not necessary to require additional groundwater monitoring. However, as described in the proposed Monitoring and Reporting Requirements (Appendix 1) dischargers will be required to implement BMPs for the protection of both surface water and groundwater.

10. REFERENCES

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