WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

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JAMES F. STAHL
Chief Engineer and General Manager

January 31, 2006
File No: 31-370.40.4A

303 (d) Deadline:
1/31/06

Via Electronic and U.S. Mail

Mr. Craig J. Wilson, Chief
Monitoring and TMDL Listing Unit
Division of Water Quality
State Water Resources Control Board
PO Box 100
Sacramento, CA 95812-0100

Dear Mr. Wilson:

Comments on State Board's Proposed 2006 Revision of the Clean Water Act Section 303(d) List of Water Quality Limited Segments

The County Sanitation Districts of Los Angeles County (Districts) are pleased to provide you with our comments regarding the State Water Resources Control Board's (State Board) proposed 2006 Update of the Clean Water Act Section 303(d) List of Water Quality Limited Segments (303(d) List). The Districts are a consortium of 24 independent special districts serving the wastewater and solid waste management needs of over 5 million people and 3,300 industries in Los Angeles County, California. The Districts serve 78 cities and unincorporated areas within the County. We currently operate and maintain over 1,300 miles of trunk sewers and 11 wastewater treatment plants that collectively treat over 500 million gallons per day of wastewater. Of the 11 wastewater treatment plants, 7 discharge to inland surface waters, 1 discharges to the ocean (on the Palos Verdes Shelf), and 3 discharge to land and/or supply water for water recycling purposes. The Districts submitted data and information to the State Board in June 2004 in response to the State Board's data solicitation for the 2006 303(d) List (Data Solicitation). The Districts submitted additional data at the request of the State Board in December 2004. The Districts also participated in the State Board's workshop on the proposed 303 (d) list held in Southern California on January 5, 2006.

First and foremost, the Districts want to take this opportunity to commend the State Board on this revision of the 303(d) list. In applying the recently adopted 303(d) Listing Policy, the State Board's 303(d) listing process is noticeably more transparent and consistent, and the proposed listing decisions in most cases have a well-documented, rigorous and scientifically valid basis (especially when compared with many of the listing decisions made in the past, particularly for a number of items placed on the list prior to the 2002 listing cycle). Although the Districts did not agree with every aspect of the Listing Policy, its use in developing the proposed 2006 303(d) list has markedly improved the overall listing process. Additionally, we wish to commend you and your staff for your excellent work on this extremely important effort to update the 303(d) list.

Overview

The Districts' specific comments on the Proposed 2006 303(d) List are contained in several attachments and enclosures. A brief overview of the watersheds to which the Districts' wastewater treatment plants discharge (including location maps), is provided in Attachment 1. Our complete comments on specific listings of concern are contained in Attachment 2 and our comments and recommendations on specific waterbodies are summarized in Table 1. The Districts have reviewed the Staff Report and fact sheets supplied by the State Board in various categories (List, Delist, Do not list and Do not delist) for the waterbodies to which our facilities discharge and we agree with the State Board on some proposed changes to the list and disagree on other listings. We have laid out our reasoning for listings where examination of the evidence has led to a different conclusion than that currently proposed by the State Board in Attachment 2.

We wish to begin by bringing to the attention of the State Board the fact that, based on our review of the data and fact sheets released for public comment, we have found that a number of water bodies proposed for inclusion on the 2006 303(d) list are attaining water quality standards, and therefore qualify for delisting (or alternatively, do not qualify for listing, if they are not already on the 303(d) list). We believe that it is very important for the State Board to follow-up on this information and make changes to the proposed 2006 303(d) list where appropriate, since it is certainly good news when water bodies are meeting standards, and the implications of erroneous listings are substantial. In several instances, we reached a different conclusion than staff because we were able to identify additional data that, when considered together with the data considered by the State Board, demonstrate attainment. In all instances, we believe that these data meet the definition of "existing and readily available data," and therefore must be considered by the State Board. *See* State Water Resources Control Board, Water Quality Control Policy For Developing California's Clean Water Act Section 303(d) List (Listing Policy), p. 17 (Section 6.1.1) (stating that "at a minimum, readily available data and information includes . . . receiving water monitoring data from discharger monitoring reports"); *see also* 40 CFR § 130.7(b)(5). In most cases, these data were collected as part of NPDES permit monitoring requirements and were submitted to the Los Angeles Regional Water Quality Control Board (Regional Board) in discharge monitoring reports, and therefore these data were in the possession of the Regional Board. In some cases, the data were collected between June 2004 and the present (since the Data Solicitation), and a large enough dataset is now available to meet the minimum number of samples required for listing/delisting. In all of these instances, we believe re-examination of the proposed decision with respect to listing is warranted to ensure that sound listing decisions are made that are in accordance with the State Board's Listing Policy. We therefore request that the State Board reconsider these listings based on the analysis contained in the attached materials.

The Districts commend the State Board for improving the rigor of the 303(d) List, as well as for providing "fact sheets" that contain explanations of the basis for State Board decision-making. The Districts support the State Board's use of a Water Quality Limited Segments Being Addressed category of the 303(d) list for the portion of listings where an impairment will be mitigated through an existing program and a TMDL for the impairment is not warranted or where a TMDL has already been established. A good example of listings that should be placed in this category of the 303(d) list is diazinon (which is proposed for listing on various water bodies). U.S. EPA has mandated a phase out of all non-agricultural uses of diazinon, requiring retail sales of diazinon for indoor and outdoor uses to cease as of December 2002 and December 2004, respectively. U.S. EPA's action will essentially eliminate all urban usage of diazinon, once existing stocks of this pesticide have been used up. The U.S. EPA's phase out of urban uses of diazinon is a good example of an existing regulatory program that can be reasonably expected to result in attainment of the diazinon evaluation guideline within a reasonable, specified time frame. Therefore, it is most appropriate to address this pollutant with the Water Quality Limited Segments Being Addressed category, where water quality impairments for diazinon in urban area water bodies have been documented and otherwise meet the criteria for listing under the Listing Policy, but for which a TMDL is not necessary.

One area where a re-examination of several proposed listings is needed stems from the incorrect application of the potential municipal drinking water beneficial use designation to several waterbodies in the Los Angeles region, which has led to a number of new proposed listings. We believe that these proposed listings are not valid, because the proposed listings are based on the application of water quality objectives that are associated with the potential MUN beneficial use category, which in fact don't apply to these waterbodies. In summary, most potential municipal drinking water supply use designations in the Los Angeles Region Basin Plan have been found to be "conditional" use designations of no legal effect. This situation, and the listings which are affected by it, are explained further in the attached comments.

Another issue for which we request reconsideration is the State Board's decision not to utilize total metals data when considering delistings for metals. By way of background, in the California Toxics Rule, water quality criteria for metals are expressed as dissolved metals because this is considered the bioavailable fraction and therefore is the most environmentally appropriate way to regulate metals. However, federal regulations require that NPDES permit limits for metals be expressed as total metals. Studies can be done to develop what is known as a translator to characterize the fraction found as dissolved on a site-specific basis. The most important point here is that dissolved metals are always some fraction of total metals.

The Staff Report indicates that total metals data are not being considered because the CTR metals criteria are based on dissolved metals. Staff believes it is inappropriate to compare the total metals data to the dissolved criteria. In response to the data solicitation for development of the 303d list, the Districts submitted total metals data to the State Board. The Districts are required to analyze for total metals by our NPDES permits, and these are the data that we submitted. The Districts believe that utilizing total metals data in a delisting context is not only technically valid, but also can be considered conservative. Clearly, if a total metals concentration is below the water quality criterion, then obviously the dissolved fraction of the metal would also be below the criterion.

Additionally, the Districts believe that the inclusion of total metals data in a dataset for delisting purposes can provide better temporal representation, as well as improved spatial representation. For example, the Districts sample for total metals year-round in dry weather. In many water segments in the San Gabriel River watershed, most of the dissolved metals data available are stormwater data collected only in wet weather, and without the total metals data, water quality conditions would remain uncharacterized for much of the year. Therefore, the Districts believe it is appropriate for the State Board to consider total metals data within a weight of evidence context when evaluating potential delistings for metals, and we request that the Board staff include the total recoverable metals data that was submitted (in the Data Solicitation and is resubmitted in the attachments to this letter) for the San Gabriel River watershed in their analysis.

This is a particularly important and timely issue because TMDLs for several metals in the San Gabriel River watershed are currently under development by the Regional Board and are scheduled for completion pursuant to the Los Angeles Region TMDL Consent Decree by March 2007. The use of the total recoverable metals data will mean the difference between listing and delisting a water body in several instances. The Districts therefore urge the State Board to consider total metals data as an additional line of evidence when evaluating the listing status for several reaches in the San Gabriel River watershed.

The Districts commend the State Board for re-examining some of the 303(d) listings which were carried over from previous listing cycles for which the original basis of the listing was insufficient. A good example of this is the proposed delisting of "abnormal fish histology" for several segments in the San Gabriel River watershed, based on the fact that fish histology is an effect, and this effect has not been linked to a specific pollutant or toxicity.

Conclusion

In conclusion, the Districts commend the State Board for many of the proposed revisions to the 2006 303(d) List. We believe these changes will focus the attention of the TMDL process on those waters and impairments for which attainment with water quality standards will yield the greatest potential water quality benefits. Given the limited resources available for the development and implementation of TMDLs, we believe it is important for the State Board to concentrate on those waters where problems are documented and understood, and where a TMDL is the appropriate tool to solve the problem. However, further refinements are necessary to complete this process and develop a scientifically and legally defensible list with a sound and consistent basis. Therefore, we urge you to fully consider the information and analysis we are submitting and we hope that the State Board will decide to make the changes we are recommending.

If you have any questions regarding our comments or the information and data we are providing to you, please contact the undersigned, Beth Bax, or Heather Lamberson at (562) 699-7411.

Very truly yours,

James F. Stahl

Sharon N. Green

for Victoria O. Conway
Assistant Department Head
Technical Services Department

VOC:HL:drs

Enclosures

cc: Members, State Board (letter only)
Celeste Cantu, Executive Officer (letter only)
Jon Bishop, Los Angeles-RWQCB (letter only)

Table 1. Summary of Comments on Specific 303(d) Listings

Water Body	Pollutant	SWRCB proposed decision	Districts' Recommendation	Reason(s)
Coyote Creek	Copper, Lead	Do not delist	Delist	Current Data Show Attainment of Water Quality Standard
Coyote Creek	Cyanide	List	Do not list	Current Data Show Attainment of Water Quality Standard
Coyote Creek	Selenium, Zinc	Delist	Delist	Current Data Show Attainment of Water Quality Standard
Coyote Creek, Santa Clara River Reach 6	Diazinon	List	List as water quality segment being addressed	An Existing Program will Result in Attainment
Coyote Creek, San Gabriel River Estuary, San Gabriel River Reach 1	Abnormal Fish Histology	Delist	Delist	Insufficient Basis to List
Coyote Creek, San Gabriel River Reach 1	pH	List	Do not list	Basin Plan Objective is not being exceeded
Coyote Creek, San Gabriel River Reach 1, San Jose Creek Reach 1, San Jose Creek Reach 2	Excess Algal Growth	Delist	Delist	Insufficient Basis to List
Coyote Creek, San Gabriel River Reach 2, Santa Clara River Reach 5, Santa Clara River Reach 6	Nitrite, Aluminum	List	Do not list	Beneficial Use is wrong for waterbody; MCLs do not apply
Outer Cabrillo Beach	coliform	Do Not Delist	Delist	Current Data Show Attainment of Water Quality Standard
Outer Cabrillo Beach, Abalone Cove Beach, Bluff Cove Beach, Long Point Beach, Malaga Cove Beach, Portuguese Bend Beach, Royal Palms Beach, Whites Point Beach	Beach Closures	Delist	Delist	Current Data Show Attainment of Water Quality Standard
San Gabriel River Estuary, San Gabriel River Reach 1, San Gabriel River Reach 2, San Jose Creek Reach 1, Rio Hondo Reach 1, Santa Clara River Reach 5, Santa Clara River Reach 6	Ammonia	List	Do not list	Current Data Show Attainment of Water Quality Standard
San Gabriel River Reach 1	Toxicity	Delist	Delist	Current Data Show Attainment of Water Quality Standard
San Gabriel River Reach 2	Copper	Do not delist	Delist	Current Data Show Attainment of Water Quality Standard
San Gabriel River Reach 2	Lead, Zinc	Delist	Delist	Current Data Show Attainment of Water Quality Standard
San Gabriel River Reach 3	Toxicity	Do not delist	Delist	Current Data Show Attainment of Water Quality Standard
San Gabriel River Reach 3, Rio Hondo Reach 2	Ammonia	Do not list	Do not list	Current Data Show Attainment of Water Quality Standard
San Jose Creek Reach 2	Ammonia	List	Do not list	Insufficient Basis to List
Santa Clara River Reach 5	Diazinon	List	Do not list	Current Data Show Attainment of Water Quality Standard
Santa Clara River Reach 5	Nitrate + Nitrite	Do not delist	Delist	Current Data Show Attainment of Water Quality Standard
Santa Clara River Reach 5	PCBs	List	Do not list	Insufficient Basis to List
Santa Clara River Reach 5, Santa Clara River Reach 6	Phosphate	Do not list	Do not list	Insufficient Basis to List
Santa Clara River Reach 6	Chlorpyrifos	List	Do not list	Current Data Show Attainment of Water Quality Standard
Santa Clara River Reach 6	Nitrate + Nitrite	Do not list	Do not list	Current Data Show Attainment of Water Quality Standard
Santa Clara River Reach 6	Nitrite	List	Do not list	Current Data Show Attainment of Water Quality Standard
Santa Clara River watershed	TDS, Chloride, Sulfates	varies	List as high priority	
Santa Monica Bay Offshore/Nearshore	Chlordane (sediments), PAHs (sediments)	Do Not Delist	Delist	Current Data Show Attainment of Water Quality Standard

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Sharon Green

From: Sharon Landau [slandau@lacsd.org]
Sent: Thursday, May 09, 2002 1:48 PM
To: 'sgreen@lacsd.org'; 'bbax@lacsd.org'; 'hlamberson@lacsd.org'; 'vconway@lacsd.org'
Subject: FW: Reach designations

For those of you who would like some extra clarification on the SCR reach numbers.

-----Original Message-----
From: Elizabeth Erickson [SMTP:eerickso@rb4.swrcb.ca.gov]
Sent: Thursday, May 09, 2002 10:28 AM
To: VCFB1@aol.com; brapp@ci.fillmore.ca.us; Nwilkinson@ci.santa-paula.ca.us; sbautista@fs.fed.us; blouie@lacsd.org; slandau@lacsd.org; Oamoah@ladpw.org; schong@ladpw.org; Jayme.Laber@mail.co.ventura.ca.us; Martin.Hernandez@mail.co.ventura.ca.us; msubbotin@newhall.com; Jonathan Bishop; Hmerenda@santa-clarita.com; jfosselmen@santa-clarita.com; Crea@ucdavis.edu; Odaugovish@ucdavis.edu; sldrill@ucdavis.edu; dandetemer@unitedwater.org
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Subject: Reach designations

RWQCB
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SCR Reach 2, Highway 101 birdge and Freeman Diversion
SCR Reach 3, Freeman Diversion to Fillmore Street A
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USEPA
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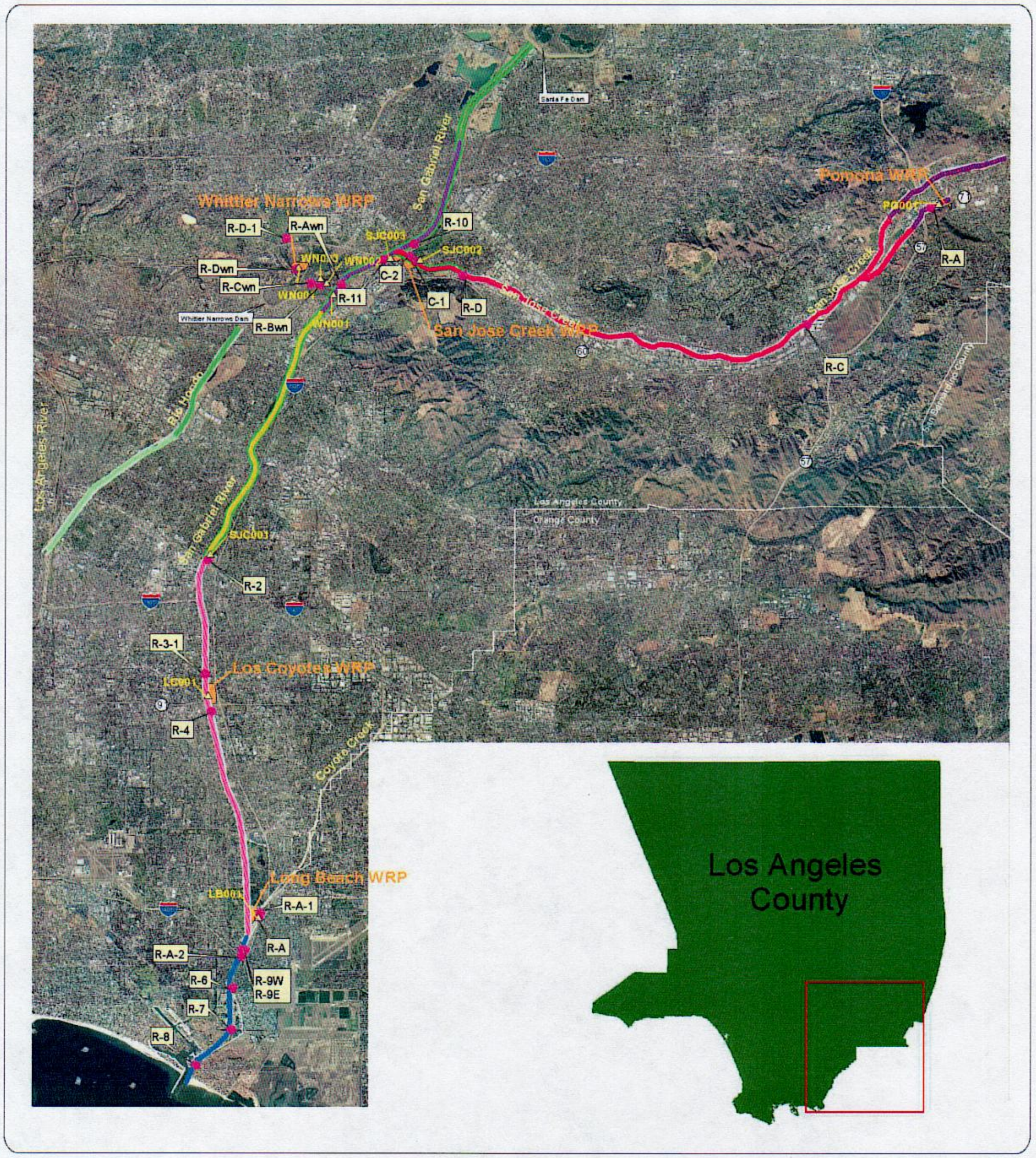
SCR Reach 3,Freeman Diversion Dam to Above santa paula creek and below timber canyon
SCR Reach 4, Above Timber Canyon to above Grimes Canyon
SCR Reach 5,Above Grimes Cyn to Propane Road
SCR Reach 6,Propane Road to Blue Cut Gaging station
SCR Reach 7,Blue Cut gaging station to West Pier Highway 99
SCR Reach 8, West Pier Highway 99 to Bouquet Canyon Road Bridge
SCR Reach 9, Bouquest Canyon Road Bridge to above Lang gaging station
SCR Reach 10, above Lang gauging station

EXHIBIT 1

Figure 1: Lower San Gabriel River Watershed



- Effluent Discharge Point
- LACSD Receiving Water Stations
- Water Reclamation Plant
- Lined
- Unlined

Lower San Gabriel River Watershed Reaches

- RH Reach 1
- RH Reach 2
- SJC Reach 1
- SJC Reach 2
- SGR Estuary
- SGR Reach 1
- SGR Reach 2
- SGR Reach 3

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY, CALIF.
OFFICE OF CHIEF ENGINEER AND GENERAL MANAGER
GENERAL MAP OF

Lower San Gabriel River Watershed

JAMES F. STAHL - CHIEF ENGINEER & GENERAL MANAGER
WHITTIER, CALIF. MAY 2002

1 0 1 2 3 4 5 6 Miles

N

Figure 2: Santa Clara River

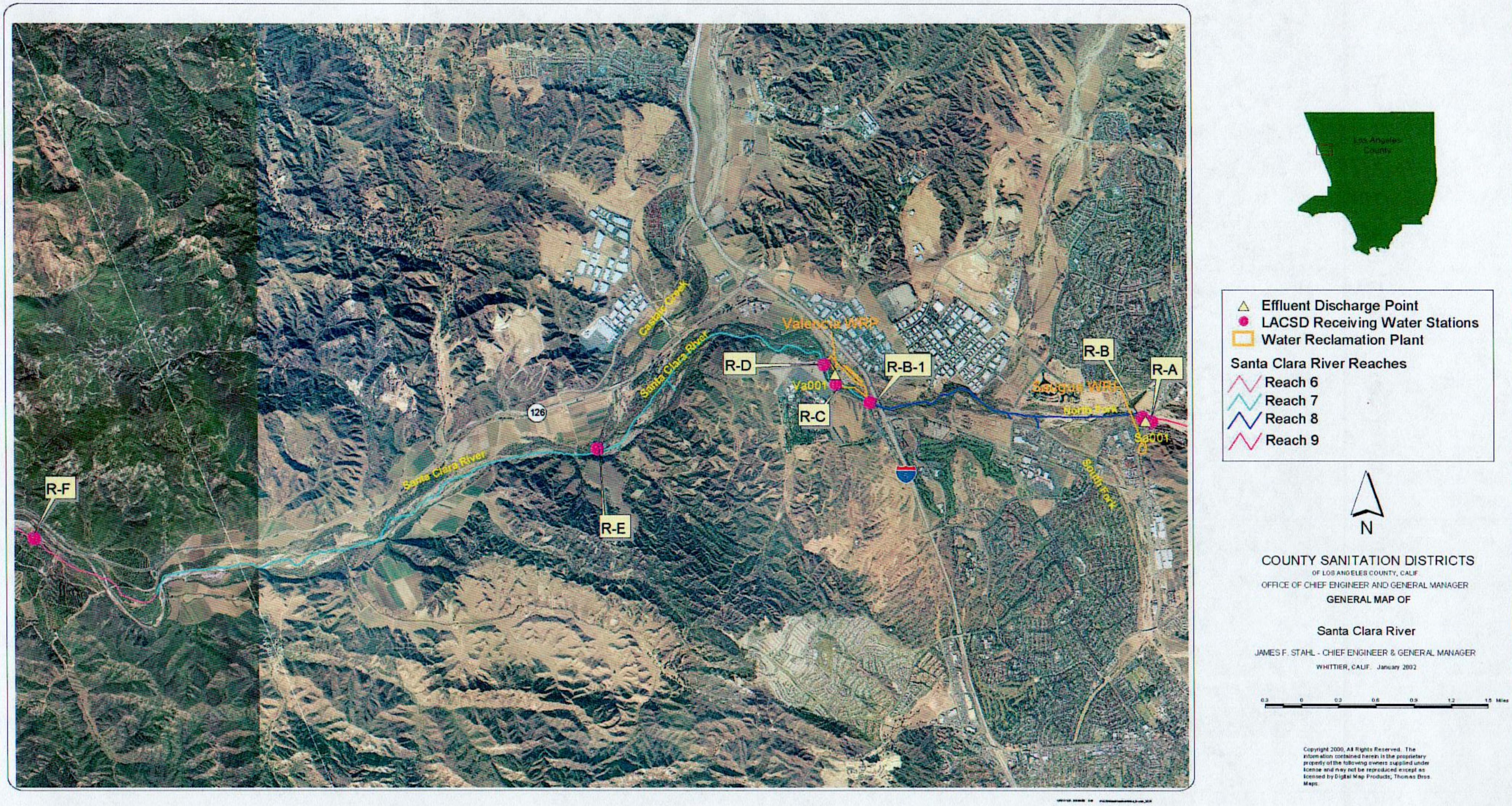
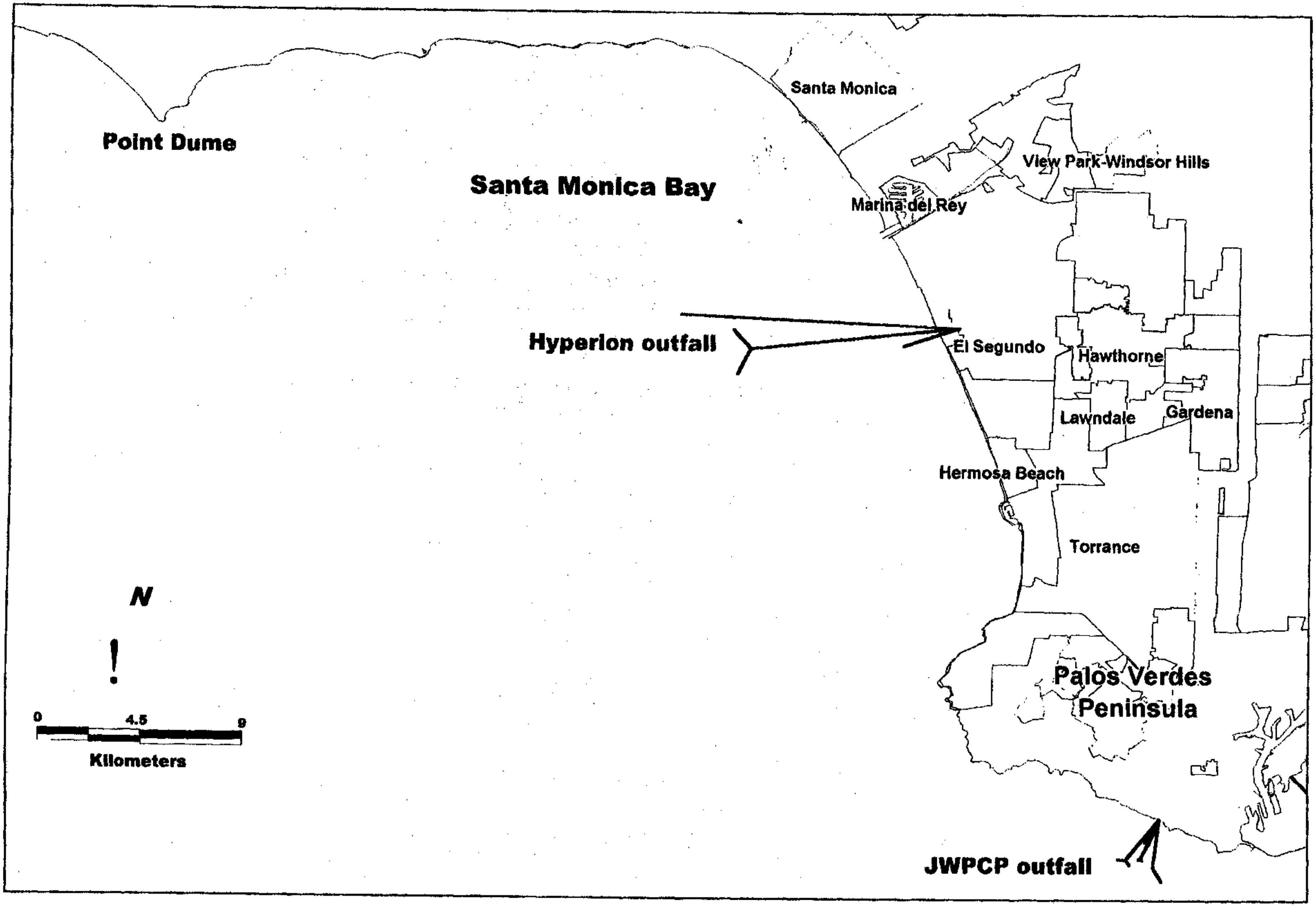


Figure 3 Santa Monica Bay



COMMENTS ON SPECIFIC LISTINGS

WATER SEGMENT: **San Gabriel River Estuary**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired; therefore, this water body should not be listed for ammonia.**

The State Water Resources Control Board (SWRCB) determined that ammonia should be listed for the estuary of the San Gabriel River primarily because a remedial program was in place to address the ammonia impairments and the SWRCB had not reviewed data that indicated the reach was in attainment. Although the SWRCB was correct in identifying that the inclusion of nitrification and denitrification (NDN) at the upstream Long Beach and Los Coyotes Water Reclamation Plants (WRPs) represented a remedial program already in place that would address local ammonia impairments, the most recent data were not reviewed to determine if the water body was in attainment. The Draft Staff Report lists data from 1997, 1998 and 2000. However, NDN was operational at the upstream plants as of June 2003; therefore, ammonia measurements from before June 2003 are not representative of current conditions and should not be used to determine impairment. In fact, recent measured ammonia concentrations demonstrate that the estuary attains the saltwater ammonia objectives in the Basin Plan since the operation of NDN began.

The data presented herein were collected at receiving water stations RA2, R6, R7 and R8 in the San Gabriel River Estuary (refer to Figure 1 for receiving water station locations). It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Program for the Long Beach WRP. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4). Tables A.1, A.2, A.3 and A.4 show the measured ammonia concentrations at receiving water stations RA2, R6, R7 and R8 in the San Gabriel River Estuary, respectively. These stations are the only stations monitored by the Districts within this reach.

Tables A.1, A.2, A.3 and A.4 list every ammonia measurement taken at the four receiving water stations in the estuary since June 13, 2003 (which was the start-up date for NDN at the upstream plants). The attached tables also include calculations of the one-hour and four-day average ammonia objective from the Basin Plan for saltwater. (The salinity at these stations corresponds to brackish to saltwater conditions and therefore the saltwater objectives are the applicable water quality objectives in accordance with the Basin Plan.) The tables include columns to indicate when the one-hour and/or the four-day objective was exceeded. In the case of the San Gabriel River estuary, the four-day ammonia objective was exceeded three times out of 466 measurements. The one-hour objective was never exceeded.

Per Table 3.1 of the Listing Policy (SWRCB Listing Policy, pg. 9), three exceedances out of 466 measurements is clearly not impaired and thus, the Districts do not believe that the San Gabriel River Estuary should be listed for ammonia.

WATER SEGMENT: **San Gabriel River Reach 1**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired; therefore, this water body should not be listed for ammonia.**

The SWRCB determined that ammonia should be listed for this reach of the San Gabriel River primarily because a remedial program was in place to address the ammonia impairments and the SWRCB had not reviewed data that indicated the reach was in attainment. Although the SWRCB was correct in identifying that the inclusion of nitrification and denitrification (NDN) at the nearby San Jose Creek and Los Coyotes WRPs represented a remedial program already in place that would address any ammonia impairments, the most recent data were not reviewed to determine if the water body was in attainment with the applicable objectives. The measured ammonia concentrations within the reach illustrate that the reach has been in attainment of the freshwater ammonia objectives in the Basin Plan since the operation of NDN began at the WRPs discharging to this reach.

The data presented herein were collected at receiving water stations R2, R3-1, R4 and R9W in Reach 1 of the San Gabriel River (refer to Figure 1 for receiving water station locations). It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Programs for the San Jose Creek and Los Coyotes WRPs. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg.4). Tables B.1, B.2, B.3 and B.4 show the measured ammonia concentrations at these receiving water stations in the San Gabriel River. These stations are the only stations monitored by the Districts within this reach.

Tables B.1, B.2, B.3 and B.4 list every ammonia, pH and temperature measurement taken at R2, R3-1, R4 and R9W, respectively, since June 13, 2003. (NDN was operational at these plants as of June 2003; therefore, ammonia measurements from before June 2003 are not representative of current conditions and should not be used to determine impairment.) The attached tables also include a calculation of the monthly average ammonia objective from the Basin Plan (based on the monthly pH and temperature measured) and a column to indicate when the monthly ammonia objective was exceeded. In the case of Reach 1 of the San Gabriel River, the monthly ammonia objective was exceeded five times out of 118 monthly measurements (25 to 30 measurements are available at each of the four receiving water stations within the reach). The daily objective was never exceeded.

Per Table 3.1 of the Listing Policy (SWRCB Listing Policy, pg. 9), 11 exceedances of the water quality criteria are required to place a water segment on the 303(d) list for 118 total measurements. Given that only five exceedances were measured, the Districts do not believe that San Gabriel River Reach 1 should be listed for ammonia.

WATER SEGMENT: **San Gabriel River Reach 2**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.**

DISTRICTS' RESPONSE: **Available receiving water data indicate that the water segment is not impaired. Available upstream receiving water data suggest that the water segment is not impaired. Therefore, we recommend that this reach not be listed.**

The SWRCB determined that ammonia should be listed for this reach of the San Gabriel River primarily because a remedial program was in place to address the ammonia impairments and the SWRCB had not reviewed data that indicated the reach was in attainment. The SWRCB was correct in identifying that the inclusion of nitrification and denitrification (NDN) at the upstream San Jose Creek and Whittier Narrows WRPs represented a remedial program already in place that would address any ammonia impairments. NDN became operational in 2003, thus this remedial program is in place.

It is important to note there is not always flow in all parts of this reach; both the San Jose Creek and Whittier Narrows WRPs have several different discharge locations and the flow from each discharge location is managed in conjunction with the Los Angeles County Department of Public Works, which operates both the Rio Hondo and the San Gabriel River Spreading Grounds. Some of the flow from the San Jose Creek WRP is discharged directly to Reach 1 of the San Gabriel River (after traveling through a multi-mile tunnel from the plant). Most of the flow from the Whittier Narrows WRP is discharged to the Rio Hondo, rather than to the San Gabriel River. Thus, during dry weather, there are times when flow along the San Gabriel River is discontinuous, and some or all of Reach 2 is essentially dry. (Note that there is a rubber dam operated by the Los Angeles County Department of Public Works at the entrance to the San Gabriel River spreading grounds, which is inflated when the spreading grounds are in use, thereby bisecting the reach and creating an entirely dry area in the lower half of Reach 2.)

Nonetheless, the available data referenced in the Draft Staff Report do not exceed the Basin Plan objectives for ammonia. To further illustrate compliance, while the Districts do not monitor any receiving water stations in this reach, data from the upstream reach, Reach 3, is shown in Table C.1, C.2 and C.3. Other than the San Jose Creek and Whittier Narrows WRPs, there is no major point source that would be likely to contribute significant amounts of ammonia to Reach 2. Since ammonia is contributed primarily by the WRPs in Reach 3, the Reach 3 data should be considered representative of the attainment status for ammonia in Reach 2. (Given that ammonia transforms quickly to other nitrogen compounds, the concentration of ammonia in Reach 2 is most likely less than what is measured in Reach 3.)

The data presented herein were collected at receiving water stations WN-RA, R10 and R11 in San Gabriel River Reach 3 (refer to Figure 1 for receiving water station locations). It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Programs for the San Jose Creek and Whittier Narrows WRPs. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4).

Tables C.1, C.2, and C.3 list every ammonia, pH and temperature measurement in Reach 3 since June 13, 2003. (NDN was operational at the San Jose Creek and Whittier Narrows plants as of June 2003; therefore, ammonia measurements from before June 2003 are not representative of current conditions and should not be used to determine impairment.) The attached tables also include a calculation of the monthly average ammonia objective from the Basin Plan (based on the monthly pH and temperature measured) and a column to indicate when the monthly ammonia objective was exceeded. In the case of Reach 3 of the San Gabriel River, the monthly ammonia objective was exceeded only once out of 58 monthly measurements. The daily objective was never exceeded. Per Table 3.1 of the Listing Policy, Reach 3 should not be considered impaired with just one exceedance. Thus, since the attainment status in San Gabriel Reach 3 is representative of ammonia conditions in Reach 2, the Districts do not believe that San Gabriel River Reach 2 should be listed for ammonia.

WATER SEGMENT: **San Gabriel River Reach 3**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **Do not list**

SWRCB STAFF RECOMMENDATION: **After review of the available data and information, SWRCB staff concludes that the water body-pollutant combination should not be placed on the section 303(d) list because applicable water quality standards for the pollutant are not exceeded.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired.**

The SWRCB determined that ammonia should not be listed for this reach of the San Gabriel River because a remedial program was in place to address the ammonia impairments and the current data indicate the reach is in attainment of ammonia objectives. The SWRCB was correct in identifying that the inclusion of nitrification and denitrification (NDN) at the WRPs discharging to this reach represented a remedial program already in place that would address any ammonia impairments. Full NDN became operational at the San Jose Creek and Whittier Narrows WRPs in June 2003, thus this remedial program is in place. The Districts monitor the receiving water in San Gabriel River Reach 3; these data are shown in Tables C.1, C.2 and C.3.

The data presented herein were collected at receiving water stations WN-RA, R10 and R11 in San Gabriel River Reach 3 (refer to Figure 1 for receiving water station locations). It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Programs for the San Jose Creek and Whittier Narrows WRPs. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4).

Tables C.1, C.2 and C.3 list every ammonia, pH and temperature measurement in Reach 3 since June 13, 2003. (NDN was operational at the upstream plants as of June 2003; therefore, ammonia measurements from before June 2003 are not representative of current conditions and should not be used to determine impairment.) The attached tables also include a calculation of the monthly average ammonia objective from the Basin Plan (based on the monthly pH and temperature measured) and a column to indicate when the monthly ammonia objective was exceeded. In the case of Reach 3 of the San Gabriel River, the monthly ammonia objective was exceeded only once out of 58 monthly measurements. The daily objective was never exceeded. Thus, the Districts agree with the SWRCB that San Gabriel River Reach 3 should not be listed for ammonia.

WATER SEGMENT: **San Jose Creek Reach 1**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired; therefore, this water body should not be listed for ammonia.**

The SWRCB determined that ammonia should be listed for this reach of the San Jose Creek primarily because a remedial program was in place to address the ammonia impairments and the SWRCB had not reviewed data that indicated the reach was in attainment. Although the SWRCB was correct in identifying that the inclusion of nitrification and denitrification (NDN) at the nearby Pomona and San Jose Creek WRPs represented a remedial program already in place that would address ammonia impairments, the most recent data reviewed to determine if the water body was in attainment only included June 2003 to November 2004. If the SWRCB reviews all the currently available data (through late 2005) and considers the Site Specific Objectives (SSOs) for ammonia developed for this water body, the reach is in attainment with the Basin Plan ammonia objectives.

The data presented herein were collected at receiving water stations C1, C2, POM-RA, POM-RC, and POM-RD, all of which are either in San Jose Creek Reach 1 or the south fork of the creek, which is tributary to Reach 1 (refer to Figure 1 for receiving water station locations). It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Programs for the Pomona and San Jose Creek WRPs. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4).

Tables D.1, D.2, D.3, D.4 and D.5 list every ammonia, pH and temperature measurement taken at receiving water stations C1, C2, POM-RA, POM-RC, and POM-RD, respectively, in San Jose Creek Reach 1 since June 13, 2003. (NDN was operational at these plants as of June 2003; therefore, ammonia measurements from before June 2003 are not representative of current conditions and should not be used to determine impairment.) The attached tables also include a calculation of the monthly average ammonia objective from the Basin Plan (based on the monthly pH and temperature measured) and a column to indicate when the monthly ammonia objective was exceeded. In the case of San Jose Creek Reach 1, the monthly ammonia objective was exceeded eleven times out of 111 monthly measurements. The daily objective was never exceeded.

Without further qualifying information, the number of exceedances would suggest the waterbody is impaired. However, it is important to note that of the 11 exceedances, 9 were recorded at station POM-RA (directly downstream from the Pomona WRP). Table D.3 for POM-RA includes a column with the daily flow from Pomona WRP. In July and August 2005, the average flow from Pomona WRP was close to zero and while the average measured ammonia concentrations were also very low – 0.2 mg/L in both cases - the ammonia objectives were exceeded in these samples because of high pH values measured in the receiving water.

However, the Districts have worked collaboratively with the Regional Board and U.S. EPA on the development of SSOs for ammonia in local waterbodies. This effort began in 2001 and a final report with recommended SSOs was submitted to the Regional Board in 2003 (please refer to Attachment D.1, Ammonia Water Effects Ratios and Site-specific Objectives for Los Angeles County Waterbodies-Final Results). The Regional Board is planning on considering the SSOs for inclusion into the Basin Plan in early 2006.[1] The SSOs take into account site-specific conditions that have been shown to alter the toxicity of ammonia to aquatic life in the specific waterbodies. Water samples from San Jose Creek itself were used to determine the site-specific toxicity of ammonia. Thus, for San Jose Creek Reach 1, it is more appropriate to use the SSO developed for this water body than the default ammonia objectives in the Basin Plan (which were developed by U.S. EPA in a laboratory using reconstituted water samples.) Reviewing the data with respect to the SSOs, there are only 6 exceedances in 111 monthly measurements. Thus, the Districts believe that the SWRCB should consider the attainment status of the reach in light of the probable near-term adoption of the SSOs and not list San Jose Creek Reach 1 as impaired for ammonia.

[1] "The Regional Board is scheduled to consider proposed site-specific objectives (SSOs) for ammonia in several watersheds in early 2006", Responsiveness Summary, Revision of Early Life Stage Provision of Freshwater Ammonia Objectives Basin Plan Amendment, December 2005.

WATER SEGMENT: **San Jose Creek Reach 2**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.**

DISTRICTS' RESPONSE: **The original listing was unsupported. There are no ammonia data for the reach that demonstrate impairment; therefore, this water body should not be listed for ammonia.**

The SWRCB determined that ammonia should be listed for this reach of the San Jose Creek primarily because a remedial program was in place to address the ammonia impairments and the SWRCB had not reviewed data that indicated the reach was in attainment. However, in this case, the SWRCB was incorrect in identifying that the inclusion of nitrification and denitrification (NDN) at the nearby Pomona WRP would address any ammonia impairments in San Jose Creek Reach 2, because this reach is upstream of Reach 1, into which the Pomona WRP discharges. (The Pomona WRP actually discharges into the south fork of San Jose Creek, which is a tributary to Reach 1, not Reach 2.) In fact, the Districts not only do not monitor any stations in this reach, we are also unaware of any data that could have been used to support the original listing for ammonia.

In 1996, when the original 303 (d) listings were determined, San Jose Creek was defined as a single segment. The reach was later split into 2 reaches and the ammonia listing was automatically applied to both segments. The SWRCB recognized the lack of stations for San Jose Creek Reach 2 in the Draft Staff Report, in the fact sheet relating to delisting algal growth in Reach 2. The Fact Sheet acknowledges that there were no data assessed for the reach and states, "There is no assessment in Reach 2 as currently defined." (Draft Staff Report Volume II, pg. 358). This was also discussed in the Districts' comments on the 2002 303(d) list, dated June 14, 2002[2].

Given that there are no receiving water data for Reach 2 to evaluate with regards to the ammonia objectives, and thus the original listing for ammonia is unsupported, the Districts do not believe that San Jose Creek Reach 2 should be listed for ammonia.

[2] Hereby incorporated by reference.

WATER SEGMENT: **Rio Hondo Reach 1**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.**

DISTRICTS' RESPONSE: **There are no ammonia data for the reach that demonstrate impairment. Available upstream receiving water data indicate that the water segment is not impaired. Therefore, this segment should not be listed.**

The SWRCB determined that ammonia should be listed for this reach of the Rio Hondo primarily because a remedial program was in place to address the ammonia impairments and the SWRCB had not reviewed data that indicated the reach was in attainment. The SWRCB was correct in identifying that the inclusion of nitrification and denitrification (NDN) at the upstream Whittier Narrows WRP represented a remedial program already in place that would address any ammonia impairments. Full NDN became operational at the Whittier Narrows WRP in June 2003, thus this remedial program is already in place. Although the Districts do not monitor any receiving water stations in this reach, the Districts do monitor the receiving water in Rio Hondo Reach 2, which is upstream of Rio Hondo Reach 1. These data are shown in Tables E.1, E.2 and E.3. Ammonia is primarily contributed to rivers from point sources such as POTWs, and the only major point source in the Rio Hondo is the Districts' Whittier Narrows WRP, which discharges in Rio Hondo Reach 2. There are no major point sources downstream of the Whittier Narrows WRP that would contribute significant amounts of ammonia to Reach 1; thus, the Reach 2 data are representative of the attainment status for ammonia in Reach 1. (Given that ammonia transforms quickly to other nitrogen compounds, the concentration of ammonia in Reach 1 is most likely less than what is measured in Reach 2.)

The data presented herein were collected at receiving water stations WN-RB, WN-RD, and WN-RD1 in Rio Hondo Reach 2 (refer to Figure 1 for receiving water station locations). It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Program for the Whittier Narrows WRP. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4).

Tables E.1, E.2 and E.3 list every ammonia, pH and temperature measurement taken in Reach 2 since June 13, 2003. (NDN was operational at the Whittier Narrows WRP as of June 2003; therefore, ammonia measurements from before June 2003 are not representative of current conditions and should not be used to determine impairment.) The attached tables also include a calculation of the monthly average ammonia objective from the Basin Plan (based on the monthly pH and temperature measured) and a column to indicate when the monthly ammonia objective was exceeded. In the case of Rio Hondo Reach 2, the monthly ammonia objective was exceeded only once out of 71 monthly measurements. The daily objective was never exceeded. Per Table 3.1 of the Listing Policy, and as recognized in the SWRCB's recommendations, Rio Hondo Reach 2 is not impaired with one exceedance. Thus, since the attainment status in Rio Hondo Reach 2 is representative of ammonia conditions in Reach 1, the Districts do not believe that Rio Hondo Reach 1 should be listed for ammonia.

WATER SEGMENT: **Rio Hondo Reach 2**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **Do not list**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.**

DISTRICTS' RESPONSE: **Agree; Available receiving water data show that the water segment is not impaired.**

The SWRCB determined that ammonia should not be listed for this reach of the Rio Hondo because a remedial program was in place to address the ammonia impairments and the current data indicated the reach was in attainment. The SWRCB was correct in identifying that the inclusion of nitrification and denitrification (NDN) at the upstream Whittier Narrows WRP represented a remedial program already in place that would address any ammonia impairments. Full NDN became operational in June 2003, thus this remedial program is already in place. The Districts monitor the receiving water in Rio Hondo Reach 2; these data are shown in Tables E.1, E.2 and E.3.

The data presented herein were collected at receiving water stations WN-RB, WN-RD, and WN-RD1 in Rio Hondo Reach 2 (refer to Figure 1 for receiving water station locations). It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Program for the Whittier Narrows WRP. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4).

Tables E.1, E.2 and E.3 list every ammonia, pH and temperature measurement taken in Reach 2 since June 13, 2003. (NDN was operational at the Whittier Narrows WRP as of June 2003; therefore, ammonia measurements from before June 2003 are not representative of current conditions and should not be used to determine impairment.) The attached tables also include a calculation of the monthly average ammonia objective from the Basin Plan (based on the monthly pH and temperature measured) and a column to indicate when the monthly ammonia objective was exceeded. In the case of Rio Hondo Reach 2, the monthly ammonia objective was exceeded only once out of 71 monthly measurements. The daily objective was never exceeded. Thus, the Districts agree with the SWRCB's determination that, based on the currently available data, Rio Hondo Reach 2 should not be listed for ammonia.

WATER SEGMENT: **Santa Clara River Reach 5**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired; therefore, this water body should not be listed for ammonia.**

The SWRCB determined that ammonia should be listed for this reach of the Santa Clara River primarily because a remedial program was in place to address the ammonia impairments and the SWRCB had not reviewed data that indicated the reach was in attainment. Although the SWRCB was correct in identifying that the inclusion of nitrification and denitrification (NDN) at the nearby Saugus and Valencia WRPs represented a remedial program already in place that would address any ammonia impairments, the most recent data were not reviewed to determine if the water body was in attainment. The measured ammonia concentrations within the reach illustrate that the reach has been in attainment of the freshwater ammonia objectives in the Basin Plan since the operation of NDN at the Saugus and Valencia WRPs began.

The data presented herein were collected at receiving water stations RC, RD and RE in Reach 5 of the Santa Clara River (refer to Figure 2 for receiving water station locations). It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Program for the Valencia WRP. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4). Tables F.1, F.2 and F.3 list the measured ammonia concentrations at receiving water stations RC, RD, and RE in the Santa Clara River, respectively. These stations are the only stations monitored by the Districts within this reach.

Tables F.1, F.2 and F.3 list every ammonia, pH and temperature measurement taken at RC, RD and RE, respectively, since January 2004 (the NDN process was undergoing optimization through the fall of 2003). The attached tables also include a calculation of the monthly average ammonia objective from the Basin Plan (based on the monthly pH and temperature measured) and a column to indicate when the monthly ammonia objective was exceeded. In the case of Reach 5 of the Santa Clara River, the monthly ammonia objective was exceeded twice out of 63 monthly measurements. The daily objective was never exceeded.

Per Table 3.1 of the Listing Policy (SWRCB Listing Policy, pg. 9), 6 exceedances of the water quality criteria are required to place a water segment on the 303(d) list for 63 total measurements. Given that only two exceedances were measured, the Districts do not believe that Santa Clara River Reach 5 should be listed for ammonia.

WATER SEGMENT: **Santa Clara River Reach 6**

POLLUTANT: **Ammonia**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired; therefore, this water body should not be listed for ammonia.**

The SWRCB determined that ammonia should be listed for this reach of the Santa Clara River primarily because a remedial program was in place to address the ammonia impairments and the SWRCB had not reviewed data that indicated the reach was in attainment. Although the SWRCB was correct in identifying that the inclusion of nitrification and denitrification (NDN) at the upstream Saugus WRP represented a remedial program already in place that would address any ammonia impairments, the most recent data were not reviewed to determine if the water body was in attainment. The measured ammonia concentrations within the reach illustrate that the reach has been in attainment of the freshwater ammonia objectives in the Basin Plan since the operation of NDN at the upstream Saugus WRP began.

The data presented herein were collected at receiving water stations RB and RB01 in Reach 6 of the Santa Clara River (refer to Figure 2 for receiving water station location). It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Program for the Saugus WRP. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4). Tables G.1 and G.2 show the measured ammonia concentrations at receiving water stations RB and RB01 in the Santa Clara River, respectively. These stations are the only stations monitored by the Districts within this reach.

Tables G.1 and G.2 list every ammonia, pH and temperature measurement taken at RB and RB01, respectively, since January 2004 (the NDN process was undergoing optimization through the fall of 2003). The attached tables also include a calculation of the monthly average ammonia objective from the Basin Plan (based on the monthly pH and temperature measured) and a column to indicate when the monthly ammonia objective was exceeded. In the case of Reach 6 of the Santa Clara River, the monthly ammonia objective was exceeded once out of 42 monthly measurements. The daily objective was never exceeded.

Per Table 3.1 of the Listing Policy (SWRCB Listing Policy, pg. 9), 4 exceedances of the water quality criteria are required to place a water segment on the 303(d) list for 42 total measurements. Given that only one exceedance was measured, the Districts do not believe that Santa Clara River Reach 6 should be listed for ammonia.

WATER SEGMENTS: **Coyote Creek, San Gabriel River Estuary, San Gabriel River Reach 1**

POLLUTANT: **Abnormal Fish Histology**

PROPOSED DECISION: **Delist**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should be removed from the 303(d) list because biological impacts documented were not associated with toxicity or pollutant concentrations, and cannot be associated with water or sediment numeric-specific evaluation guidelines.**

DISTRICTS' RESPONSE: **Agree with delisting**

The Districts support the SWRCB's decision to remove Coyote Creek, San Gabriel River Estuary and San Gabriel River Reach 1 from the 303(d) list for abnormal fish histology. This determination is consistent with the provisions contained in the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (Listing Policy), adopted September 30, 2004. Section 3.8 of the Listing Policy provides that a water segment shall be placed on the 303(d) list if the water segment exhibits an adverse biological response (or responses) measured in resident individuals as compared to reference conditions and these impacts are associated with water or sediment concentrations of pollutants as described in section 3.6 of the Listing Policy. As described in the Fact Sheets for the proposed delistings (Draft Staff Report Volume II, pgs. 258, 339, and 343), the weight of evidence indicates that there is insufficient information to conclude that adverse biological responses are associated with specific pollutants or toxicity.

In comment letters regarding the 2002 Update of the 303(d) list (dated June 14, 2002, November 1, 2002 and January 30, 2003[3]), the Districts requested that the SWRCB remove the listings for Abnormal Fish Histology for the San Gabriel River Watershed, because the pollutant or stressor causing the alleged impairment was not identified. Furthermore, the Districts also commented that the listing was invalid because there is no adopted water quality objective for "abnormal fish histology," so there is no suitable basis upon which to judge impairment or attainment of applicable water quality standards. Thus, the Districts support the delisting of these waters for "abnormal fish histology".

[3] Hereby incorporated by reference.

WATER SEGMENTS: **Coyote Creek, San Gabriel River Reach 1, San Jose Creek Reach 1, San Jose Creek Reach 2**

POLLUTANT: **Excess Algal Growth**

PROPOSED DECISION: **Delist**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should be removed from the 303(d) list because this condition can be most effectively addressed by focusing on reducing or eliminating the nutrient pollutants proposed for listing or already on the 303(d) list (Coyote Creek); it cannot be determined if the guideline used was applicable and water quality standards were exceeded. Furthermore, excess algae growth information should not be placed on the 303(d) list because it is not a pollutant or toxicity (San Gabriel River Reach 1, San Jose Creek Reach 1, and San Jose Creek Reach 2).**

DISTRICTS' RESPONSE: **Agree with Delisting**

The Districts agree with the SWRCB's decision to remove Coyote Creek, San Gabriel River Reach 1, San Jose Creek Reach 1 and San Jose Creek Reach 2 from the 303(d) list for algae. The SWRCB's rationale for delisting because "it cannot be determined if the guideline used was applicable and water quality standards were exceeded", and because algae "is not a pollutant or toxicity" is consistent with the provisions of the Listing Policy. It was also noted by the SWRCB that for San Gabriel River Reach 1, there were an insufficient number of samples exceeding the subjective algae guideline in the original listing to warrant listing as provided for in the Listing Policy (Draft Staff Report Volume II, pg. 346). (The Fact Sheet refers to the exceedance frequency contained in Table 4.1 of the Listing Policy, but Table 3.2 is actually the correct table to determine allowable exceedance frequencies for conventionals and other pollutants. Table 4.1 addresses delisting for toxicants.) In fact, all four of these original algae listings had an insufficient number of exceedances to warrant listing in accordance with the Listing Policy, and could not be listed today on that basis alone (notwithstanding the lack of applicable evaluation guidelines, and the fact that algae is not a pollutant or toxicity).

The Fact Sheet for San Jose Creek Reach 2 acknowledges that there were no data assessed for the reach. In 1996, when the original listings for algae were made, San Jose Creek was defined as a single segment. The reach was later split into 2 reaches and the listing was automatically applied to both segments. The Fact Sheet states, "There is no assessment in Reach 2 as currently defined." (Draft Staff Report Volume II, pg. 358). This was discussed in the Districts comments on the 2002 303(d) list, dated June 14, 2002.

However, the Districts disagree with the SWRCB's rationale for delisting in the case of Coyote Creek. The Fact Sheet for Coyote Creek (Draft Staff Report Volume II, pg. 261) states that the listing should be removed because "this condition can be most effectively addressed by focusing on reducing or eliminating the nutrient pollutants proposed for listing or already on the 303(d) list." The Fact Sheet specifically refers to ammonia listings and proposed nitrite listings for the reach. As explained in previous comment letters to the SWRCB regarding the 2002 303(d) list (dated June 14, 2002, November 1, 2002 and January 30, 2003), the Districts believe that physical habitat parameters, rather than nutrients, may be controlling factors in determining algae levels in local waterways. To our knowledge, the actual causes controlling algal growth in Coyote Creek, San Gabriel River and San Jose Creek, have never been determined, and therefore it is unclear whether "reducing or eliminating" ammonia and nitrite in Coyote Creek would have any effect on algae.

In summary, the Districts agree with the SWRCB's basis for delisting for San Gabriel River Reach 1 and San Jose Creek. The fact that algae is not a pollutant or toxicity, and the lack of an appropriate evaluation guideline consistent with Section 6.1.3 of the Listing Policy, is the appropriate basis upon which to recommend delisting of all of these waterbodies, including Coyote Creek.

WATER SEGMENT: **Coyote Creek**

POLLUTANT: **pH**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **Basin Plan water quality objective for pH is not being exceeded, since it has not been determined whether elevated pH measurements are *as a result of waste discharge*; therefore, this water body should not be listed for pH.**

The Districts disagree with the SWRCB's decision to list Coyote Creek as impaired due to exceedances of the Basin Plan objective for pH (pH above 8.5). The Basin Plan objective for pH reads: "The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharge. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge." (*emphasis added*) To our knowledge, it has not been demonstrated that the exceedances in Coyote Creek are as a result of waste discharge. Therefore, the Districts believe that there is insufficient information to place this water segment on the 303(d) list.

The Districts' do not disagree that pH is a stressor that may cause impairment to aquatic life beneficial uses, but instead believe that it is not clear if the Basin Plan water quality objective for pH is being exceeded in this case, since it has not been determined if the pH exceedances are *a result of waste discharge*. On the contrary, the weight of evidence indicates that pH measurements exceed 8.5 more frequently upstream of waste discharges as compared to downstream of the discharges, and therefore suggests that pH exceedances are in fact not as *a result of waste discharge*.

Available pH data from June 2003 through August 2005 for Districts' receiving water stations located on Coyote Creek are presented in Tables H.1, H.2 and H.3, and Figures H.1, H.2 and H.3. The Districts collect pH measurements at three stations in Coyote Creek: 1) RA1, located upstream of the discharge from the Long Beach WRP; 2) RA, located immediately downstream of the discharge to Coyote Creek; and 3) R9E, located at the end of Coyote Creek (at the end of the concrete lined channel) just above the San Gabriel River estuary (please refer to Figure 1 for WRP and station locations). Table H.1 contains pH data from station RA1. Out of 107 samples collected at station RA1 (upstream of the discharge), 75 of the pH measurements exceed 8.5. This represents an exceedance frequency of over 70%, upstream of the discharge. Table H.2 presents the pH data collected immediately downstream of the discharge of the Long Beach WRP at station RA. Out of 109 samples collected at this location, only 17 pH measurements exceed 8.5. This represents an exceedance frequency of only approximately 16%, and demonstrates that immediately below the discharge, the pH water quality objective is in attainment (per Table 3.2 of the Listing Policy). It is also likely that exceedances at the downstream sampling station RA are due to the influence of flow from the upstream station RA1, and not as a result of waste discharge, as evidenced by pH results from Long Beach WRP effluent samples (Table H.4 and Figure H.4). The effluent pH from the Long Beach WRP averages 7.4, which is well below 8.5.

Samples collected at the furthest downstream station, R9E, (Table H.3) show that 25 out of 111 pH samples exceed 8.5. Again, these exceedances are likely not as *a result of waste discharge*, as the effluent data from the Long Beach WRP shows that the pH of the discharge is below 8.5.

The Districts recommend that the SWRCB not list this waterbody because there is insufficient information to demonstrate the Basin Plan objective is exceeded. The Basin Plan objective specifically states that "The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharge…", and the available water quality data for Coyote Creek clearly demonstrates that pH 8.5 is exceeded more frequently upstream of the discharge from the Long Beach WRP. Therefore, the Districts believe it has not been demonstrated that the exceedances in the receiving water are as a result of wastes discharged.

WATER SEGMENT: **San Gabriel River Reach 1**

POLLUTANT: **pH**

PROPOSED SWRCB DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **Basin Plan water quality objective for pH is not being exceeded, since it has not been determined whether elevated pH measurements are *as a result of waste discharge*; therefore, this water body should not be listed for pH.**

The Districts disagree with the SWRCB's proposal to list San Gabriel River Reach 1 as impaired due to exceedances of the Basin Plan objective for pH (pH above 8.5). The Basin Plan objective for pH reads "The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharge. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge." (*emphasis added*) To our knowledge, it has not been demonstrated that the exceedances in San Gabriel River Reach 1 are as a result of waste discharge. Therefore, the Districts believe that there is insufficient information to place this water segment on the 303(d) list.

The Districts do not disagree that pH is a stressor that may cause impairment to aquatic life beneficial uses, but instead believe that it is not clear if the Basin Plan water quality objective for pH is being exceeded in this case, since it has not been determined if the pH exceedances are *a result of waste discharge*. On the contrary, the weight of evidence indicates that pH measurements exceed 8.5 more frequently upstream of waste discharges as compared to downstream of the discharges, and this information therefore suggests that pH exceedances are in fact not as *a result of waste discharge*.

Available pH data from June 2003 through August 2005 for Districts' receiving water stations located on San Gabriel River Reach 1 are presented in Tables I.1, I.2, I.3 and I.4, and Figures I.1, I.2, I.3 and I.4. The Districts' collect pH measurements at four stations in San Gabriel River Reach 1: 1) R2, located immediately downstream of Districts' discharge SJC001, at the upstream end of Reach 1. (Discharge SJC001 discharges effluent from the San Jose Creek East and San Jose Creek West WRPs.); 2) R3-1, located immediately upstream of the discharge from the Los Coyotes WRP; 3) R4, located immediately downstream of the discharge from the Los Coyotes WRP; and 4) R9W, located at the end of San Gabriel River Reach 1 (at the end of the concrete lined channel) just above the San Gabriel River estuary (please refer to Figure 1 for WRP and station locations). Table I.1 contains pH data from station R2, located at the upstream end of Reach 1. Out of 81 samples, only 2 exceed pH 8.5. Under most conditions, the flow at station R2 consists entirely of effluent from the San Jose Creek East and West WRPs, as it is located directly below the discharge. The effluent pH from the San Jose Creek East and West WRPs averages 7.0 and 7.1, respectively; the measured pH values are shown in Tables I.5 and I.6, and Figures I.5 and I.6.

Table I.2 contains pH data from station R3-1. Out of 109 samples collected at station R3-1 (located upstream of the discharge from the Los Coyotes WRP), 41 measurements exceed pH 8.5. This represents an exceedance frequency of approximately 38%, upstream of the discharge. Table I.3 presents the pH data collected immediately downstream of the discharge of the Los Coyotes WRP at station R4. Out of

106 samples collected at this location, only 6 exceed pH 8.5. This represents an exceedance frequency of only approximately 6%, and demonstrates that immediately below the discharge, the pH water quality objective is in attainment (per Table 3.2 of the Listing Policy). It is also likely that exceedances at the downstream sampling station R4 are due to the influence of flow from the upstream station R3-1, and not as a result of waste discharge, as evidenced by pH results from Los Coyotes WRP effluent samples (Table I.7 and Figure I.7).

Samples collected at the furthest downstream station, R9W (Table I.4), show that 61 out of 109 samples exceed pH 8.5. Again, these exceedances are likely not as *a result of waste discharge*, as the effluent data from the Los Coyotes WRP show that the pH of the discharge is below 8.5.

The Districts recommend that the SWRCB not list this waterbody because there is insufficient information to demonstrate the Basin Plan objective is exceeded. The Basin Plan objective specifically states that "The pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharge…", and the available water quality data for San Gabriel River Reach 1 clearly demonstrate that pH 8.5 is exceeded more frequently upstream of waste discharges, as compared to directly downstream of the discharges. Therefore, the Districts believe it has not been demonstrated that the exceedances in the receiving water are as a result of wastes discharged.

WATER SEGMENT: **San Gabriel River Reach 1**

POLLUTANT: **Toxicity**

PROPOSED DECISION: **Delist**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should be removed from the section 303(d) list because applicable water quality standards for the pollutant are not exceeded.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired.**

The Districts agree with the SWRCB's decision to delist San Gabriel River Reach 1 for toxicity. Water quality data available for Reach 1 of the San Gabriel River indicate that the water segment meets the criteria for delisting under Section 4.1 of the Listing Policy.

In response to the SWRCB Public Solicitation of Water Quality Data and Information for the 2004 Clean Water Act 303(d) List (Public Solicitation), the Districts submitted toxicity data for Reach 1 of the San Gabriel River[4]. In June 2003, the Districts completed conversion of five water reclamation plants in the San Gabriel River watershed to nitrification/denitrification (NDN) mode, so only data from June 2003 to the present are indicative of post-NDN toxicity in the reach.[5] Accordingly, the Districts submitted toxicity data collected from June 2003 through May 2004 as part of the Districts' routine NPDES water quality monitoring program for samples taken at receiving water stations R4, R9W, and R3-1 (please refer to Figure 1 for the location of these receiving water stations), and data collected from a collaborative pre-TMDL toxicity study conducted by the U.S. EPA and the Districts in August through October 2003. Combining the data from the Districts' routine NPDES monitoring program with the samples collected for the U.S. EPA/Districts' collaborative study, a total of 47 samples had been taken from Reach 1 of the San Gabriel River, since the implementation of NDN in June 2003 until the Public Solicitation in 2004. None of these samples showed evidence of toxicity.

Appendix J presents a chronic toxicity monitoring summary for Reach 1 of the San Gabriel River from June 2003 through December 2005. A subset of this dataset (as described above) was submitted to the SWRCB in response to the Public Solicitation as described previously. The more recent data are being provided to the SWRCB to demonstrate continued attainment of the water quality standard. Toxicity results from the Districts' routine NPDES monitoring are contained in Tables J.3 (Station R2), J.4 (Station R3-1), J.5 (Station R4) and J.6 (Station R9W). The summary also includes additional toxicity data collected in a collaborative study with U.S. EPA related to development of the San Gabriel River TMDL, from April 2005 through December 2005 (Table J.1). The purpose of this study was to characterize toxicity in the San Gabriel River watershed for the toxicity TMDL, which was originally scheduled for completion by March 2004, according to the Los Angeles Region TMDL Consent Decree. The deadline has since been extended to March 2007. Additional data collected from the Surface Water

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[4] Response to Public Solicitation hereby incorporated by reference.

[5] Prior toxicity results are not representative of current conditions, due to the high levels of ammonia that were present before operation of NDN began.

Ambient Monitoring Program (SWAMP)/San Gabriel River Regional Monitoring Program study are also included (Table J.2). Samples for this study were taken in June 2005 from randomly-selected sampling sites in the lower San Gabriel River watershed. A total of five random samples were collected in Reach 1.

Combining all available data, a total of 122 valid toxicity tests are available for Reach 1. (As mentioned in the Districts' submittal to the SWRCB in response to the Public Solicitation, receiving water samples collected for the U.S. EPA collaborative TMDL toxicity study in August 2003 are being excluded from this analysis, due to a documented, short-term operational upset at the San Jose Creek WRP (consistent with Section 6.1.5.3 of the Listing Policy).) Out of the 122 valid toxicity tests available for the reach, only 6 samples showed evidence of statistically significant toxicity. (It should also be noted that three of the tests with statistically significant toxicity exhibited effects of less than 25%, indicating a likely "false positive" hypothesis test result.) According to Table 4.1 of the Listing Policy, this exceedance frequency satisfies the requirements for delisting, and therefore this listing should be removed from the 303(d) list.

WATER SEGMENT: **San Gabriel River Reach 3**

POLLUTANT: **Toxicity**

PROPOSED DECISION: **Do Not Delist**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should not be removed from the section 303(d) list because it cannot be determined if applicable water quality standards are attained.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired; therefore, this water body should be delisted for toxicity.**

The Districts disagree with the SWRCB's decision not to delist San Gabriel River Reach 3 for toxicity. Available water quality data for Reach 3 indicates that the water quality standard is attained. Based on the Districts' analysis of available water quality data for the reach, only 2 samples out of a total 38 samples showed evidence of statistically significant toxicity. This meets the criteria for delisting under Section 4.1 of the Listing Policy. Therefore, this listing should be removed from the 303(d) list.

In response to the SWRCB Public Solicitation of Water Quality Data and Information for the 2004 Clean Water Act 303(d) List (Public Solicitation), the Districts submitted toxicity data for Reach 3 of the San Gabriel River. In June 2003, the Districts completed conversion of five water reclamation plants in the San Gabriel River watershed to nitrification/denitrification (NDN) mode, so only data from June 2003 to the present are indicative of post-NDN toxicity in the reach.[6] Accordingly, the Districts submitted toxicity data collected from June 2003 through May 2004 as part of the Districts' routine NPDES water quality monitoring program for samples taken at receiving water stations WN-RA and R11 (please refer to Figure 1 for the location of these receiving water stations), and data collected from a collaborative pre-TMDL toxicity study conducted by U.S. EPA and the Districts in August through October 2003 (samples were collected in the San Gabriel River at Peck Road, which is located in Reach 3). Combining the data from the Districts' routine NPDES monitoring program with the samples collected for the U.S. EPA/Districts' collaborative study, a total of 15 samples had been taken from Reach 3 of the San Gabriel River since the implementation of NDN in June 2003 until the Public Solicitation in 2004. Only one of these samples showed evidence of toxicity.

Given that over a year has passed since the 2004 data submittal, more information is now available that should be considered as part of this listing decision. Appendix K presents a chronic toxicity monitoring summary for Reach 3 of the San Gabriel River from June 2003 through December 2005. A subset of this data was submitted to the SWRCB in response to the Public Solicitation as described above. More recent data are being provided to the SWRCB to demonstrate continued attainment of the water quality standard. Tables K.1 and K.3 include toxicity results from the Districts' routine NPDES monitoring at receiving water stations R11 and WN-RA, respectively. The summary also includes additional data collected from a recent collaborative study with U.S. EPA related to development of the San Gabriel River TMDL, from April 2005 through December 2005 (Table K.2). The purpose of this study is to characterize toxicity in

[6] Prior toxicity results are not representative of current conditions, due to the high levels of ammonia that were present before operation of NDN began.

the San Gabriel River watershed for the toxicity TMDL. This TMDL was originally scheduled for completion by March 2004, according to the Los Angeles Region TMDL Consent Decree, but completion has since been extended to March 2007.

Combining all available data, a total of 38 valid toxicity tests are now available for Reach 3. Out of the 38 valid toxicity tests available for the reach, only 2 samples showed evidence of statistically significant toxicity. (Furthermore, the Districts consider the toxicity observed in those two tests to be debatable.[7]) According to Table 4.1 of the Listing Policy, this exceedance frequency satisfies the requirements for delisting, and therefore this listing should be removed from the 303(d) list.

[7] The *Ceriodaphnia* test conducted on 10/23/03 at R11 was identified as exhibiting toxicity at the time of testing and reporting using an older EPA protocol (1991). However, this test would have been identified as being "non-toxic" using the most recent EPA protocol (2002) after application of this method's required pMSD and dose response evaluation criteria. All chronic toxicity testing conducted after January 2004 utilized this more recent protocol. Additionally, the toxicity observed in the Pimephales tests conducted at R-11 on 05/03/05 exhibited effects below 25% indicating that the statistically significant effects observed in this test likely represented a "false positive".

WATER SEGMENT: **Coyote Creek**

POLLUTANT: **Cyanide**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **Districts' receiving water data show that water segment is not impaired, and Districts' research indicates that detected data are likely due to analytical interference; therefore this water segment should not be listed.**

The Districts disagree with the SWRCB's decision to list Coyote Creek as impaired due to cyanide. The Districts recommend that the SWRCB not list this water body because a re-evaluation of the available water quality data for the reach indicates that the resulting number of exceedances does not meet the minimum number of exceedances required to place a water segment on the 303(d) list, per Table 3.1 (SWRCB Listing Policy, pg. 9) of the Listing Policy. When Districts' data for Coyote Creek are combined with the data cited by the SWRCB in the related Fact Sheet (Draft Staff Report Vol. II, pg. 48-49), only 5 out of 87 samples exceed the California Toxics Rule (CTR) freshwater chronic criteria for cyanide of 5.2 ug/L, which does not meet the minimum criteria for listing in Table 3.1.

Districts' data from samples collected at three receiving water stations in Coyote Creek (RA1, RA, R9E, please refer to Figure 1 for receiving water station location) from July 2001 through July 2005 are provided in Table L.1, and shown graphically on Figure L.1. It should be noted that these data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Program for the Long Beach WRP. Therefore, these data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol.I, pg. 4). A total of 102 samples were collected during this period. Out of these 102 samples, 78 samples were used to determine the allowable exceedance frequency because these 78 samples were analyzed using a detection limit below the applicable water quality criteria, as recommended in section 6.1.5 of the SWRCB Listing Policy. Out of the 78 samples collected by the Districts, only 1 sample exceeded the applicable cyanide objective. If the Districts' data are combined with the data cited by the SWRCB in the Fact Sheet (4 out of 9 samples), the resulting exceedance frequency of the combined data would total 5 out of 87 samples. Per Table 3.1 of the Listing Policy, a minimum of 8 samples would be required to list this water body.

Additionally, research studies conducted by the Districts have indicated that methods used to preserve samples of cyanide taken from wastewater can result in false positives for cyanide. We therefore have serious concerns as to whether the reported cyanide exceedances for this water body represent actual exceedances or are simply artifacts of the preservation method.

WATER SEGMENT: **Coyote Creek**

POLLUTANT: **Diazinon**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **Water segment should be placed in the Water Quality Limited Segments Being Addressed category of the 303(d) list because an existing regulatory program is expected to result in the attainment of the water quality standard.**

The SWRCB is proposing to list Coyote Creek under the Water Quality Limited Segments category of the 303(d) list. While the Districts agree that current water quality data do not indicate that the selected evaluation guideline, the California Department of Fish and Game (CDFG) acute fresh water hazard assessment criteria for the protection of aquatic life (0.16 ug/L), is being attained, the Districts disagree with the SWRCB's proposed placement of this waterbody in the Water Quality Limited Segments category of the 303(d) list. The Districts believe it is appropriate to place this water segment-pollutant combination under the Water Quality Segments Being Addressed category of the 303(d) list because an action taken by the U.S. EPA is addressing diazinon in urban water bodies and this action can be expected to result in the attainment of the evaluation guideline. Therefore, establishment of a TMDL for diazinon is not warranted. Specifically, on December 5, 2000, the U.S. EPA announced a phase out of all non-agricultural uses of Diazinon (See Exhibit M.1, U.S. EPA, Office of Prevention, Pesticides, and Toxic Substances, Diazinon Revised Risk Assessment and Agreement with Registration, Revised January 2001). This phase out required all retail sales of diazinon for indoor uses to cease as of December 31, 2002. Sales of diazinon for outdoor non-agricultural uses were required to cease as of December 31, 2004. Outdoor non-agricultural uses include home lawn and garden applications as well as other non-agricultural outdoor uses such as application around the outside of buildings.

The U.S. EPA's action will essentially eliminate all urban usage of diazinon, once existing stocks of this pesticide have been used up. The only remaining uses of diazinon are for outdoor agricultural applications, and there is little agriculture, if any, in the Coyote Creek drainage area. To quantify the impact of the phase out to date, data collected by the California Department of Pesticide Regulation (DPR) on pesticide usage were examined. All agricultural usage of pesticide and all pesticide applications by certified applicators must be reported to DPR. In 2000, before the phase-out was announced, there were 218,318 pounds of reported diazinon usage in Los Angeles County for non-farming applications (primarily structural pest control but also small amounts for landscape maintenance, nurseries, public health, and regulatory pest control). In 2004, the last year for which data is available, the amount used in Los Angeles County for the same applications had dropped dramatically to 903 pounds, representing a usage decrease of over 99.6%. Because diazinon will no longer be used in urban areas once existing stocks have been used, it will no longer be entering Coyote Creek and diazinon concentrations in this water segment should decrease accordingly.

The U.S. EPA's phase out of urban uses of diazinon is an existing regulatory program that is reasonably expected to result in attainment of the diazinon evaluation guideline within a reasonable, specified time frame. Therefore, it is most appropriate to place this water segment in the Water Quality Limited Segments Being Addressed category.

WATER SEGMENT: **Santa Clara River Reach 5**

POLLUTANT: **Diazinon**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **Available receiving water data show that water segment is not impaired; therefore, this water body should not be listed for diazinon.**

The Districts disagree with the SWRCB's proposed listing of Santa Clara River Reach 5 as impaired by diazinon. Based on the Districts' analysis of available water quality data for the reach, only 1 sample out of a total 31 samples exceed the diazinon evaluation guideline applied, the chronic CDFG Hazard Assessment Criteria of 0.10 ug/L. This does not meet the minimum number of exceedances required for listing per Table 3.1 (SWRCB Listing Policy, pg. 9) of the Listing Policy.

Available diazinon data for Santa Clara River Reach 5 include Districts' data from samples collected quarterly at three receiving water stations in Reach 5 (RC, RD, and RE; please refer to Figure 2 for receiving water station locations) from January 2004 through July 2005, in addition to samples collected for the SWRCB's Surface Water Ambient Monitoring Program (SWAMP) in October and November 2001. The data are provided in Table N.1, and shown graphically on Figure N.1. It should be noted that the Districts' data were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Program for the Valencia WRP. Therefore, this data should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4). A total of 27 samples were collected by the Districts for diazinon in Reach 5. Out of these 27 samples, none exceeded the chronic CDFG Hazard Assessment Criteria for diazinon of 0.10 ug/L. A total of 6 samples were collected by SWAMP; however further analysis of the data demonstrated that some samples should be averaged. Two samples were collected at station 403STCNRB on October 30, 2001, and two samples were collected at the same station on November 13, 2001. Section 6.1.5.6 of the Listing Policy indicates that samples collected from the same location on the same day should be averaged, "To be considered temporally independent, samples collected during the averaging period shall be combined and considered one sampling event. For data that are not temporally independent (e.g., when multiple samples are collected at a single location on the same day), the measurements shall be combined and represented by a single resultant value." (SWRCB Listing Policy, pg. 24). When the SWAMP samples collected on the same days are averaged, the resulting average values are 0.054 ug/l for October 30, 2001 and 0.11 ug/L for November 13, 2001 (the single exceedance). The averaged SWAMP samples indicate one exceedance out of 4 samples, and when combined with Districts' data results in a total of one exceedance in 31 samples. Per Table 3.1 of the Listing Policy, a minimum of 3 samples would be required to list this water body. Therefore, the Districts recommend that the SWRCB do not list Santa Clara River Reach 5 for diazinon.

It should also be noted that the only exceedance of the diazinon criteria was in November 2001. More recent data do not show any exceedances, which may be a result of activity taken by the U.S. EPA to phase out all non-agricultural uses of diazinon. (On December 5, 2000, the U.S. EPA announced a phase out of all non-agricultural uses of Diazinon (See Exhibit M.1, U.S. EPA, Office of Prevention, Pesticides, and Toxic Substances, Diazinon Revised Risk Assessment and Agreement with Registration, Revised January 2001). This phase out required all retail sales of diazinon for indoor uses to cease as of December 31, 2002. Sales of diazinon for outdoor non-agricultural uses were required to cease as of December 31, 2004. Outdoor non-agricultural uses include home lawn and garden applications as well as other non-agricultural outdoor uses such as application around the outside of buildings. The U.S. EPA's action will essentially eliminate all urban usage of diazinon, once existing stocks of this pesticide have been used up. The only remaining uses of diazinon are for outdoor agricultural applications.

To reiterate, the Districts recommend that the SWRCB do not list Santa Clara River Reach 5 for diazinon because the exceedance frequency of the available data does not warrant listing per the Listing Policy. (If the SWRCB still decides to list diazinon for Reach 5 of the Santa Clara River notwithstanding the additional data and analysis provided herein demonstrating attainment of the CDFG diazinon threshold, this listing should be placed in the Water Quality Limited Segments Being Addressed category of the 303(d) list because an existing regulatory program is expected to result in attainment of the CDFG diazinon threshold.)

WATER SEGMENT: **Santa Clara River Reach 6**

POLLUTANT: **Diazinon**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **Water segment should be placed in the Water Quality Limited Segments Being Addressed category of the 303(d) list because an existing regulatory program is expected to result in the attainment of the water quality standard.**

The SWRCB is proposing to list Santa Clara River Reach 6 under the Water Quality Limited Segments category of the 303(d) list. While the Districts agree that current water quality data do not indicate that the selected evaluation guideline, the CDFG chronic fresh water Hazard Assessment criteria for the protection of aquatic life (0.10 ug/L) is being attained, the Districts disagree with the SWRCB's proposed placement of this waterbody in the Water Quality Limited Segments category of the 303(d) list. The Districts believe it is appropriate to place this water segment-pollutant combination under the Water Quality Segments Being Addressed category of the 303(d) list because an action taken by the U.S. EPA is addressing diazinon in urban water bodies and this action can be expected to result in the attainment of the evaluation guideline. Therefore, establishment of a TMDL for diazinon is not warranted. Specifically, on December 5, 2000, the U.S. EPA announced a phase out of all non-agricultural uses of diazinon (See Exhibit M.1, U.S. EPA, Office of Prevention, Pesticides, and Toxic Substances, Diazinon Revised Risk Assessment and Agreement with Registration, Revised January 2001). This phase out required all retail sales of diazinon for indoor uses to cease as of December 31, 2002. Sales of diazinon for outdoor non-agricultural uses were required to cease as of December 31, 2004. Outdoor non-agricultural uses include home lawn and garden applications as well as other non-agricultural outdoor uses such as application around the outside of buildings.

The U.S. EPA's action will essentially eliminate all urban usage of diazinon, once existing stocks of this pesticide have been used up. The only remaining uses of diazinon are for outdoor agricultural applications, and there is little agriculture, if any, in Reach 6 of the Santa Clara River. To quantify the impact of the phase out to date, data collected by the California Department of Pesticide Regulation (DPR) on pesticide usage were examined. All agricultural usage of pesticide and all pesticide applications by certified applicators must be reported to DPR. In 2000, before the phase-out was announced, there were 218,318 pounds of reported diazinon usage in Los Angeles County for non-farming applications (primarily structural pest control but also small amounts for landscape maintenance, nurseries, public health, and regulatory pest control). In 2004, the last year for which data is available, the amount used in Los Angeles County for the same applications had dropped dramatically to 903 pounds, representing a usage decrease of over 99.6%. Because diazinon will no longer be used in urban areas once existing stocks have been used, it will no longer be entering Reach 6 of the Santa Clara River and diazinon concentrations in this water segment should decrease accordingly.

The U.S. EPA's phase out of urban uses of diazinon is an existing regulatory program that is reasonably expected to result in attainment of the diazinon evaluation guideline within a reasonable, specified time frame. Therefore, it is most appropriate to place this water segment in the Water Quality Limited Segments Being Addressed category.

WATER SEGMENT: **San Gabriel River Reach 2**

POLLUTANT: **Lead, Zinc**

PROPOSED DECISION: **Delist**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should be removed from the section 303(d) list because applicable water quality standards for the pollutant are not exceeded.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segments are not impaired, and therefore should be delisted.**

The Districts agree with the SWRCB's decision to delist San Gabriel River Reach 2 for lead and zinc. Water quality data available for Reach 2 of the San Gabriel River indicate that the water segment meets the criteria for delisting under Section 4.1 of the Listing Policy for both lead and zinc.

In response to the SWRCB Public Solicitation of Water Quality Data and Information for the 2004 Clean Water Act 303(d) List (Public Solicitation), the Districts submitted lead and zinc data collected from the Los Angeles County Department of Public Work's (LADPW) mass emission station S14, located downstream of the crossing of San Gabriel River Parkway within Reach 2 of the San Gabriel River.

Out of 63 lead measurements, there were only 4 exceedances of the CTR criteria for lead. Out of 63 zinc measurements, only 3 samples exceeded the CTR criteria for zinc. This meets the criteria for delisting, per Table 4.1 of the Listing Policy. In addition, as described in the Districts' data submittal for the Public Solicitation, all of these exceedances occurred during the 1997-1998 El Niño event, and therefore are not representative of normal seasonal variability. Section 6.1.5.3 of the Listing Policy states, "Samples should be representative of the critical timing that the pollutant is expected to impact the water body. Samples used in the assessment must be temporally independent. If the majority of samples were collected on a single day or during a short-term natural event (e.g., a storm, flood, or wildfire), the data shall not be used as the primary data set supporting the listing decision." Therefore, the Districts agree with the SWRCB that lead and zinc should be delisted for Reach 2 of the San Gabriel River.

WATER SEGMENT: **San Gabriel River Reach 2**

POLLUTANT: **Copper**

PROPOSED DECISION: **Do Not Delist**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should not be removed from the section 303(d) list because applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **Available receiving water data shows that the water segment is not impaired; therefore, this water body should be delisted for copper.**

The Districts disagree with the SWRCB's decision not to delist San Gabriel River Reach 2 for copper. Water quality data available for Reach 2 of the San Gabriel River indicates that the water segment meets the criteria for delisting under Section 4.1 of the Listing Policy for copper, and therefore should be removed from the 303(d) list.

In response to the SWRCB Public Solicitation of Water Quality Data and Information for the 2004 Clean Water Act 303(d) List (Public Solicitation), the Districts submitted copper data collected from the Los Angeles County Department of Public Work's (LADPW) mass emission station S14, located downstream of the crossing of San Gabriel River Parkway within Reach 2 of the San Gabriel River.

Out of 62 copper measurements, there were only 4 exceedances of the CTR criteria for copper. This exceedance frequency meets the criteria for delisting, per Table 4.1 of the Listing Policy. In addition, as described in the Districts' data submittal for the Public Solicitation, all of these exceedances occurred during the 1997-1998 El Niño event, and therefore are not representative of normal seasonal variability. Section 6.1.5.3 of the Listing Policy states, "Samples should be representative of the critical timing that the pollutant is expected to impact the water body. Samples used in the assessment must be temporally independent. If the majority of samples were collected on a single day or during a short-term natural event (e.g., a storm, flood, or wildfire), the data shall not be used as the primary data set supporting the listing decision."

The Fact Sheet for this listing (draft Staff Report, Do Not Delist, Los Angeles Region, pg. 461) cites an additional 26 samples taken from the same location, out of which there are 7 exceedances. The time period (1997-2000) given in the Fact Sheet appears to overlap with the dataset submitted by the Districts, and thus it is unclear whether these 7 exceedances are distinct from the 4 exceedances in the original dataset or if an error has been made and the four valid exceedances were double-counted.

WATER SEGMENTS: **Coyote Creek, San Gabriel River Reach 2, Santa Clara River Reach 5, Santa Clara River Reach 6**

POLLUTANT: **Nitrite, Aluminum**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **The Municipal and Domestic Supply (MUN) beneficial use is not designated for this waterbody. Therefore, water quality objectives to protect the MUN beneficial use cannot be applied to these waters, and should not be used as a basis for listing.**

The Draft Staff Report includes an evaluation of several waterbodies for impairment related to the Municipal and Domestic Supply (MUN) beneficial use. Many of these waters are actually designated MUN*, not MUN. The MUN* beneficial use is a conditional designation that has no legal effect, and therefore should not be used as a basis for impairment determination. U.S. EPA has recognized this distinction in past correspondence to the SWRCB, "Thus, the waters identified with a "*" in Table 2-1 [of the 1994 Los Angeles Basin Plan] do not have MUN as a designated use until such time as the State undertakes additional study and modifies its Basin Plan. Because this conditional use designation has no legal effect, it does not constitute a new water quality standard subject to U.S. EPA review under section 303(c)(3) of the Clean Water Act." (See Exhibit P.1, Letter from Alexis Strauss [U.S. EPA] to Celeste Cantu [SWRCB], dated Feb. 15, 2002.)

Because the MUN* conditional designation has been determined by U.S. EPA to have no legal effect, water quality objectives associated with the MUN beneficial use should not be applied to MUN* waters. The Los Angeles Basin Plan specifically describes Maximum Contaminant Levels (MCLs) as applicable criteria for waters designated MUN, "Water designated for use as Domestic or Municipal Supply (MUN) shall not contain concentrations of chemical constituents in excess of the limits specified in the following provisions of Title 22 of the California Code of Regulations which are incorporated by reference into this plan: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), and Table 64444-A of Section 64444 (Organic Chemicals)...". (See Los Angeles 1994 Basin Plan at pg. 3-8.) Table 3-5 of the Basin Plan lists the MCLs for inorganic chemicals for waters designated MUN, including the MCLs for aluminum and nitrite. Therefore, proposed listings for Coyote Creek (nitrite), San Gabriel River Reach 2 (aluminum), Santa Clara River Reach 5 (aluminum) and Santa Clara River Reach 6 (nitrite) should be removed since the water quality objectives used as the basis for listing, in this case the MCLs for drinking water, are applicable only to waters designated MUN, and are not applicable to waters designated MUN*. (This comment also applies to the "do not list" fact sheet for aluminum in Coyote Creek.) (Notwithstanding the fact that MUN does not apply to Coyote Creek, the available nitrite data for Coyote Creek, shown in Table P.1 and Figure P.1, demonstrate that the water body is in attainment with the Basin Plan objectives for nitrite.)

In addition, several Fact Sheets in the Draft Staff Report where the MUN beneficial use was misapplied, but listing was not proposed, should also be reviewed and corrected accordingly. For example, Coyote Creek was not proposed to be listed for aluminum because it did not meet the minimum number of exceedances required to list (Draft Staff Report, Do Not List, pg. 327). However, the actual reason this waterbody should not be listed is because there are no applicable aluminum standards, since the waterbody is not designated MUN.

Based upon the Districts' review of the Fact Sheets, it appears that several other water bodies in the Los Angeles Region may have had the MUN beneficial use misapplied (i.e., Burbank Western Channel, Dominguez Channel, Los Cerritos Channel, etc.) The Districts therefore request that the SWRCB undertake a thorough review of all categories of Fact Sheets (i.e., List, Do Not List, Delist, Do Not Delist) and remove all references and/or comparisons to water quality objectives associated with the MUN beneficial use for waters having the conditional designation MUN*.

WATER SEGMENT: Coyote Creek

POLLUTANT: **Selenium**

PROPOSED DECISION: **Delist**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should be removed from the section 303(d) list because applicable water quality standards for the pollutant are not exceeded.**

DISTRICTS' RESPONSE: **Agree; Available receiving water data show that the water segment is not impaired; therefore, this water body should be delisted for selenium.**

The Districts agree with the SWRCB's decision to delist Coyote Creek for selenium. Water quality data available for Coyote Creek indicate that the water segment meets the criteria for delisting under Section 4.1 of the Listing Policy.

The Districts are providing additional data to the SWRCB to demonstrate continued attainment with the water quality standard. Table Q.1 and Figure Q.1 show total selenium data for Coyote Creek collected at the Districts' three receiving water stations located in the reach: 1) RA1, located upstream of the discharge from the Long Beach WRP; 2) RA, located immediately downstream of the discharge to Coyote Creek; and 3) R9E, located at the end of Coyote Creek (at the end of the concrete lined channel) just above the San Gabriel River estuary (please refer to Figure 1 for WRP and station locations) from July 2001 through July 2005.

Out of 55 samples collected by the Districts for the reach, only 2 samples exceeded the total selenium criteria of 5 ug/L. The Fact Sheet cites additional samples collected by LADPW at the mass emission station (S13) located on Coyote Creek above the Long Beach WRP. Four out of a total of 64 of the LADPW samples exceeded the chronic selenium criterion. When these data are combined, a total of 119 samples are available for the reach. The resulting exceedance frequency is 6 exceedances out of a total of 119 samples. This frequency satisfies the criteria for delisting under Section 4.1 of the Listing Policy, and therefore the Districts agree with the SWRCB's decision to remove this water segment from the 303(d) list.

WATER SEGMENT: **Coyote Creek**

POLLUTANT: **Zinc, Copper, Lead**

PROPOSED DECISION: **Delist (Zinc), Do Not Delist (Copper, Lead)**

SWRCB STAFF RECOMMENDATION: **Zinc: Water-body pollutant combination should be removed from the section 303(d) list because applicable water quality standards for the pollutant are not exceeded.**

Copper, Lead: Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.

DISTRICTS' RESPONSE: **Zinc: Agree with Delisting; Available receiving water data show that the water segment is not impaired.**

Copper, Lead: Available receiving water data show that the water segment is not impaired: therefore, this water body should be delisted for copper and lead.

All: The Districts strongly encourage the SWRCB to consider total metals data as an additional line of evidence when evaluating potential delistings for metals.

The Districts agree with the SWRCB's decision to remove Coyote Creek from the 303(d) list for zinc. Water quality data available for Coyote Creek indicate that the water segment meets the criteria for delisting under Section 4.1 of the Listing Policy.

The Districts disagree however, with the SWRCB's decision not to utilize total metals data when evaluating delistings for metals. The Fact Sheets indicate that some of the data reported "could not be compared against any applicable criteria or WQO established for total [metal] for the protection of any beneficial use in fresh water." (Draft Staff Report, Vol. II, Los Angeles Region, pg. 269 and Do Not Delist, Los Angeles Region, pg. 314). The SWRCB is referring in the Fact Sheets to total metals data submitted by the Districts in response to the Public Solicitation. The Districts acknowledge that in the California Toxics Rule (CTR), water quality criteria for metals are expressed as dissolved metals because this is considered the bioavailable fraction and therefore is the most appropriate way to regulate metals. However, the Districts are required by the Regional Board to analyze total metals (i.e., as a requirement of the Districts' NPDES permits' Monitoring and Reporting Programs), and therefore the Districts collect and submit total metals data.

The Draft Staff Report indicates that total metals data are not being considered because the CTR metals criteria are based on dissolved metals, and it is inappropriate to compare the total metals data to the dissolved criteria. Studies can be done to develop a translator to characterize the dissolved metal fraction on a site-specific basis, but obviously the concentration of a dissolved metal is always less than the total concentration of that metal for any particular sample. The Districts believe that utilizing total metals data in a delisting context is not only technically valid, but also can be considered conservative; if a total metals value is below the water quality criteria, then obviously the dissolved fraction would also be below the criteria, and likely would be even lower. The totals metal data represent an available data source that should be used to determine delistings; it is almost a negligent action to not use this data when the total metals data confirm a delisting.

The Districts believe that the inclusion of total metals data in a dataset for delisting purposes provides better temporal representation, and, in this case, will also improve spatial representation. For example, the Districts sample for total metals year-round in dry weather. In many water segments, most of the dissolved metals data available is stormwater data collected only in wet weather. Therefore, without the total metals data, water quality conditions would remain uncharacterized for much of the year. Additionally, in this water body, the stormwater data are collected at only one location in the reach, whereas the Districts measure total metals at three additional locations within the reach. In general, utilizing available total metals data for delisting purposes will provide the SWRCB with a much larger dataset, providing for a more robust dataset on which to base important listing decisions. Therefore, the Districts believe it is appropriate for the SWRCB to consider total metals data within a weight of evidence context when evaluating potential delistings for metals, and we request that the SWRCB include the total recoverable metals data that were submitted by the Districts for the San Gabriel River watershed.

It should be noted, however, that the same application of total metals data is not necessarily technically appropriate when evaluating potential listings for metals. As discussed above, the dissolved concentration for a metal is always less than the total metal concentration for any particular sample. Therefore, when a total metal concentration is below a water quality criterion, it is certain that the dissolved concentration is also below the water quality criterion. When a total metals concentration is above a water quality criterion, however, it is uncertain whether or not the dissolved concentration will also be above the criterion, because the actual dissolved concentration is unknown.

The consideration of total metals data when evaluating the metals listings for Coyote Creek is a particularly important and timely issue because TMDLs for metals in the San Gabriel River watershed are currently under development by the Regional Board, and are scheduled for completion, pursuant to a consent decree deadline, by March 2007. The use of the total recoverable metals data can mean the difference between listing and delisting a waterbody (and thus the development of a TMDL or not). Districts' data for total zinc, copper, and lead during the period July 2001 through July 2005 are provided in Tables R.1, R.2 and R.3, respectively. The data are shown graphically on Figures R.1, R.2, and R.3. Total zinc, copper and lead data for Coyote Creek are collected by the Districts at three receiving water stations: 1) RA1, located upstream of the discharge from the Long Beach WRP; 2) RA, located immediately downstream of the discharge to Coyote Creek; and 3) R9E, located at the end of Coyote Creek (at the end of the concrete lined channel) just above the San Gabriel River estuary (please refer to Figure 1 for WRP and station locations). When the total metals data for zinc, copper, and lead are combined with the dissolved metals data, the resulting exceedance frequency for zinc is 6 out of a total 175 samples (1 exceedance out of 111 total zinc samples). The combined exceedance frequency for copper is 19 out of 174 total samples (2 exceedances out of 111 total copper samples). The combined exceedance frequency for lead is 7 out of a total 161 samples (1 exceedance out of 97 total lead samples). The resulting exceedance frequencies appear to satisfy the criteria for delisting under Section 4.1 of the Listing Policy. (To reiterate, this was a conservative analysis, in which the dissolved fraction of metal was overestimated and assumed to be the total measured concentration and a delisting is still called for despite the conservative assumptions.) If the total metals data are not considered, copper and lead may remain listed, and a TMDL would need to be developed (where it does not appear to be warranted). It is evident that this decision regarding the consideration of total metals data has a potentially large impact, considering the resources that will be required for TMDL development and implementation. The Districts therefore urge the State Board to consider total metals data as an additional line of evidence when evaluating water segments for potential delisting.

WATER SEGMENT: **Santa Clara River Reach 5**

POLLUTANT: **Polychlorinated biphenyls (PCBs)**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment does not meet the minimum criteria for listing, and data used for listing are not temporally representative; therefore, this water body should not be listed for PCBs.**

The Districts disagree with the SWRCB's proposed listing of Santa Clara River Reach 5 as impaired by PCBs. Based on the Districts' review of available water quality data for the reach, only 1 sample out of a total 2 samples exceed the CTR chronic criterion of 0.014 ug/L (The Fact Sheet for this proposed listing incorrectly reports the criteria as 0.014 mg/L. See Draft Staff Report Vol. II, pg. 179). This does not meet the minimum number of exceedances required for listing per Table 3.1 (SWRCB Listing Policy, pg. 9) of the Listing Policy.

Available data for PCBs in Santa Clara River Reach 5 are provided in Table S.1. The data in the table include Districts' data from samples collected at three receiving water stations in Reach 5 (RC, RD and RE; please refer to Figure 2 for receiving water station locations) from August 1996 through February 2005, in addition to samples collected for the SWRCB's Surface Water Ambient Monitoring Program (SWAMP) in October and November 2001. All Districts' data for PCBs for this period are non-detect; however the detection limit is above the applicable water quality criterion of 0.014 ug/L PCBs.

The Districts were only able to locate 2 samples for PCBs in the SWAMP database (samples were collected on October 30, 2001 and November 13, 2001). It appears that the SWAMP sample collected on October 30, 2001 exceeds the CTR chronic criterion for PCBs. However, the SWAMP sample collected on November 13, 2001 does not exceed 0.014 ug/L total PCBs (all but 2 congeners were non-detect). A single exceedance is insufficient to place a water segment on the 303(d) list, based on the minimum number of exceedances given in Table 3.1 of the Listing Policy. Therefore the Districts recommend that the SWRCB not list Santa Clara River Reach 5 for PCBs.

In addition, both SWAMP samples were taken during a single season (wet season) in 2001. This does not meet the recommended criteria for temporal representation in the Listing Policy, and therefore should not be used as the sole basis for listing. The Listing Policy states, "In general, samples should be available from two or more seasons or from two or more events when effects or water quality exceedances would be expected to be clearly manifested." (SWRCB Listing Policy, pg. 23). Therefore, the Districts do not believe that sufficient information is available at this time to warrant placing Santa Clara River Reach 5 on the 303(d) list for PCBs.

WATER SEGMENT: **Santa Clara River Reach 5**

POLLUTANT: **Nitrate + Nitrite**

PROPOSED DECISION: **Do Not Delist**

SWRCB STAFF RECOMMENDATION: **Water body should be placed in the Water Quality Limited Segments Being Addressed category of the 303(d) list because a TMDL has been approved by U.S. EPA and an implementation plan has been approved.**

DISTRICTS' RESPONSE: **Available receiving water data show that water segment is no longer impaired; therefore, this water body should be delisted for nitrate + nitrite.**

The Districts disagree with the SWRCB's decision not to delist Santa Clara River Reach 5 for nitrate + nitrite. The water quality data available for Reach 5 of the Santa Clara River indicate that the water quality standard is attained. Based on the Districts' analysis of available water quality data for the reach, only 7 samples out of a total 101 samples exceed the nitrate + nitrite water quality objective of 5 mg/L. This meets the criteria for delisting under Section 4.2 of the Listing Policy. Therefore, this listing should be removed from the 303(d) list.

Available nitrate+nitrite data for Santa Clara River Reach 5 includes: 1) Districts' data from samples collected at three receiving water stations in Reach 5 (RC, RD, and RE; please refer to Figure 2 for receiving water station locations) from December 2003 through July 2005; 2) data from the Newhall Ranch WRP pre-NPDES permitting program collected in Reach 5 near the Los Angeles/Ventura County Line from May 2004 through November 2005; and 3) data collected by United Water Conservation District (UWCD) in Reach 5 at Blue Cut near the Los Angeles/Ventura County Line from September 2003 through January 2005. The data from the Districts, Newhall Ranch, and UWCD are provided in Tables T.1 (a,b,c), T.2 and T.3, respectively. The combined dataset is shown graphically on Figure T.1. A subset of both the Districts' data (December 2003 through May 2004) and the UWCD data (September 2003 through April 2004) were submitted to the SWRCB in response to the Public Solicitation for Water Quality Data and Information for the 2004 Clean Water Act Section 303(d) List. More recent data from Districts' receiving water stations RC, RD, and RE were submitted to the Regional Board as part of the Districts' receiving water Monitoring and Reporting Program for the Valencia WRP. The Newhall Ranch WRP data were also submitted to the Regional Board as part of their pre-NPDES permitting activities. Therefore, all of the data contained in Tables T.1 (a,b,c), T.2 and T.3 should be considered existing and readily available water quality data as described in Volume I of the Draft Staff Report (Draft Staff Report Vol. I, pg. 4). A total of 101 samples were collected for nitrate + nitrite in Reach 5. (It should be noted that a total of 93 individual samples were collected by Newhall Ranch, however several of these measurements were not averaged consistent with Section 6.1.5.6 of the Listing Policy (i.e., "If the averaging period is not stated for the standard, objective, criterion or evaluation guideline, then the samples collected less than 7 days apart shall be averaged.") If the data are averaged correctly, 38 measurements taken by Newhall Ranch remain.)

Out of a total of 101 samples for Reach 5, only 7 exceeded the 5 mg/L nitrate + nitrite water quality objective. The Fact Sheet for this listing erroneously links the 5 mg/L nitrate + nitrite objective to the protection of drinking water supplies (Draft Fact Sheet, Do Not Delist, Los Angeles Region, pg. 474) and the MUN beneficial use. The Santa Clara River Reach 5 is not designated MUN (please refer to the comments related to the MUN* conditional designation in this attachment.), and furthermore the nitrate + nitrite water quality objective of 5 mg/L was set based on background levels, not to protect a specific beneficial use. The 1975 Basin Plan included the nitrate + nitrite surface water quality objectives for the Santa Clara River Watershed, and provided background water quality data as the basis for these objectives. Table 4-1, pages I-4-10 and I-4-11 of the 1975 Basin Plan (See Attachment K.1 of the Districts' comments to the SWRCB on the 2002 303(d) list, dated June 14, 2002). For these reasons, it is appropriate to use Table 4.2 (Maximum number of measured exceedances allowed to remove a water segment from the section 303(d) list for conventional or other pollutants, SWRCB Listing Policy, pg. 15) of the Listing Policy to determine the maximum number of exceedances for delisting. Table 4.2 indicates that a water segment should be delisted if there are 16 or fewer exceedances for a sample size of 101 samples.

Again, the Districts would like to emphasize that, while it is true that a TMDL has been developed and implemented for nitrate + nitrite for Reach 5, this water segment should now be delisted because the available water quality data for the reach indicate that the water body attains the water quality standard. Section 2.2 of the Listing Policy states that waters shall be removed from the Water Quality Limited Segments Being Addressed category, "if it is demonstrated in accordance with section 4 [of the Listing Policy] that water quality standards are attained."(SWRCB Listing Policy, pg. 3)

WATER SEGMENT: **Santa Clara River Reach 6**

POLLUTANT: **Nitrite**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem. However there has been a remedial program put in place to address this problem.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired, and the data used as the basis for proposed listing are not representative of current water quality conditions. Therefore, this segment should not be listed for nitrite.**

The Districts disagree with the SWRCB's proposed listing of Santa Clara River Reach 6 as impaired by nitrite. The data cited in the Fact Sheet (Draft Staff Report, Vol. II, Los Angeles Region, pg. 188) as the basis for the proposed listing were collected before conversion of the Districts' WRPs in the Santa Clara River watershed to nitrification-denitrification (NDN) mode. Nitrite measurements taken in the Santa Clara River before the implementation of NDN processes at the WRPs are not reflective of current water quality conditions.

The Saugus WRP, which discharges to Reach 6 of the Santa Clara River, was fully converted to NDN mode on September 11, 2003. NDN processes significantly reduce nitrogen concentrations in treated effluent discharged to Reach 6. In a Districts' letter to the SWRCB dated June 14, 2004, in response to the SWRCB's Public Solicitation of Water Quality Data and Information for the 2004 Clean Water Act Section 303(d) List, the Districts' provided the SWRCB with nitrate and nitrite data collected from September 2003 through May 2004 (see pg. 5 and Table B.1). These water quality data are reflective of water quality conditions since the conversion to NDN mode of Districts' facilities discharging to the Santa Clara River. Water quality data collected before NDN conversion (i.e., before September 2003) should not be used as a basis for listing. Section 6.1.5.3 of the Listing Policy states, "If the implementation of a management practice(s) has resulted in a change in the water body segment, only recently collected data [since the implementation of the management measure(s)] should be considered." (SWRCB Listing Policy, pg. 23). Therefore the data used as the basis of the proposed listing, cited in the Fact Sheet as collected between 1997 and 2002, should be excluded from the data analysis.

Table U.1 and Figure U.1 show nitrite measurements taken since the conversion of Districts' facilities in the Santa Clara River watershed to NDN mode (i.e., September 2003 to July 2005). The post-NDN data shows that the nitrite water quality objective of 1 mg/L is being attained. Out of 43 samples collected in Reach 6, none of the samples exceed the water quality objective. Samples were taken from stations RB and RB01 (at the upstream and downstream ends of Reach 6, respectively; please refer to Figure 2 for receiving water station locations). Since the post-NDN water quality data show that the water quality objective is not exceeded, the Districts request that the SWRCB not list the Santa Clara River Reach 6 as impaired for nitrite.

WATER SEGMENT: **Santa Clara River Reach 6**

POLLUTANT: **Nitrate + Nitrite**

PROPOSED DECISION: **Do Not List**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should not be placed on the section 303(d) list because applicable water quality standards for the pollutant are not exceeded.**

DISTRICTS' RESPONSE: **Agree; Available receiving water data show that the water segment is not impaired and therefore this water body should not be listed for nitrate + nitrite.**

The Districts agree with the SWRCB's decision not to list Santa Clara River Reach 6 for nitrate + nitrite. Water quality data available for Reach 6 of the Santa Clara River indicate that the water quality standard is attained. Based on the Districts' analysis of current water quality data for the reach, none of the samples exceed the nitrate + nitrite water quality objective of 10 mg/L. This does not meet the criteria for listing under Section 3.2 of the Listing Policy. Therefore, this water segment should not be placed on the 303(d) list.

Available nitrate + nitrite data for Santa Clara River Reach 6 consist of Districts' data from samples collected at two stations in Reach 6 (RB and RB01, please refer to Figure 2 for receiving water station locations) from December 2003 through July 2005. The data are provided in Tables V.1a, and V.1b, and are shown graphically on Figure V.1. A subset of this data (December 2003 through May 2004) was submitted to the SWRCB in response to the Public Solicitation for Water Quality Data and Information for the 2004 Clean Water Act Section 303(d) List. Data previously submitted in response to the Public Solicitation showed attainment of the water quality objective at that time. More recent data are being provided here to demonstrate continued attainment of the water quality objective, consistent with the SWRCB proposal not to place this water segment on the 303(d) list.

It should be noted that a portion of the data cited in the Fact Sheet (Draft Staff Report, Do Not List, Los Angeles Region, pg. 487) was collected before conversion of the Districts' WRPs in the Santa Clara River watershed to nitrification-denitrification (NDN) mode. As discussed in the Districts' comments regarding the proposed listing of nitrite for Reach 6 of the Santa Clara River, nitrogen measurements taken in the Santa Clara River before the implementation of NDN processes are not reflective of current water quality conditions. The data provided in Tables V.1a and V.1b and Figure V.1 were collected after the conversion to NDN mode of Districts' facilities discharging to the Santa Clara River and are thus reflective of current water quality conditions. The post-NDN data shows that the nitrate + nitrite water quality objective of 10 mg/L is being attained. Out of 39 samples collected in Reach 6, none of the samples exceed the water quality objective. Since the post-NDN water quality data show that the water quality objective is attained, the Districts agree that the SWRCB should not list the Santa Clara River Reach 6 as impaired for nitrite + nitrate.

WATER SEGMENTS: **Santa Clara River Reach 5 and Santa Clara River Reach 6**

POLLUTANT: **Phosphate**

PROPOSED DECISION: **Do Not List**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should not be placed on the section 303(d) list because it cannot be determined if applicable water quality standards are exceeded.**

DISTRICTS' RESPONSE: **Agree**

The Districts support the SWRCB's decision not to list Santa Clara River Reaches 5 and 6 as impaired for phosphate. The Districts believe this decision is consistent with the provisions contained in the Listing Policy. The SWRCB has determined that there is no applicable guideline for phosphate that meets the requirements for the Evaluation Guideline Selection Process (Section 6.1.3) of the Listing Policy.

As the SWRCB is aware, development of appropriate nutrient water quality criteria for California is currently underway. The Districts agree that the SWRCB should not apply numeric nutrient guidelines that have not been shown to be appropriate for use in a specific hydrographic unit. To interpret narrative water quality objectives, the Listing Policy states that guidelines must be applicable and protective of the specific beneficial use (which the Fact Sheet indicates are warm freshwater habitat and wildlife habitat for Santa Clara River Reaches 5 and 6), scientifically-based and peer reviewed, and identify a range above which impacts occur and below which no or few impacts are predicted (SWRCB Listing Policy, pg. 21). The Districts agree that the 1986 U.S. EPA recommended limit referred to in the Fact Sheet (0.01 mg/L) does not meet this criteria.

The Fact Sheet references U.S. EPA's Gold Book. The only guideline for phosphorus recommended by U.S. EPA in the Gold Book is 0.1 ug/L for elemental phosphorus and applies to estuaries and marine environments only. In U.S. EPA's Red Book of Water Quality Criteria published in 1976 (the Gold Book recommendations from U.S. EPA in 1986 are just taken from the 1976 Red Book), no limit is set for phosphate phosphorus, but the following statement is made: "A desired goal for the prevention of plant nuisances in streams or other flowing waters not discharging directly to lakes or impoundments is 100 ug/L total P." This statement is based on one reference, published in 1973.

Given the scant evidence behind the statement from U.S. EPA and the fact that the guideline quoted for phosphate phosphorus in the Fact Sheet is not even an official recommendation, the Districts agree that the 1986 U.S. EPA unofficially recommended limit does not meet the criteria in the Listing Policy on which to consider impairments.

WATER SEGMENT: **Santa Clara River Reach 6**

POLLUTANT: **Chlorpyrifos**

PROPOSED DECISION: **List**

SWRCB STAFF RECOMMENDATION: **Applicable water quality standards are exceeded and a pollutant contributes to or causes the problem.**

DISTRICTS' RESPONSE: **Available receiving water data show that the water segment is not impaired for chlorpyrifos; therefore, this water body should not be listed.**

The Districts disagree with the SWRCB's proposed listing of Santa Clara River Reach 6 as impaired by chlorpyrifos. Based on the Districts' review of available water quality data for the Reach 6, none of the samples exceed the chlorpyrifos evaluation guideline applied, the chronic CDFG Aquatic Life guideline of 0.05 ug/L. It appears that the chlorpyrifos data collected by the SWAMP program and cited in the Fact Sheet (Draft Staff Report, Vol.II, Los Angeles Region, pg. 185) were actually collected in Bouquet Canyon Creek, a tributary to the Santa Clara River, and not in Reach 6 itself. A review of the data obtained from the SWAMP database shows that sampling site STCBQT (the sampling location referred to in the Fact Sheet) is located on the Bouquet Canyon Creek tributary. The SWAMP chlorpyrifos data from site STCBQT are provided in Table W.1.

The Districts were unable to locate any chlorpyrifos data for Reach 6 of the Santa Clara River in the SWAMP database. However, water quality data collected in Reach 6 by the Los Angeles County Department of Public Works (LACDPW) from August 2002 through April 2003 show that none of the 6 samples exceeded the CDFG Aquatic Life guideline for chlorpyrifos. The LACDPW chlorpyrifos data are provided in Table W.2 and shown graphically on Figure W.1. The LACDPW data were collected at sampling site S29, which is located at the Old Road Bridge, at the downstream end of Reach 6 (near Districts' sampling site RB-1; refer to Figure 2 for the location of this site).

Because the available receiving water data for Santa Clara River Reach 6 show no exceedances of the chronic CDFG Aquatic Life guideline for chlorpyrifos, this water segment should not be listed.

WATER SEGMENT: **Santa Monica Bay Offshore/Nearshore**

POLLUTANT: **Chlordane (sediments), PAHs (sediments)**

PROPOSED DECISION: **Do Not Delist**

SWRCB STAFF RECOMMENDATION: **Water-body pollutant combination should not be removed from the section 303(d) list because it cannot be determined if applicable water quality standards are attained.**

DISTRICTS' RESPONSE: **Available sediment data show that the water segment is not impaired for chlordane and PAHs in sediments; therefore, this water segment should be delisted.**

The Districts disagree with the SWRCB's decision not to delist Santa Monica Bay Offshore/Nearshore for chlordane and PAHs in sediments. Available data from the Southern California Bight Regional Monitoring Surveys conducted in 1998 (Bight'98) and 2003 (Bight'03) provide a sufficient number of samples to demonstrate that chlordane and PAHs do not occur in sediments in this water body at concentrations that exceed the sediment quality evaluation guidelines identified in section 6.1.3 of the Listing Policy.

The Districts submitted chlordane and total PAH data for Santa Monica Bay in response to the SWRCB Public Solicitation in June 2004 (see Table E.1). Data from a total of 23 sites within Santa Monica Bay sampled for the Southern California Coastal Water Research Project (SCCWRP) Southern California Bight 1998 Regional Monitoring Program (Bight '98) were submitted. Out of the 23 sediment samples collected from Santa Monica Bay, none of the samples exceeded the Effects Range Median (ERM) sediment quality guideline for chlordane (6.0 ng/g) or total PAHs (44,792 ng/g). Notwithstanding the fact that sediment quality guidelines such as ERMs are based solely on coincidental occurrence between observed adverse biological effects and potentially toxic substances in aquatic sediments, and no cause-and effect relationship should be implied, ERMs nonetheless have been identified by the SWRCB in the Listing Policy as acceptable evaluation guidelines to represent standards attainment or beneficial use protection for marine sediments (Listing Policy, pg. 20).

The Fact Sheets for the chlordane and PAH listings (Draft Staff Report, Do Not Delist, Los Angeles Region, pgs. 476 and 480, respectively) acknowledged that although none of the samples exceeded the sediment evaluation guidelines for chlordane and total PAHs, a minimum of 28 samples is required before a pollutant can be considered for removal from the 303(d) list, per Table 4.1 of the Listing Policy.

Additional sediment data for chlordane and total PAHs are presented in Tables X.1, X.2 and X.3. The data presented in Tables X.1, X.2 and X.3 are from the SCCWRP Southern California Bight 2003 Regional Monitoring Program (Bight '03), and recently became available to Bight '03 participants, including the SWRCB and the Los Angeles Regional Water Quality Control Board. In the 2003 regional survey, another 29 randomly allocated sites between 5- and 200-meter isobaths within Santa Monica Bay were sampled for sediment chlordane and total PAHs. Out of the additional 29 sediment samples for chlordane taken in 2003, none exceeded the ERM. Likewise, for total PAHs, none of the 29 additional sediment samples from Bight '03 exceeded the ERM for total PAHs. Therefore, the combined data set from the Bight '98 and Bight '03 regional surveys indicates that out of a combined total of 52 samples for chlordane, none exceed the sediment quality guideline being applied by the SWRCB. The combined dataset for total PAHs shows that out of a total 52 sediment samples, none exceed the applicable sediment quality guideline. According to Table 4.1 of the Listing Policy, this satisfies the requirements for delisting, and therefore both the chlordane and total PAHs sediment listings for Santa Monica Bay should be removed from the 303(d) list.

WATER SEGMENT: **Cabrillo Beach (Outer), Abalone Cove Beach, Bluff Cove Beach, Long Point Beach, Malaga Cove Beach, Portuguese Bend Beach, Royal Palms Beach, Whites Point Beach**

POLLUTANT: **High Coliform Count (Cabrillo Beach [Outer]), Beach Closures (All)**

SWRCB DECISION: **Do Not Delist (Cabrillo Beach, High Coliform Count); Delist (All, Beach Closures)**

SWRCB STAFF RECOMMENDATION: **Cabrillo Beach: Water body and pollutant (coliform) should be placed in the Water Quality Limited Segments Being Addressed category of the 303(d) list because a TMDL has been approved by USEPA and an implementation plan has been approved.**

All: Water body should not be placed in the Water Quality Limited Segments Being Addressed Category of the 303(d) list because beach closures are not pollutants and it is uncertain if the closures are backed by data showing exceedances of water quality standards.

DISTRICTS' RESPONSE: **Disagree with decision not to delist Outer Cabrillo Beach for Coliform. Agree with decision to delist all for Beach Closures. Available water quality data indicate that the water segments are not impaired, and therefore should be delisted.**

The Districts agree with the SWRCB's decision to delist the Palos Verdes area beaches (Outer Cabrillo Beach, Abalone Cove, Bluff Cove, Long Point, Malaga Cove, Portuguese Bend, Royal Palms, and Whites Point) for Beach Closures. However, the Districts disagree with the SWRCB's decision not to delist Outer Cabrillo Beach as impaired for High Coliform Count. Current bacteriological data collected by the Districts show that the Palos Verdes area beaches, including Outer Cabrillo Beach, do not exceed the water quality standards for bacteria.

Table Y.1 contains a compliance summary for bacteriological data collected by the Districts at 9 stations in the Palos Verdes peninsula area from 2001 through 2005. The sampling locations are shown in Figure Y.1. Table Y.2 contains the raw data and formulas used to develop the compliance summary. It should be noted that the data provided in Table Y.2 are routinely submitted to the Los Angeles Regional Water Quality Control Board as part of monitoring activities associated with the Santa Monica Bay Beaches Bacteria TMDL. Therefore, these data should be considered existing and readily available water quality information.

The compliance summary shows that marine recreational water quality standards for bacteria are being attained at all 9 locations, including Outer Cabrillo Beach. At all monitored locations in the Palos Verdes area, the number of actual exceedances does not meet the minimum number of exceedances required for listing under Section 3.3 and Table 3.2 of the Listing Policy. The Districts also agree that these beaches should not be listed for Beach Closures, consistent with Section 3.3 of the Listing Policy. The water quality data provided confirm that these water bodies are not impaired due to bacteria. The Districts therefore recommend that in addition to delisting the Palos Verdes area beaches (Outer Cabrillo Beach, Abalone Cove, Bluff Cove, Long Point, Malaga Cove, Portuguese Bend, Royal Palms, and Whites Point) for Beach Closures, that the SWRCB also delist Outer Cabrillo Beach for High Coliform Count. Regardless of the fact that a TMDL and implementation plan have been approved, Outer Cabrillo Beach should not be placed in the Water Quality Limited Segments Being Addressed category of the 303(d) list. Outer Cabrillo Beach should be removed from the 303(d) list because the available water quality data show that Outer Cabrillo Beach attains the water quality standard.

WATER SEGMENT: **Santa Clara River Reach 3, Santa Clara River Reach 5, Santa Clara River Reach 6, Hopper Creek, Santa Clara River Reach 11, Piru Creek, Pole Creek, Sespe Creek, Wheeler Canyon/Todd Barranca**

POLLUTANT: **Total Dissolved Solids, Sulfates, Chloride**

PROPOSED DECISION: **Varied**

DISTRICTS' RECOMMENDATION: **These listings should all be made high priority and scheduled for TMDL completion within the next listing cycle.**

The Districts request that the State Board consider making all of the salt-related listings in the Santa Clara River Watershed for which TMDLs have not yet been established a high priority and to schedule them for TMDL completion within the next listing cycle (i.e. by 2008). Some of these listings are on the 2002 303(d) list, whereas others are newly proposed for the 2006 303(d) list. These listings include some that address the river mainstem, while several are for tributaries that flow into the mainstem of the river. Currently, it is our understanding from the draft Staff Report that these TMDLs are not specifically scheduled for completion (i.e., they are not listed in Table 9 with specific dates assigned), meaning that they may not be complete until 2019.

The Upper Santa Clara River Chloride TMDL was approved by the Los Angeles Regional Board in May 2004, and it went into effect in May 2005. As a result of the development of this TMDL, agricultural interests became concerned about the effects of salt and chloride on salt-sensitive local crops, like avocados and strawberries. These and other salt-sensitive crops grown in the Oxnard Plain and Santa Clara River valley represent a large economic interest for Ventura County farmers. As part of this TMDL's Implementation Plan, there are required studies to 1) further characterize the surface and subsurface flow and fate of chloride in the upper Santa Clara River watershed and 2) investigate the impacts of chloride on salt sensitive crops.

It would be beneficial for all parties, including the Regional Board, if all of the salt-related listings in this watershed could be made a high priority and scheduled for completion during the next listing cycle so that these studies (or additional side-by-side) efforts could encompass all of the salt-related impairments in the watershed on the same timeline with combined resources. This would allow more expeditious and efficient development of these TMDLs, and would enable the watershed to attain applicable water quality objectives as quickly as possible.

United States
Environmental Protection
Agency

Prevention, Pesticides And
Toxic Substances
(7506C)

Revised January 2001

EPA

Diazinon Revised Risk Assessment and Agreement with Registrants

Action and Rationale

EPA is releasing its revised risk assessment and announcing an agreement with registrants to remove and phase out certain uses of the organophosphate pesticide diazinon. Also known as Spectracide and other trade names, diazinon is one of the most widely-used insecticides in the U.S., especially for household lawn and garden pest control.

The Food Quality Protection Act, enacted in 1996, sets a more stringent safety standard for most pesticides and offers special protection for children. EPA has accepted a voluntary agreement from the manufacturers of diazinon to modify the uses of this pesticide to address the tough new safety standard of FQPA.

The Agency accepted the termination of all indoor residential and indoor non-residential uses of diazinon. EPA and the registrants also have agreed to phase out and cancel outdoor residential lawn and garden uses (i.e., all outdoor non-agricultural uses) over the next few years. Together, these actions will end about 75% of the current use of diazinon. EPA and the registrants have further agreed to remove about one third of the agricultural crop uses of diazinon. This action will also help mitigate risks to workers, birds and other wildlife, drinking water resources, and the environment.

Risk Mitigation

EPA and the registrants of diazinon have agreed to the following modifications:

- ***Reducing Residential Risks...*** About 75% of diazinon currently is used in and around the home. Diazinon accounts for about 30% of the homeowner use insecticide market. The agreement will result in termination of all retail sale of diazinon for residential crack and crevice treatments and all other indoor uses by the end of 2002.

  The agreement also virtually ends sales of the residential lawn care use of diazinon in 2003, and provides for orderly transition to a new product line. The home lawn care use accounts for most residential exposure but less risk than the indoor use of diazinon. Under the agreement, production of diazinon for home lawn care and all other outdoor non-agricultural uses must phase down at least 50% by 2003. Production, formulation, and sales to retailers are scheduled to phase out and end completely during 2003. Registrants will buy back any products from retailers that remain at the end of 2004. However, few retail products for home lawn care uses are expected to remain in the market by that time.

- ***Reducing Ecological Risks...*** Broadcast application of diazinon to turf poses one of the greatest pesticide risks to birds. Just one granule or seed treated with diazinon is enough to kill a small bird. Diazinon had the highest number of reported bird kill incidents of any registered pesticide during 1994-1998. Birds of many species have been killed, including ducks, geese, hawks, songbirds, woodpeckers, and others. Since residential use of diazinon accounted for over half of these incidents, phasing out and canceling the outdoor residential uses is expected to further mitigate risks to birds and other wildlife.

Diazinon is one of the most commonly found pesticides in air, rain, and fog. Monitoring data indicate that while it is widespread in surface water nationally, diazinon is most commonly found in surface water in urban areas as a result of runoff from residential use. Phasing out and eventually canceling the outdoor residential uses of diazinon, as well as some current agricultural uses, will help reduce residues of diazinon in surface water and throughout the environment.

- ***Reducing Drinking Water Risks...*** The agreement to phase out and cancel all outdoor residential uses of diazinon is expected to reduce human exposure to diazinon through drinking water, since residential applications are potentially a major source of drinking water contamination.

- ***Reducing Worker Risks...*** Risks to agricultural workers who mix, load, and apply diazinon or harvest treated crops also are of concern to EPA. The agreement will help mitigate worker risks by canceling about 30% of the current agricultural uses of diazinon. The agreement also will maintain the Restricted Use Pesticide classification for remaining diazinon crop uses so they will continue to be limited to trained, certified applicators. These and other measures to reduce both worker and ecological risks will be discussed further in consultation with stakeholders as EPA develops an interim reregistration eligibility decision for diazinon.

- ***Supporting Low-Risk Uses...*** The agreement allows about 70% of current diazinon agricultural uses to continue. The continuing diazinon uses are important to the production of many minor crops, and do not exceed the "risk cup" for diazinon. EPA will further consider worker and ecological risks in developing risk management options, considering public comments received during the next 60 days, and in completing an interim reregistration eligibility decision for diazinon.

Phased In Approach

The diazinon agreement phases in various restrictions and cancellations to address higher risk, indoor residential uses first. Because much pesticide risk reduction involves increasing margins of safety, it is reasonable to focus first on uses that achieve the greatest risk reduction for children. Allowing other uses to continue for specific periods of time will help ensure that appropriate alternatives are available for a reasonable and orderly transition.

Reregistration of Diazinon

The risk mitigation measures in this agreement represent an important step in EPA's review of diazinon. As the Agency continues its review of diazinon through the reregistration process, we will continue to look at both occupational and ecological risks to ensure that diazinon meets current safety standards. If EPA determines that unreasonable risks remain for workers or the environment, the Agency will incorporate additional risk mitigation measures as part of the interim reregistration eligibility decision.

Provisions of the Agreement and Associated EPA Actions

Home Uses		
Site	**Mitigation Measures**	**Effective Dates**
Indoor Uses All uses inside any structure, vehicle, vessel, aircraft, or enclosed area and/or on any contents therein (except mushroom houses), including residences, food/feed handling establishments, schools, museums, stores, hospitals, sports facilities, warehouses, and greenhouses. All indoor pet uses including pet collars.	Product registrations are being canceled or amended to delete indoor uses from end use product labels (except use in mushroom houses). EPA's Federal Register notice of January 10, 2001, proposed to delete these uses.	Cancellations become effective after the 30-day public comment period, upon issuance of a cancellation order in February 2001. As of March 1, 2001, manufacturing use products may no longer be used to formulate end use products for indoor uses. Retailers stop sale December 31, 2002
Outdoor Non-Agricultural Uses Home lawn, garden, and any other outdoor residential or outdoor non-agricultural uses	Production will phase down Uses will be phased out Technical registrants will buy back existing products from retailers Product registrations will (expire) be canceled, with no provision for existing stocks	Technical registrants reduce amount of diazinon produced by 50% or more by 2003. Stop formulation of products June 30, 2003 Stop sale to retailers August 31, 2003 Commencing December 31, 2004 December 31, 2004

Agricultural Uses Proposed for Cancellation		
Crop	**Action**	**Effective Dates**
Alfalfa Bananas Beans (dried) Bermudagrass Celery Red Chicory (radicchio) Citrus Clover Coffee Cotton Cowpeas Cucumbers Dandelions Kiwi Lespedeza Parsley Parsnips Pastures Peppers Irish Potatoes Sweet Potatoes Rangeland Sheep Sorghum Spinach Squash (summer and winter) Strawberries Swiss chard Tobacco Tomatoes Turnips	EPA published a Federal Register notice on January 10, 2001, proposing to delete these uses from product labels.	The proposed cancellations may become effective after the 30-day public comment period, upon issuance of a cancellation order in February 2001.

For Additional Information

For additional information on the diazinon agreement or other aspects of the Agency's pesticide regulatory program, contact EPA's Office of Pesticide Programs at (703) 305-5017, or visit our web site, www.epa.gov/pesticides.

For information on pesticides and their toxicity, contact the National Pesticide Telecommunications Network at 1-800-858-7378.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105

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(In Reply, refer to WTR-5)

Celeste Cantú, Executive Director
California State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100

Dear Ms. Cantú:

On May 26, 2000, the U.S. Environmental Protection Agency ("EPA") took action on amendments to the *Water Quality Control Plan, Los Angeles Region* ("Basin Plan") adopted by the Los Angeles Regional Water Quality Control Board ("Regional Board") on March 27, 1989, October 22, 1990, June 13, 1994, and January 27, 1997 (Regional Board Resolutions 89-03, 90-11, 94-07, and 97-02). In that action, EPA approved the 1989, 1990, and 1997 amendments and partially approved/partially disapproved the 1994 amendment. On August 22, 2000, the City of Los Angeles, City of Burbank, City of Simi Valley, and the County Sanitation Districts of Los Angeles County challenged EPA's water quality standards action in the U.S. District Court. On December 18, 2001, the court issued an order remanding the matter to EPA to take further action on the 1994 Basin Plan amendment consistent with the court's decision. [Attachment 1] Specifically, the court required EPA to approve the 1994 Basin Plan in whole; disapprove the 1994 Basin Plan in whole; or partially approve and partially disapprove the 1994 Basin Plan,

> "in such a way as to preserve the LA-RWQCB's intention not to immediately subject the waters identified by an asterisk ("*") for the MUN use designation in Table 2-1 of the 1994 Basin Plan to the stringent criteria necessary to protect the MUN use designation for such waters absent further study."

Id. Accordingly, EPA is today revising its May 26, 2000 decision as follows:

I. Municipal and Domestic Supply Designation ("MUN")

In today's action, EPA approves in whole the 1994 Basin Plan. EPA bases its approval on the court's finding that the Regional Board's identification of waters with an asterisk ("*") in conjunction with the implementation language at page 2-4 of the 1994 Basin Plan, was intended "to only conditionally designate and not finally designate as MUN those water bodies identified by an ("*") for the MUN use in Table 2-1 of the Basin Plan, without further action."

EXHIBIT G.2

Court Order at p. 4. Thus, the waters identified with an ("*") in Table 2-1 do not have MUN as a designated use until such time as the State undertakes additional study and modifies its Basin Plan.[1] Because this conditional use designation has no legal effect, it does not constitute a new water quality standard subject to EPA review under section 303(c)(3) of the Clean Water Act ("CWA"). 33 U.S.C. § 1313(c)(3).

EPA notes that there are certain waterbodies identified by an asterisk ("*") in Table 2-1 which are also identified with an E or I indicating that the MUN use is either "existing" or "intermittent". See 1994 Basin Plan, Table 2-1, footnotes. For any discharge permits to these waterbodies, EPA expects the State to continue to protect any beneficial uses that are actually being attained in the waterbody as required by 40 C.F.R. § 131.12(a)(1) and the State's antidegradation policy. State Board Resolution No. 68-16.

II. Narrative Criteria Applicable to Toxic Pollutants

Pursuant to the court's order, EPA has also reviewed the new or revised narrative criteria in the 1994 Basin Plan to determine consistency with section 303(c)(2)(B) of the CWA, 33 U.S.C. § 1313(c)(2)(B), and with the regulations at 40 C.F.R. § 131.11(a)(2). See Court Order at p. 9, para. 10.

Section 303(c)(2)(B) of the CWA requires states to adopt specific numeric criteria for those toxic pollutants listed pursuant to section 307(a)(2) for which section 304(a) criteria have been adopted.[2] If a state does not adopt numeric criteria for the priority toxic pollutants for which 304(a) criteria have been adopted, EPA guidance allows a state to satisfy section 303(c)(2)(B) by adopting a translator procedure to translate narrative criteria for priority toxic pollutants. 57 Fed. Reg. 60853, 60873 (Dec. 22, 1992). In 1994 when the Basin Plan amendment was adopted by the State, the Basin Plan did not contain all of the numeric criteria for toxic pollutants as required by section 303(c)(2)(B) and the State had not developed a translator procedure. Because California had not satisfied the requirement of section 303(c)(2)(B), on May 18, 2000, EPA promulgated the California Toxics Rule ("CTR") in which it established the specific numeric criteria for the priority toxic pollutants for California, as required by CWA section 303(c)(2)(B). 65 Fed. Reg. 31682, 31686-87 (May 18, 2000). In addition, in December 1992, EPA had promulgated the National Toxics Rule ("NTR") which

---

[1]It is EPA's understanding that the Regional Board will commence review of the MUN use designations to identify appropriate beneficial uses before its next triennial review. We will work closely with the Regional Board to ensure that modifications to use designations are completed consistent with the Clean Water Act and federal regulations.

[2]Consistent with the regulatory definition in 40 C.F.R. § 131.3(d) which states that "toxic pollutants" means "those pollutants listed by the Administrator under section 307(a) of the Act," EPA uses the terms "toxic pollutants" and "priority toxic pollutants" interchangeably because the 307(a) pollutants are known as priority toxic pollutants.

also established certain numeric criteria for toxic pollutants in California as required by section 303(c)(2)(B). 57 Fed. Reg. 60848 (Dec. 22, 1992). Thus, any need for California to have a "translator" in the absence of numeric criteria to satisfy section 303(c)(2)(B) has been superceded by the existence of numeric criteria.

In addition to the requirements of section 303(c)(2)(B), 40 C.F.R. § 131.11(a)(2) requires that

> "[w]here a State adopts narrative criteria for toxic pollutants to protect designated uses, the State must provide information identifying the method by which the State intends to regulate point source discharges of toxic pollutants on water quality limited segments based on such narrative criteria."

The 1994 Basin Plan includes several new or revised narrative criteria; however, only two new and one revised narrative water quality criteria might be used to regulate point source discharges of priority toxic pollutants on water quality limited segments.[3] These three narrative criteria are Bioaccumulation, Polychlorinated Biphenyls ("PCBs"), and Toxicity. As noted above, for certain priority toxic pollutants, the NTR or CTR provide specific numeric criteria and thus no further information is required under 40 C.F.R. § 131.11(a)(2). For any other priority toxic pollutants, or in order to use narrative criteria in lieu of the promulgated numeric criteria, the State must provide information regarding how it will regulate point source discharges to water quality limited segments using these narratives. Accordingly, EPA has evaluated whether the State has provided information identifying the methods for implementing these three narratives. Each narrative is discussed separately below: [New criteria and additions to existing criteria are *italicized* and deletions to existing criteria are in ~~strikeout~~ format.]

---

[3]The 1994 Basin Plan also contains a criterion for "Chemical Constituents" which states,

> "*Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated use.*
>
> Waters designated for use as Domestic or Municipal Supply (MUN) shall not contain concentrations of chemical constituents in excess of the limits specified in the following provisions of Title 22 of the California Code of Regulations which are incorporated by reference into this plan: Table 64431-A of Section 64431 (Inorganic Chemicals), Table 64431-B of Section 64431 (Fluoride), and Table 64444-A of Section 6444 (Organic Chemicals). *This incorporation by reference is prospective including future changes to the incorporated provisions as the changes take effect.* (See Tables 3-5, 3-6, and 3-7.)" 1994 Basin Plan at p. 3-8.

This Chemical Constituents criterion functions as a numeric criterion which relies on MCLs in the State's Title 22 regulations to protect waters with the MUN use designation. Consequently, no further information is required under 40 C.F.R. § 131.11(a)(2) and this criterion is fully approved.

1. **Bioaccumulation**

Narrative Objective for Bioaccumulation:

"Toxic pollutants shall not be present at levels that will bioaccumulate in aquatic life to levels which are harmful to aquatic life or human health." 1994 Basin Plan at p. 3-8.

EPA approved this narrative criterion on May 26, 2000. In response to the court remand, EPA evaluated whether California had provided information identifying how it would use this criterion to regulate point source discharges of toxic pollutants to water quality limited segments. While the State has procedures to calculate water quality based effluent limitations (WQBELs) for priority toxic pollutants using the numeric water quality criteria identified in the California Toxics Rule (see *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* State Board, 2000 ("State Implementation Policy" or "SIP") at pp. 5-12), EPA has not identified other information in the Basin Plan, the California Toxics Rule, or State Implementation Policy which describe how the State intends to regulate point source discharges of other priority toxic pollutants using this bioaccumulative narrative criterion. Thus, until such time as the State provides information as required by 40 C.F.R. § 131.11(a)(2), EPA does not consider its May 26, 2000 approval of the bioaccumulation narrative criterion to extend to the use of this criterion for purposes of regulating point source discharges of toxic pollutants on water quality limited segments.[4] When EPA determines that the State has provided the information required by 40 C.F.R. § 131.11(a)(2), the State may then use this narrative criterion for purposes of regulating discharges from point sources of toxic pollutants to water quality limited segments.

2. **Polychlorinated Biphenyls** (PCBs)

Narrative Objective for PCBs:

"The purposeful discharge of PCBs (the sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) to waters of the Region, or at locations where the waste can subsequently reach waters of the Region, is prohibited." 1994 Basin Plan at p. 3-15.

EPA approved this narrative criterion on May 26, 2000. In response to the court remand, EPA evaluated whether California had provided information identifying how it would use this criterion to regulate point source discharges of toxic pollutants to water quality limited segments. This narrative criterion for PCBs is best described as a discharge prohibition. Thus, in its own terms it provides sufficient information for its implementation to satisfy 40 C.F.R.

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[4]Because the requirements of 40 C.F.R. § 131.11(a)(2) are only triggered for the regulation of point sources discharges of priority toxic pollutants on water quality limited segments, the narrative criterion would be applicable for any other purpose.

§ 131.11(a)(2). Therefore, EPA affirms its May 26, 2000 approval of the PCB narrative criterion.

The 1994 Basin Plan also includes a revised criterion for the pass-through or uncontrollable discharges of PCBs which is numeric and therefore does not trigger the requirements of 40 C.F.R. § 131.11(a)(2).[5]

3. **Toxicity**

Narrative and Numeric Objectives for Toxicity:

"All waters shall ~~not contain~~ *be maintained free of* toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in, human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration ~~(SWRCB and Department of Fish and Game has issued "Guidelines for Performing Static Acute Toxicity Fish Bioassays in Municipal and Industrial Wastewaters - July 1976")~~ or other appropriate methods as specified by the *State or* Regional Board.

The survival of aquatic life in surface waters, subjected to waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge, or ~~when necessary for~~ other control water ~~that is consistent with the requirements for "experimental water" (dilution water) as described in the guidelines. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay~~.

There shall be no acute toxicity in ambient waters, including mixing zones. The acute toxicity objective for discharges [see previous paragraph] *dictates that the average survival in undiluted effluent for any three consecutive 96-hour static or continuous flow bioassay tests shall be at least 90%, with no single test having less than 70% survival when using an established USEPA, State Board, or other protocol authorized by the Regional Board.*

There shall be no chronic toxicity in ambient waters outside of mixing zones. To determine compliance with this objective, critical life stage tests for at least three species

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[5]**Numeric Objective for PCBs:**

Pass-through or uncontrollable discharges to waters of the Region, or at locations where the waste can subsequently reach water of the Region, are limited to 70 pg/L (30 day average) for protection of human health and 14 ng/L and 30 ng/L (daily average) to protect aquatic life in inland fresh waters and estuarine waters respectively. 1994 Basin Plan at p. 3-15.

with approved testing protocols shall be used to screen for the most sensitive species. The test species used for screening shall include a vertebrate, an invertebrate, and an aquatic plant. The most sensitive species shall then be used for routine monitoring. Typical endpoints for chronic toxicity tests include hatchability, gross morphological abnormalities, survival, growth, and reproduction.

~~In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.~~

Effluent limits for specific toxicants can be established by the Regional Board to control toxicity identified under Toxicity Identification Evaluations (TIEs)." 1994 Basin Plan at pp. 3-16 and 3-17.

EPA approved this narrative criterion for toxicity on May 26, 2000. In response to the court remand, EPA evaluated whether California had provided information identifying how it would use this criterion to regulate point source discharges of toxic pollutants to water quality limited segments.

The first and second paragraphs delete reference to 1976 acute toxicity test guidance that, in the NPDES program, has been superseded by acute and chronic toxicity test methods required by 40 C.F.R. Part 136, Table 1A and the State Implementation Policy. SIP at pp. 28-30.

The third paragraph is new and contains detailed information regarding the implementation of the narrative acute toxicity criterion for regulation of point source discharges. This information specifies the use of approved acute toxicity test methods, specifies that there can be no mixing zones for acute toxicity (see also SIP at p. 15 and Appendix 1), and identifies numeric WQBELs for acute toxicity (i.e., percent survival requirements). This language itself provides sufficient detail for the regulation of discharges to satisfy 40 C.F.R. § 131.11(a)(2). Therefore, EPA fully approves the narrative acute toxicity criterion.

The fourth paragraph is also new and contains detailed information regarding the implementation of the narrative chronic toxicity criterion. This information specifies the test organisms and test endpoints and requires that no chronic toxicity be present outside a mixing zone. In addition, the State Implementation Policy contains chronic toxicity control provisions in the form of approved test protocols and requirements for TIE/TRE procedures. SIP at pp. 28-30. The fifth paragraph, which is also new, further directs the Regional Board to establish effluent limitations for specific toxicants which have been identified with the TIE procedures. This is also now required by the SIP which requires chronic toxicity effluent limitations where discharges show reasonable potential. All of this information, in conjunction with the regulations at 40 C.F.R. § 122.44(d)(1)(vi), provides sufficient detail for the regulation of discharges to satisfy 40 C.F.R. § 131.11(a)(2). Therefore, EPA fully approves the narrative chronic toxicity criterion.

EPA intends to continue working closely with the Regional Board during the triennial review process. Our aim is to take prompt action on any further Basin Plan amendments and assist the Regional Board as needed. If there are any questions regarding our action, please contact Robyn Stuber, of my staff, at (415) 972-3524. As always, we look forward to continued cooperation with the State in achieving our mutual environmental goals.

Sincerely,

Alexis Strauss 15 February 2002
Director, Water Division

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September 2003

Ammonia Water Effects Ratios and Site-Specific Objectives for Los Angeles County Waterbodies-Final Results

Submitted to:
County Sanitation Districts of Los Angeles County
City of Los Angeles
City of Burbank

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Executive Summary

In 1999, the City of Los Angeles, County Sanitation Districts of Los Angeles County (CSDLAC), and the City of Burbank began the development of a site-specific freshwater objective for ammonia. The chosen approach was to develop a Water Effects Ratio (WER) downstream of ten wastewater treatment plant (POTW) discharges to effluent dominated water bodies in the Los Angeles River, San Gabriel River, and Santa Clara River watersheds. This report provides a summary of the results of that study and the proposed WERs and site-specific objectives (SSOs) for these waterbodies. Based on the results of the study, the WERs will be used to calculate chronic site-specific objectives. Acute site-specific objectives are not being proposed as a part of this study. The complete work plan for the study is included in Appendix 1-*Ammonia Water Effects Ratio and Site Specific Objective Work Plan for the Los Angeles County Waterbodies.*

SAMPLING SCHEDULE AND LOCATIONS

Samples were collected at ten stations, each downstream of a wastewater treatment plant. At all but one station, four acute *Hyalella azteca* toxicity tests and one chronic *Pimephales promelas* (fathead minnow) test were collected. Additionally, at five stations, a chronic *Hyalella azteca* test was conducted to confirm that the use of acute tests to establish WER values was appropriately conservative for the purposes of this study. As a result of some QA/QC problems with the analysis of some samples, four acute *Hyalella* tests, two chronic *Hyalella* tests and three chronic fathead minnow tests were rejected and not used in the study analysis. Therefore, a total of 35 acute *Hyalella* tests, three *Hyalella* chronic tests, and seven chronic fathead minnow tests were successfully conducted during this study. The acute *Hyalella* tests were conducted during both dry and wet weather to assess the impacts of different seasons on the WER. Sampling began in January 2002 and was completed in February 2003. In addition, an initial study to assess the potential for developing a WER for ammonia was conducted in October 2000 at two sites on the Los Angeles River and at two sites on the San Gabriel River. The following table (ES-1) summarizes the sampling locations for the study and a map of the sampling locations is included as Figure ES-1.

Table ES- 1. POTW Characteristics and Associated Sampling Locations

Name	Agency	Main Receiving Water	Design / Permitted Flow (mgd)	Typical Dry Weather Upstream Flow (mgd)	Sampling Location ID	Description
DC Tillman	City of Los Angeles	Los Angeles River	80	NA	LA-1, LA-R8	Downstream of DC Tillman at Van Nuys Blvd. and Coldwater Canyon
LA-Glendale	City of Los Angeles	Los Angeles River	20	51	LA-2, LA-R7	Downstream of LA Glendale at Los Feliz
Burbank WWTP	City of Burbank	Burbank Western Wash/Los Angeles River	9	NA	BW-1	Downstream of Burbank at Riverside Dr.
Saugus	CSDLAC	Santa Clara River	6.5	0	SCR-1	Downstream of Saugus- 25 feet downstream of discharge
Valencia	CSDLAC	Santa Clara River	12.6	5.4	SCR-2	Downstream of Valencia, 1.6 miles upstream of Chiquita Canyon Road.
Whittier Narrows	CSDLAC	Rio Hondo/San Gabriel River	15	NA	RH-1	Downstream of Whittier Narrows WRP 150 feet upstream of the Whittier Narrows Dam
Los Coyotes	CSDLAC	San Gabriel River	37.5	0	SGR-2, SGR-R9W	Downstream of Los Coyotes at Willow
Long Beach	CSDLAC	Coyote Creek	25	10.3	CC-1	Downstream of Long Beach at foot bridge 200 yards downstream of discharge
San Jose Creek	CSDLAC	San Gabriel River/San Jose Creek	100	0	SGR-1, SGR-R4	Downstream of San Jose Creek WRP at Alondra
Pomona	CSDLAC	San Jose Creek	15	0	SJC-1	Downstream of Pomona WRP at San Jose St.

NA Flow information is not available, but is likely to be minimal.

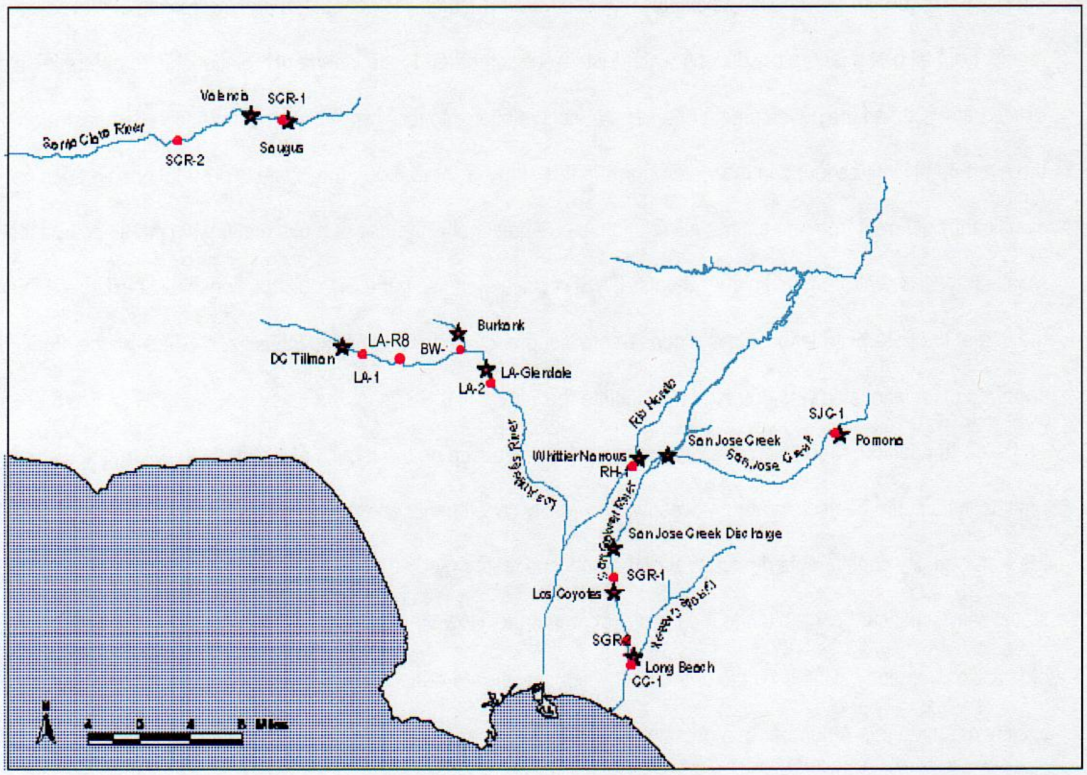

Figure ES- 1. Map of Sampling Locations

ANALYTICAL APPROACH

During the testing, it became clear that a WER greater than 1.0 for the sensitive invertebrate species, *Hyalella*, occurred in the waterbody, but a WER for a sensitive fish species, fathead minnow, was closer to 1. Consequently, an adjustment was made to the analytical approach, based on discussions with the Technical Advisory Committee (TAC) for the study, to take this fact into consideration. It was decided that to develop a SSO for ammonia, the WER calculated from the *Hyalella* data would be used to adjust the invertebrate data used to calculate the ammonia criteria whereas the fish data used in the criteria equation calculation would not be adjusted. After the adjustments for the invertebrate data, the criteria would be recalculated to determine the SSO. In these calculations, the objective is determined by the lower of 1) the temperature-adjusted Hyalella GMCV and 2) the lowest fish GMCV. This approach results in a SSO that is protective of both invertebrate and fish species.

Additionally, the TAC requested that the pH relationship for *Hyalella* be examined to determine whether or not it matched the pH relationship developed in the USEPA's 1999 Ammonia Criteria (criteria). The pH relationship is a critical part of the study because it is used to adjust the results from the laboratory dilution water tests to equivalent results at the same pH as the site water (before the WER is calculated). A separate pH study was conducted and the results of that study as well as the results from all of the laboratory dilution water tests were compared to the criteria pH relationship to determine if differences existed that justified the development of a separate pH relationship for *Hyalella*. The comparison demonstrated that, at least for the average pH values found in the waterbodies in this study (7.34 to 8.05), the *Hyalella* pH relationship does not appear to be significantly different from the criteria pH relationship. Additionally, the use of a pH relationship developed based on the study results in WERs that are much higher than the WERs calculated using the EPA pH relationship (See Table 9 in the report). So the use of the EPA pH relationship is a conservative approach to developing the WERs and SSOs for the study. As a result, a separate pH relationship was not used to calculate the WERs and SSOs for the study.

In addition, regression analyses were performed based on the results of the study to determine if any significant relationships could be ascertained between water quality constituents and the resulting toxicity in the waterbody. The analysis of the water quality constituents demonstrated that the ions tested (sodium, potassium, calcium, chloride, and TDS) have a statistically significant correlation to the toxicity of ammonia. However, the ions also have a more significant correlation to each other. Consequently, it is difficult to determine which specific ion or combination of ions has the greatest impact on reducing the toxicity of ammonia. A number of regression analyses were performed with different ions separately and in combination with other ions and the results demonstrated that sodium and chloride have similar relationships to toxicity, but sodium and TDS have the strongest relationship with the WER. None of the relationships had a high enough r-squared (R^2) to be predictive (all R2 values were 0.4 or less). A site-by-site analysis was also conducted to see if some of the variability could be reduced and more significant relationships determined. The analysis showed that different ions were the most significant influence in different waterbodies, but for the most part, increasing ion concentrations resulted in less toxicity and increasing WERs. The demonstration of these relationships shows that ions do appear to be the major site-specific driver in reducing ammonia toxicity. This phenomenon has been identified in other studies, though the exact mechanism(s) for the reduced toxicity have not been identified. The prevailing theory is that the ions in the water increase the ability of the organism to excrete ammonia and potentially reduce the uptake of ammonium ions by the organism (Borgmann, 1997). Other water quality constituents, such as BOD and TSS, did not demonstrate significant relationships to ammonia toxicity.

Several different SSO values were calculated based on the data collected. The first was a site-by-site SSO. Secondly, WERs and SSOs were calculated on a watershed basis. Finally, one WER was calculated based on all the data. All of the WER values were calculated based on the procedures presented in the *Interim Guidance on the Development of WERs for Metals* (USEPA, 1994). After the SSO values were calculated, the results were compared to the toxicity thresholds for any rare, endangered, threatened, or locally important species present in the waterbody to ensure that the results were protective of those species.

STUDY RESULTS AND PROPOSED WERS AND SSOS

The acute *Hyalella* tests resulted in WERs ranging from 1.395 to 2.303. The chronic *Hyalella* tests demonstrated much higher WERs, ranging from 7.025 to 44.59. Therefore, it was determined that it was conservative to use the acute tests to calculate the final WERs. The fathead minnow tests, as discussed previously, all had WERs around 1, ranging from 0.937 to 1.714. The WER guidance suggests the use of the lowest wet weather WER or the adjusted geometric mean of the dry weather results. As discussed in detail in the main report, the wet weather WERs were found to be extremely variable at a given site depending on the choice of values used to calculate the wet weather WER (e.g. upstream flow, ammonia concentration). For this reason, it was not considered appropriate to use a single, variable wet weather value instead of the adjusted geometric mean of the dry weather values. Therefore, the final WER is equal to the adjusted geometric mean of the acute *Hyalella* dry weather samples at all sites. Table ES- 2 presents the recommended final WERs for the study based on the acute *Hyalella* testing calculated for all of the scenarios discussed in the approach. The actual toxicity results are presented in the Results tables in Appendix 2-Summary of Study Results. Based on the results of the analysis, the recommended approach is to use the site-specific WERs to calculate site-specific SSOs.

Table ES- 2. Final WERs

Site	Recommended Final WER
LA1	1.966
LA2	1.967
BW1	1.400
SGR1	1.637
SGR2	2.303
CC1	2.038
SJC1	1.395
RH1	2.094
SCR1	2.233
SCR2	2.206
LA River	1.783
San Gabriel River	2.032
Santa Clara River	2.282
All Sites	1.956

To calculate the SSOs for a waterbody, a new criteria equation was developed for each of the scenarios. Each equation was calculated based on EPA guidance for determining aquatic life criteria. The SSOs are all equal to the pH relationship multiplied by the lower of 1) the *Hyalella* value adjusted by the WER or 2) the lowest fish value. This ensures that the SSOs are protective of both fish and invertebrates. The proposed SSO criteria equations based on the final WERs are shown in Table ES- 3.

Table ES- 3. Proposed Chronic Site-Specific Objectives

LA1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * MIN(2.85, 2.85 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * 2.85 * 10^{0.028*(25-Max(T,7))}$
LA2	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * MIN(2.85, 2.85 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * 2.85 * 10^{0.028*(25-Max(T,7))}$
BW1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.92 * MIN(2.85, 2.03 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.92 * 2.03 * 10^{0.028*(25-Max(T,7))}$
SGR1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.89 * MIN(2.85, 2.37 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.89 * 2.37 * 10^{0.028*(25-Max(T,7))}$
SGR2	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * MIN(2.85, 3.34 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * 3.34 * 10^{0.028*(25-Max(T,7))}$

Table ES-3 cont'd. Proposed Site-Specific Objective Equations for Ammonia by Site

SCR1	**ELS Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.854 * MIN(2.85, 3.24 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.854 * 3.24 * 10^{0.028*(25-Max(T,7))}$
SCR2	**ELS Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.854 * MIN(2.85, 3.20 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.854 * 3.20 * 10^{0.028*(25-Max(T,7))}$
SJC1	**ELS Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.92 * MIN(2.85, 2.02 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.92 * 2.02 * 10^{0.028*(25-Max(T,7))}$
RH1	**ELS Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.854 * MIN(2.85, 3.04 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.854 * 3.04 * 10^{0.028*(25-Max(T,7))}$
CC1	**ELS Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.854 * MIN(2.85, 2.96 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1 + 10^{7.688-pH}} + \frac{2.912}{1 + 10^{pH-7.688}} \right) * 0.854 * 2.96 * 10^{0.028*(25-Max(T,7))}$

Table ES- 4 provides example objectives based on the site-specific equations listed above for different pHs. The table allows comparison of the site-specific objectives determined in this study.

Table ES- 4. Example Site Specific Objectives (Total Ammonia in mg-N/L) at Different pHs

		pH							
	Temperature	6	6.5	7	7.5	8	8.5	9	9.5
LA1	20	9.6	9.2	8.2	6.0	3.4	1.5	0.67	0.37
LA2	20	9.6	9.2	8.2	6.0	3.4	1.5	0.67	0.37
BW1	20	7.4	7.1	6.3	4.6	2.6	1.2	0.52	0.29
SGR1	20	8.3	8.0	7.1	5.2	2.9	1.3	0.58	0.32
SGR2	20	11.2	10.8	9.6	7.1	3.9	1.8	0.79	0.44
CC1	20	9.9	9.5	8.5	6.2	3.5	1.6	0.70	0.39
SJC1	20	7.4	7.1	6.3	4.6	2.6	1.2	0.52	0.29
RH1	20	10.2	9.8	8.7	6.4	3.6	1.6	0.72	0.40
SCR1	20	10.9	10.5	9.3	6.8	3.8	1.7	0.76	0.42
SCR2	20	10.8	10.3	9.2	6.8	3.8	1.7	0.75	0.42

Introduction and Background

Starting in 1999, the County Sanitation Districts of Los Angeles County (CSDLAC), City of Los Angeles, and City of Burbank began a study to investigate the development of site-specific objectives (SSOs) for ammonia using a water effects ratio (WER). This report describes the results of the study and the analysis conducted to determine the WERs and SSOs for the waterbodies included in the study.

Ambient water quality criteria are set at the national level by the United States Environmental Protection Agency to be protective of conditions throughout the United States. Because of the variety of waterbodies and differing conditions throughout the country, the criteria developed on the national level might be over- or under-protective for some waterbodies. Beyond the headwaters, the waterbodies in Los Angeles County are typically effluent-dominated waterbodies running through concrete-lined channels or significantly altered watercourses. Characteristics of these waterbodies, such as high hardness and ionic composition, vary from conditions in other more "natural" waterbodies that contain flow other than urban runoff and publicly owned treatment works (POTWs) discharges. The objective of this study is to develop site-specific chronic objectives for ammonia in Los Angeles County waterbodies that are sufficiently protective of the aquatic habitat in these waterbodies. Site-specific acute objectives are not being proposed as a part of this study.

In 1999, the USEPA issued an update to the 1984 Ambient Water Quality Criteria for Ammonia. In both of the criteria documents, the USEPA acknowledged that ammonia toxicity may be dependent on the ionic composition of the exposure water, but the effects and understanding of these effects were insufficient to allow inclusion of them in the national criteria derivation. The 1999 Ammonia Criteria update states that these effects will "have to be addressed using water-effect ratios or other site-specific approaches" (USEPA, 1999). Studies cited in the 1999 Ammonia Criteria update include several studies done to investigate the impacts of the ionic composition of the exposure water on the toxicity of ammonia to a number of species, including Atlantic salmon, lake trout, rainbow trout, *Ceriodaphnia dubia*, and *Hyalella azteca*. The results of these studies indicate that the toxicity of ammonia may be reduced in waterbodies similar to those found in Southern California with high hardness and elevated concentrations of certain ions (calcium, sodium, and potassium). Because the waterbodies in Los Angeles County are primarily effluent-dominated, the hardness and ionic concentrations in these waterbodies are much higher than the concentrations found in the laboratory dilution water used in the studies that were the basis for the ammonia criteria. For this reason, there is a potential to develop a WER for ammonia in these waterbodies.

TEST SPECIES SELECTION

In the 1999 Ammonia Criteria update, the chronic criteria were developed based on a limited number of chronic toxicity studies. The most sensitive species used in the development of the criteria was *Hyalella azteca* (see 1999 Update, p. 76). The chronic study used in the development of the criteria was conducted by Uwe Borgmann in 1994. Borgmann also conducted acute toxicity tests on *Hyalella* that indicate that hardness and concentrations of certain ions may have a significant impact on the toxicity of ammonia to *Hyalella*.

The magnitude of a WER is likely to depend on the sensitivity of the test used to determine the WER. More sensitive tests are expected to result in higher WERs and less sensitive tests will result in WERs closer to 1 (USEPA, 1994). The WER guidance states that there is no reason to believe that different species with equally sensitive endpoints will result in different WERs. It is possible that the mode of action might differ from species to species and therefore the magnitude of the WER may vary. However, there are no data that support any conclusions about the existence or magnitude of such differences (USEPA, 1994).

Based on these requirements in the WER guidance, *Hyalella azteca* was chosen as the primary test species for the study. As discussed previously, this species is the most sensitive aquatic species used in the development of the chronic criteria in the 1999 Ammonia Criteria update. The endpoint of the *Hyalella* chronic toxicity test is close to, but not lower than, the chronic criteria for these waterbodies at the pH values observed in the waterbodies. The *Hyalella* acute toxicity endpoint value is higher than the acute criteria for these waterbodies. Additionally, initial tests have demonstrated that the conditions in the Los Angeles and San Gabriel Rivers significantly affect the toxicity of ammonia to this species. For these reasons, *Hyalella* is an appropriate species to use in the development of a WER for these waterbodies.

The WER guidance requires that at least one test be conducted with a secondary species to confirm the results with the primary species. Based on a review of the 1999 criteria document and other studies that have been conducted, the recommended secondary species for waterbodies designated as WARM at the discharge point is the fathead minnow (*Pimephales promelas*). The fathead minnow is the 4th most sensitive species used in the development of the chronic criteria in the 1999 Ammonia criteria update. It is also one of the species used by all of the dischargers participating in the study in their Whole Effluent Toxicity (WET) testing of effluent. As a result, determining the level of ammonia toxicity to this species in the rivers to which the POTWs discharge will correspond with the requirements to prevent chronic toxicity in effluent discharges to the river. Studies have not been conducted on this species to determine whether or not the conditions in the waterbodies in Los Angeles County have an impact on the toxicity of ammonia to this species.

For the purposes of this study, acute *Hyalella* studies are the basis of the development of the chronic WER. As discussed in the Calculation of the Final WER, the acute toxicity tests resulted in a lower WER than the chronic studies. The resulting SSO is therefore very conservative. Additionally, the shorter and less costly acute studies allowed more studies to be conducted. Finally, the acute toxicity test for *Hyalella* is a more frequently used and established test than the chronic toxicity test so there are more data from other laboratories to compare to the monitoring results. The WER guidance specifically outlines that the endpoint of the test is the determining factor for selecting the test, not whether or not the test is chronic or acute. As a result, according to the guidance, a WER developed using acute toxicity tests may be applied to a chronic criterion and vice versa as long as the endpoint of the primary test is not lower than the criteria being adjusted.

Since the WER is dependent on the sensitivity of the test and not the type of test (i.e. acute or chronic) either type of test may be used to adjust the chronic criterion. However, because *Hyalella* acute tests were not included in the development of the acute criteria, the ability of the proposed SSO to protect invertebrates that may be more acutely sensitive than *Hyalella* was assessed.

The 1994 Interim WER Guidance states on page 21 that "less sensitive toxicity tests usually give smaller WERs than more sensitive tests." The comparison between the more sensitive chronic *Hyalella* tests and the less sensitive acute *Hyalella* tests conducted for this study confirmed that statement by demonstrating that the chronic tests had much higher WERs than the acute tests. Based on this premise, the use of *Hyalella* rather than a more acutely sensitive species should result in a more conservative WER and be protective of the other invertebrates.

Although acute tests on *Hyalella* were not included in the calculation of the acute criterion, a study by Ankley (Ankley, 1995) was reviewed for implications on the criterion and discussed as being an appropriate study within the 1999 update. However, the study was not considered to have an impact on the acute criterion calculation and was therefore not added to the dataset. The Ankley study looked at a number of different pHs and water types (soft water, moderately hard water, and hard water). The range of LC50s for these studies was from 3.9 to 83.9 mg/L-N normalized to a pH of 8.0. Based on these results, the GMAV for *Hyalella* would be 25.3 mg/L-N total ammonia. This GMAV makes *Hyalella* the most acutely sensitive invertebrate tested for the acute criteria as well as the chronic criteria and the 7th most acutely sensitive species overall. Additionally, under soft water and low pH conditions, *Hyalella* is the most acutely sensitive species. Therefore, the use of acute tests for *Hyalella* is protective of invertebrates tested for both the acute and chronic criteria development, though adjustments to the chronic criterion only are being proposed in this study. Although *Hyalella* is not more acutely sensitive than fish species, the protection of fish was addressed through the SSO calculation process and is described in the Site-Specific Objectives section.

STUDY SUMMARY

Ten sampling locations on eight waterbodies were sampled downstream of ten wastewater treatment plants (POTWs). At all but one station, four samples were collected for the primary test species, *Hyalella azteca*, and one sample was collected for the secondary species, *Pimephales promelas* or fathead minnow. The primary test for *Hyalella* was an acute, 4-day test. A 21-day chronic test for *Hyalella* was also conducted at five of the ten locations to ensure the acute test results were protective of chronic conditions. Due to some Quality Assurance/Quality Control (QA/QC) problems with the data, not all of the collected samples were used in the analysis. Table 2 summarizes all of the samples collected and highlights the tests that were not used in the WER and SSO calculations. The following table (Table 1) summarizes the ten POTWs and associated sampling locations included in the study. For a complete description of the study, sampling procedures, and discharge characteristics, please refer to the monitoring plan in Appendix 1-*Ammonia Water Effects Ratio and Site-Specific Objective Workplan for Los Angeles County Waterbodies*.

Table 1. POTW Characteristics and Associated Sampling Locations

Name	Agency	Main Receiving Water	Design / Permitted Flow (mgd)	Typical Dry Weather Upstream Flow (mgd)	Sampling Location ID	Description
DC Tillman	City of Los Angeles	Los Angeles River	80	NA	LA-1, LA-R8	Downstream of DC Tillman at Van Nuys Blvd. and Coldwater Canyon
LA-Glendale	City of Los Angeles	Los Angeles River	20	51	LA-2, LA-R7	Downstream of LA Glendale at Los Feliz
Burbank WWTP	City of Burbank	Burbank Western Wash/Los Angeles River	9	NA	BW-1	Downstream of Burbank at Riverside Dr.
Saugus	CSDLAC	Santa Clara River	6.5	0	SCR-1	Downstream of Saugus- 25 feet downstream of discharge
Valencia	CSDLAC	Santa Clara River	12.6	5.4	SCR-2	Downstream of Valencia, 1.6 miles upstream of Chiquita Canyon Road.
Whittier Narrows	CSDLAC	Rio Hondo/San Gabriel River	15	NA	RH-1	Downstream of Whittier Narrows WRP 150 feet upstream of the Whittier Narrows Dam
Los Coyotes	CSDLAC	San Gabriel River	37.5	0	SGR-2, SGR-R9W	Downstream of Los Coyotes at Willow
Long Beach	CSDLAC	Coyote Creek	25	10.3	CC-1	Downstream of Long Beach at foot bridge 200 yards downstream of discharge
San Jose Creek	CSDLAC	San Gabriel River/San Jose Creek	100	0	SGR-1, SGR-R4	Downstream of San Jose Creek WRP at Alondra
Pomona	CSDLAC	San Jose Creek	15	0	SJC-1	Downstream of Pomona WRP at San Jose St.

NA Flow information is not available, but the flow is likely to be minimal.

Sampling Schedule

Due to field conditions and unexpected sampling complications, a number of changes were made to the sampling schedule presented in the work plan (Appendix 1). The following table (Table 2) summarizes the actual sampling schedule and all samples collected for the study. Some of the sample results were not used in the analysis because of sampling problems, but they are included in strikeout text for reference in this table. The problems with specific tests are noted in the table footnotes.

Table 2. Sampling Schedule

Date	BW1	LA1	LA2	CC1	RH1	SCR1	SCR2	SGR1	SGR2	SJC1
1/31/02		HA	HA			HA	HA			
3/4/02	HA			HA				HA	HA	HA
4/1/02		~~F1~~	HC, ~~F7~~		HA		HA			
4/9/02		~~F1~~	~~F1~~							
4/16/02				HA					HA	
4/29/02	~~F1~~						~~F15~~(1)		~~F15~~(1), ~~F7~~(1)	
5/15/02 (2)	HA	~~HA~~(5)	~~HA~~(5)							
6/4/02					HA	HA	HA			
6/12/02								HA		HA
6/18/02				HA					HA	
6/25/02		HA	HA							
7/9/02				F	F		F			F
7/16/02	HA					HA	HA			
7/23/02		F	F						F	
8/6/02	~~HC~~(6)						~~HC~~(6)			
8/20/02 (3)	~~F7~~					~~F7~~		~~F7~~		
8/27/02					~~HA~~(7)					~~HA~~(7)
9/10/02				HC	HC				HC	
9/24/02 (4)	~~F~~(8)					~~F~~(8)		~~F~~(8)		
12/17/02 (Wet)	HA		HA	HA					HA	HA
2/12/03 (Wet)		HA			HA	HA	HA	HA		

HA-Hyalella acute test.
HC-Hyalella chronic test
F-Complete Fathead 28 day test
F1-Fathead 1-day test. High mortality in site water resulted in early termination of test.
F7-Fathead 7-day test. High mortality in site water resulted in early termination of test.
F15-Fathead 15-day test
1-These tests were run as experiments to assess the sensitivities of juveniles vs. larval fathead minnows and mechanisms for running the fathead tests successfully without high initial mortality.
2-The renewal concentrations for the tests run on this date were switched for the 150 mg/L and 250 mg/L concentrations. The laboratory reported the results and felt that they were able to take into account the effect of this switch during the statistical analysis of the results.
3-Problems with pH control, test rerun on 9/24/02.
4-MHW sample contained parasite, no results.
5-Dissolved oxygen levels dropped below required minimum levels for an extended period of time so the tests were rejected for QA/QC reasons.
6-Control results were below acceptable levels and dissolved oxygen levels dropped below required minimum levels for an extended period of time so the tests were rejected for QA/QC reasons
7-Control results were below acceptable levels so the tests were rejected for QA/QC reasons
8-A parasite was found in the laboratory dilution water sample so the tests were rejected for QA/QC reasons.

Only three *Hyalella* acute samples were collected at SGR1 due to a malfunctioning valve. During the summer, much of the water from the San Jose Creek WRP is diverted to spreading grounds for reclamation purposes. In order to maintain consistent samples throughout the monitoring events, the amount of flow diverted to the spreading grounds had to be adjusted during sampling events. For a period of time during the monitoring events, the valve that adjusted the flow volumes was broken and could not be used to reduce the diversion volumes. Because of the requirement that samples be collected at least three weeks apart, an additional sample could not be collected during the dry season to replace the sample that could not be collected due to the malfunctioning valve.

Prior to this study, ten acute *Hyalella* initial samples were collected on the Los Angeles River and San Gabriel River and one chronic *Hyalella* test was collected on the San Gabriel River to assess the possibility for developing a WER on these waterbodies. Two samples were collected at each of five sites at different locations in the river (i.e. mid-stream and edge) to determine the spatial variability of the WER across the channel or at the same location to determine the reproducibility of the results. The data from this initial study that were collected at the same sites as the current study or at nearby sites within the same reach are included in this analysis. The following table lists the initial study sample locations. All acute samples were collected on October 4, 2000. A chronic sample was collected on the San Gabriel River at site SGR-R9W during June 2001. The chronic study collected at SGR-R9W was a 42-day test with both survival and reproductive endpoints.

Table 3. Sampling Locations for Initial Study

Location ID	Receiving Water	Description	Relationship to WER Sampling Locations	Date of Sample Collection
LA-R8	Los Angeles River	Downstream of DC Tillman at Coldwater Canyon	About 2 miles downstream LA1	10/4/00
LA-R4*	Los Angeles River	Upstream of LA-Glendale at Riverside Dr.	About 4 miles upstream of LA2	10/4/00
LA-R7	Los Angeles River	Downstream of LA Glendale at Los Feliz	Just downstream LA2	10/4/00
SGR-R4	San Gabriel River	Downstream of San Jose Creek WRP and upstream of Los Coyotes at Alondra Blvd.	Just downstream of SGR1	10/4/00
SGR-R9W	San Gabriel River	Downstream of Los Coyotes at Willow	SGR2	10/4/00

Note: *Data from LA-R4 is not included in calculations of the final WERs and SSOs presented in this report.

SAMPLING AND ANALYSIS METHODS

Samples were collected and analyzed based on the methods provided in the work plan for the study (See Appendix 1). Additionally, the complete details of all of the analytical work are included in the laboratory results provided by the laboratory and available for review upon request (16 binders of data).

Samples were collected as grab samples using an intermediate container method or by pumping into 5-gallon containers. At the laboratory, the necessary test volumes were obtained by compositing the individual sample bottles. Sample aliquots were then taken from the composited water and sent to the analytical laboratory EnviroMatrix Analytical, Inc. for analysis of the water quality constituents other than ammonia, pH, temperature, and dissolved oxygen.

Laboratory dilution water was composed of synthetic moderately hard water prepared in advance of the testing. One batch of water was prepared and used for all renewal samples needed during the testing process. The following tables summarize the key aspects of the sampling and analysis methods for the study.

Table 4. Analysis Methods

Constituent	Method of Analysis
Acute *Hyalella*	EPA/600/R-99/064
Chronic *Hyalella*	EPA/600/R-99/064
Chronic Fathead Minnow	EPA/600/4-91/002
Hardness	EPA 130.2
Alkalinity	EPA 310.1
Total Chlorine Residual	EPA 330.5
Turbidity	EPA 180.1
Chloride	SMEWW 4500 CL C
TOC	SMEWW 5310 B
TSS	SMEWW 2540 D
TDS	SMEWW 2540 C
Settleable Solids	SMEWW 2540 F
Sulfate	SMEWW 4500 SO4 E
BOD	SMEWW 5210 B
Calcium	EPA 3010/6010
Potassium	EPA 3010/6010
Sodium	EPA 3010/6010
Dissolved Oxygen	EPA 360.1
Conductivity	EPA 120.1
pH	EPA 150.1
Ammonia	EPA 350.3

Table 5. Analysis Protocols Summary

Analysis Component	Method Used
pH Buffers used for testing and pH study	Aeration, NaOH and HCl depending on the pH adjustment needed
Bottles	2.5 gallon glass pickle jars and 5 gallon glass carboys
Source of Organisms	Aquatic Indicators and in-house cultures for *Hyalella*, Aquatic Biosystems for fathead minnow
Age of Organisms	6-13 days *Hyalella*, Less than 24 hours old fathead minnow
Test Chamber	500 mL glass jars containing 250 mL water
Number of organisms	10 animals per replicate and surrogate
Dilutions	Four replicates and a surrogate with 7 dilutions to start, reduced to 5 dilutions after ranges established
Feeding methods	Acute *Hyalella* fed 1 mL of Wheat Grass slurry or YCT on Day 2, Chronic fed daily, Fathead fed newly hatched *Artemia* two times daily
Ammonia measurements	Two cross-calibrated instruments on surrogate containers
Renewal method	Acute samples renewed on Day 2, Chronic samples renewed daily
Dilution preparation method	Spiked samples with increasing amounts of ammonium chloride
Data analysis method and software used	ToxCalc v5.0.23
Photoperiod	16 hours light, 8 hours darkness

Detailed discussions of individual events and any protocol deviations are included in the laboratory results for the study.

Study Results

The results of the study are summarized in the tables in Appendix 2-Summary of Study Results. The complete laboratory reports are contained in sixteen binders of results that can be supplied upon request. These binders contain all of the laboratory records for the study and present both total and un-ionized ammonia toxicity results for each sample. In addition to the toxicity results, all of the results of the water quality analyses are included in these binders as well. Additionally, an electronic database of the results of the study has been developed and is available for review upon request from Larry Walker Associates.

QA/QC Analysis and Review

The work plan for the study (Appendix 1) contains a number of quality assurance/quality control (QA/QC) requirements for the sample collection and analysis. This section summarizes the QA/QC issues that occurred during the testing, steps taken to resolve the issues, and any tests that were considered unacceptable for analysis based on the results of the review. For details on the QA/QC requirements for the study, see Section 4 of the workplan in Appendix 1.

TEST ACCEPTABILITY

All tests were reviewed and a summary of all the QA/QC requirements in the WER is included as Appendix 3 – QA/QC Requirements. Although a number of deviations from the testing protocol were determined, only a few were considered to have a significant impact on the test results. Listed below are the two criteria used to determine if a test was unacceptable for the purposes of the study:

1. Survival in the laboratory dilution water control test was below the acceptable level for the test.
2. Dissolved oxygen levels in the test were below the minimum required value (3.5 mg/L for *Hyalella* and 4.0 for fathead minnow) for more than 10% of samples collected during the testing period (approximately more than 1 day in all of the dilutions in the acute tests).

In some cases, control survival in the site water was below the required survival rate. These tests were still considered acceptable as long as the survival rate in the laboratory dilution water control was acceptable, because the control samples in site water all contained some ammonia that might have impacted the survival of the test organisms.

These two criteria were used to eliminate unacceptable test results from the WER analysis because the EPA ammonia criteria documents used both the control survival and the dissolved oxygen levels to determine whether or not a particular study would be included in the calculation of the national ammonia criteria. Additionally, it was clear from the data review that these two issues had impacted the results of at least some of the tests that failed the criteria.

Although the two criteria discussed above were the only ones used to reject test results, the QA/QC review also examined the other QA/QC criteria identified in the WER guidance. The QA/QC criteria in the guidance is meant to provide a framework for conducting the tests in the most consistent manner possible and provide a mechanism for assessing if any toxicity tests are not appropriate for data analysis because of the occurrence of major problems (the two conditions identified above) or the sum total of a large number of minor issues. Because of the difficulty in conducting tests with living organisms in site water and the natural variability that occurs during any type of water quality testing, some other less than ideal conditions occurred in some of the tests. However, in the context of the results and the rest of the conditions during the testing, none of these variations was considered to have a significant impact on the test results and no tests were rejected as a result of the variations. The following issues were the ones most commonly identified during the QA/QC review:

- Temperature deviations were found in most tests, but the deviations were just outside the acceptable range in most cases.
- Turbidity was not run on any of the samples collected after 3/4/02. Turbidity was inadvertently left off of the Chain-of-Custody during the April monitoring events and subsequent to those events, the lab requested that the COC just state "water chemistry" rather than detailing out all of the constituents. The lab apparently then based the water chemistry analysis on the inaccurate April COCs and turbidity analyses were not completed after the first two events.

- There were occasional inversions in the data (a lower concentration dilution had a lower survival than a higher concentration dilution), especially in site water, and occasional non-normal distributions.
- The 36-hour holding time was exceeded in a few samples because the laboratory was not able to set up all of the tests as quickly as planned.

The QA/QC review resulted in the decision to not use the results from a few of the collected samples. Because an additional sample was collected at each site, the number of samples per site was still sufficient to calculate the WER and SSO values. Following is a discussion of the specific QA/QC issues for each type of test, as well as the tests that were considered unacceptable for the purposes of the study.

HYALELLA

Four site water and one laboratory water acute *Hyalella* tests were rejected from this study. One set of tests was rejected because the survival in the control was unacceptable. Two other tests were rejected because the dissolved oxygen fell below the minimum level for over 10% of the testing. The rejected samples are explained below:

- LA1 from 5/15/02-The dissolved oxygen levels were below the minimum level in 20% of the measurements.
- LA2 from 5/15/02-The dissolved oxygen levels were below the minimum level in 40% of the measurements.
- 8/27/02 tests because the laboratory dilution water control survival was only 45%. The samples from SJC1 and RH1 for this sample date were rejected because of the control survival and the fact that no acceptable side-by-side laboratory dilution water test was available for WER calculations.

For each of these tests, the QA/QC problems appeared to have had a significant impact on the test results. For the LA1, LA2 and 8/27/02 tests, the toxicity results were significantly lower than the results obtained during other events. For the laboratory dilution water test on 8/27/02, the result was greater than a factor of 2 lower than the average of all of the other tests collected during the study, and therefore could have been considered unacceptable from that perspective as well. None of the other tests that were accepted for use in the study demonstrated significant deviations from the other test results.

For the chronic *Hyalella* studies, the control survival in the laboratory dilution water test conducted on 8/6/02 was slightly below the acceptable level (80%) at 77.5%. Additionally, both the site water tests for this date (SCR2 and BW1) had dissolved oxygen levels below the minimum value for more than 10% of the testing period. Therefore, the set of tests from 8/6/02 was considered unacceptable and was rejected from this study. In the June 2001 initial chronic test, the control survival in the laboratory dilution water was below the acceptable level and a reproductive endpoint could not be determined because the majority of the organisms died before the 42-day period was completed. Therefore, a chronic WER could not be calculated and this test was rejected from the analysis.

FATHEAD MINNOW TESTS

A number of problems occurred in the initial toxicity tests for fathead minnows. These initial tests resulted in very high mortality in the first 24 hours of the test at levels over 10 mg/L of total ammonia. The tests were being run at a target pH of 8.0, but the pH in some cases was as high as 8.5. The testing protocols were changed so that the tests were run at a lower pH and lower temperature. The protocol changes allowed the testing to proceed successfully. Therefore, a number of short-term tests were run in April and May 2002 to determine a successful procedure to run the test. None of these tests were conducted for the full 28 days and are therefore not considered acceptable for this study.

In July through September 2002, complete 28-day tests were conducted at all of the sites. One set of tests (9/24/02) was unacceptable for use in this study because the laboratory dilution water fathead minnows were found to have a parasite. For that reason, no results were obtained in the laboratory dilution water for the 9/24/02sample date. Consequently, the site water samples collected on that date (BW1, SGR1, and SCR1) do not have an acceptable laboratory dilution water test available for calculating a WER and could not be used for this study.

LABORATORY DILUTION WATER TEST ACCEPTABILITY

In addition to the QA/QC requirements, the laboratory dilution water results were compared to laboratory dilution water tests from other laboratories/studies to determine if the tests were acceptable. In addition, the test results in lab water from this study were compared to the average result for all of the laboratory water tests to determine if any were outside of the range of the other tests.

In order for the tests to be considered acceptable, the results in laboratory water need to be within a factor of 2 of the results in laboratory water from other studies. Ankley et. al, 1995, was used for the acute *Hyalella* comparison. For the chronic *Hyalella* and chronic fathead minnow tests, the results from the criteria document were used for comparison. (The results from the criteria document for the *Hyalella* chronic test are not directly comparable to the tests that were run for this study because the chronic test cited in the criteria document was a 42-day test with a reproductive endpoint, and this study conducted a 21-day test with a growth endpoint. However, since the chronic studies are not used for the calculation of the SSOs for the study, this comparison does not impact the study results. Therefore, the information on chronic test results is shown for informational purposes only).

One of the difficulties with the acute comparisons was that the other lab tests were run in waters with different ion compositions and different hardness. The results of this study demonstrate that ionic concentrations and hardness can impact the toxicity of ammonia to *Hyalella*. Consequently, the waters with compositions that were considered most similar to the laboratory dilution waters for this study (moderately hard water, rather than soft or hard water, with the pH closest to 8.0) were used. In addition, all of the results were normalized to pH 8 for comparison purposes. Table 6 and Table 7 summarize the results from this study as compared to the other laboratory results. In addition to comparing the study results to results from the Ankley study and the criteria document, the average of the results from this study was also compared to determine if all of the study results were within a factor of 2 of the average.

Table 6. Acute Laboratory Dilution Water Test Comparison

Event Date	Test Type	MHW Adjusted to pH 8 in mg-N/L	Factor of Difference for Other Lab Studies [1]	Factor of Difference for Average WER Study Result [2]
Result at pH 8 in mg-N/L			**71** [3]	**56.3** [4]
1/31/02	Hyalella Acute	71.8	1.0	1.3
3/4/02	Hyalella Acute	70.5	1.0	1.3
4/1/02	Hyalella Acute	47.0	1.5	1.2
4/16/02	Hyalella Acute	65.6	1.1	1.2
5/15/02	Hyalella Acute	61.6	1.2	1.1
6/4/02	Hyalella Acute	64.8	1.1	1.2
6/12/02	Hyalella Acute	38.6	1.8	1.5
6/18/02	Hyalella Acute	48.2	1.5	1.2
6/25/02	Hyalella Acute	52.3	1.4	1.1
7/16/02	Hyalella Acute	45.3	1.6	1.2
12/18/02	Hyalella Acute	88.9	1.3	1.6
2/12/03	Hyalella Acute	40.3	1.8	1.4
10/4/00	Hyalella Acute	37.4	1.9	1.5

1. The results in this column show the factor of difference between the results published by Ankley, et. al, 1995 and the results of the laboratory dilution water test associated with each sampling event.
2. The results in this column show the factor of difference between the average of the laboratory dilution water study results for this WER study and the results of the individual laboratory dilution water test associated with each sampling event.
3. The result from Ankley, et. al, 1995 adjusted to pH 8.
4. The average of the laboratory dilution water samples collected during this WER study.

Table 7. Chronic Laboratory Dilution Water Test Comparison

Event Date	Test Type	MHW Adjusted to pH 8, Temp 25 in mg-N/L	Factor of Difference for Other *Hyalella* Chronic Lab Studies [1]	Factor of Difference for Other Fathead Minnow Chronic Lab Studies [1]
Result at pH 8, Temp. 25 in mg-N/L			**1.45**[3]	**3.09**[4]
7/9/02	Fathead Chronic	6.2		2.0
7/23/02	Fathead Chronic	7.9		2.6
4/1/02	Hyalella Chronic	2.94	2.0	
9/10/02	Hyalella Chronic	0.52	2.8	

1. The results in this column show the factor of difference between the results for the *Hyalella* chronic study presented in the 1999 ammonia criteria and the results of the laboratory dilution water test associated with each sampling event.
2. The results in this column show the factor of difference between the results for the fathead minnow chronic study presented in the 1999 ammonia criteria and the results of the laboratory dilution water test associated with each sampling event.
3. The chronic *Hyalella* GMCV from the 1999 ammonia criteria document.
4. The chronic fathead minnow GMCV from the 1999 ammonia criteria document

In all cases, the *Hyalella* acute tests were less than a factor of 2 different from the Ankley results and from the average of the other tests in the study. Therefore, they were all considered acceptable for calculating WERs. The fathead chronic results were higher than the criteria document results by a factor of 2. One of the *Hyalella* chronic results was a factor of 2 higher than the criteria document results and one was almost a factor of 3 lower. The observed differences might be attributable to the differences in the test endpoint and duration and do not directly indicate that the tests are problematic. In most cases, the study results are higher than the other laboratory results that they are compared to, so the WERs determined in this study would be lower than predicted by the other laboratory results. One of the *Hyalella* chronic studies is lower than the other study result, but the other chronic *Hyalella* test is higher. Both result in WERs that are at least three times higher than the acute WERs (see Table 12) so the discrepancies do not dispute the fact that the use of acute WERs is conservative for this study. Additionally, none of the chronic tests were used in the WER calculations, therefore, the discrepancies in these results are not considered problematic for the study.

WER CALCULATIONS AND ACCEPTABILITY

The final step in reviewing the data was to compare the water quality during the sampling to typical conditions at the sites. Table 8 summarizes the average water quality during the testing (in the rows marked "WER Study") as compared to average conditions at the POTW receiving water monitoring location (where historic monitoring data were available) nearest to the sampling location (marked "Typical Conditions"). The results were almost all within the range reflective of the typical conditions (i.e. mean plus or minus two standard deviations) and were considered acceptable. The "Typical Conditions" rows show the mean of the historic data with the mean plus or minus two standard deviations in parentheses so that the out of range values could be determined. The few cases where the results were out of range are highlighted in bold and italics in Table 8.

Table 8. Water Quality Conditions During Testing as Compared to "Typical" Conditions (1)

Discharger	Station		Average Ammonia (mg/L-N)	Average Hardness (mg/L)	Average Alkalinity (mg/L)	Average DO (mg/L)	Average TDS (mg/L)	Average Chloride (mg/L)	Average Conductivity (mg/L)	Average pH
Pomona	WER Study (SJC1)		7.5	189	207	9.1	487	117	863	7.6
	Typical Conditions (RA)	Average	5.0				400	86		7.38
		Range [2]	0.78-9.18				2-798	20-152		6.14-8.62
		Number Samples	11				6	9		190
Saugus	WER Study (SCR1)		10.1	198	190	8.7	695	***196***	1233	7.4
	Typical Conditions (RB)	Average	9.7	259	253		712	125	1226	7.24
		Range [2]	1.88-17.48	185-333	159-347		590-834	83-167	986-1466	6.86-7.62
		Number Samples	95	86	56		16	15	50	340
Valencia	WER Study (SCR2)		6.7	333	246	8.8	743	122	1279	7.8
	Typical Conditions (RE)	Average	4.1	379	257		775	96	1285	
		Range [2]	0-9.53	311-447	205-309		477-1073	56-136	1073-1497	
		Number Samples	90	83	53		16	15	47	
San Jose Creek	WER Study (SGR1)		4.4	***181***	159	8.7	498	114	816	7.5
	Typical Conditions (R3)	Average		200						
		Range [2]		198-202						
		Number Samples		4						
Los Coyotes	WER Study (SGR2)		4.2	***242***	198	9.8	664	175	1184	8.3
	Typical Conditions (R5)	Average	5.6	224						
		Range [2]	1.42-9.82	218-230	219-238					
		Number Samples	6	2						
Long Beach	WER Study (CC1)		2.4	243	***228***	9.2	709	145	1202	8.3
	Typical Conditions (RA)	Average	5.0	268	***146***	12.8	856	151	1497	7.65
		Range [2]	0.6-9.4	202-334	(4)	0-26.6	468-1244	93-209	0-3073	6.91-8.39
		Number Samples	59	2	1	54	55	48	55	369
Whittier Narrows [3]	WER Study (RH1)		0.7	***177***	170	8.3	449	85	***715*** [5]	7.8
	Typical Conditions (RA)	Average	5.6	227	120		469	79	997	7.52
		Range [2]	0-15.8	181-273	0-286		417-521	73.2-84.8	925-1069	6.62-8.42
		Number Samples	6	17	4		3	3	3	[illegible]
LA Glendale	WER Study (LA2)		7.8	251	199	8.5	563	***134***	1019	7.8
	Typical Conditions (R7)	Average	6.5	284		9.3	644	107	1034	7.61
		Range [2]	2.5-10.5	216-352		6.45-12.05	546-742	83-131	[illegible]	7.41-7.81
		Number Samples	9	9		27	9	9	9	27
DC Tillman	WER Study (LA1)		11.5	174	188	8.3	511	***147***	1010	7.9
	Typical Conditions (R8)	Average	8.8	282		11.0	689	109	1079	8.05
		Range [2]	4.03-13.63	132-432		6.0-16.0	471-907	88.4-129.6	771-1387	7.51-8.62
		Number Samples	9	9		27	9	9	9	27
Burbank	WER Study (BW1)		14.2	212	217	10.7	522	124	981	8.3
	Typical Conditions (R5)	Average	16.0	270			599	123	1166	[illegible]
		Range [2]	6.2-25.8	196-344			333-865	63-183	928-1404	7.48-8.52
		Number Samples	4	4			4	4	4	98

1. The stations that start with R (i.e. RA, RB, RE, etc.) are the "typical" conditions used for comparison in this analysis. These represent the POTW receiving water monitoring location that is closest to the chosen sampling location. The average conditions were taken from the work plan for this study. For the most part, the averages and standard deviations are based on data from 1996 to 2000. In some cases there are only a few data points during this period of time.
2. The range is equal to the mean plus or minus two standard deviations and is used to assess whether the sampling results are within the range of typical conditions.
3. Whittier Narrows began nitrification and denitrification between when the "typical" condition measurements were collected and this study. This is the likely reason for some of the differences in water quality downstream of this plant.
4. Only one data point was available for alkalinity so it is not possible to determine the range of typical conditions for this constituent.
5. The average conductivity at RH1 was significantly decreased by the wet weather event. If the average of just the dry events is calculated, the value is 810.

Chloride appears to be the one constituent that was present in higher concentrations than previously observed at more than one site. This is likely due to the fact that the water supply for this area has been higher in chlorides recently, as compared to past years, because of the drier than normal conditions over the past few years. Chloride is one of the constituents that may have an impact on toxicity. However, the overall ion composition (TDS) has the strongest influence, and it is not possible to separate out the impact of specific ions (See Data Analysis Section). Both TDS and conductivity are in the range of typical values at the three sites. Given that TDS is within typical values, it is unlikely that the higher chloride concentrations observed during monitoring had significant impacts on the observed toxicity.

QA/QC SUMMARY

The QA/QC analysis demonstrated that, except for 10 rejected site water sample results, the majority of the tests collected were acceptable for the analysis, the results of the acute *Hyalella* laboratory water results compared well with other laboratory studies, and the samples were collected during typical conditions. The rejected results do not prevent the development of WERs and SSOs for the waterbodies in the study.

Data Analysis

PH RELATIONSHIP CALCULATION

The toxicity of ammonia to aquatic organisms is partially dependent on the pH of the water. During the toxicity testing for this study, the pH of the laboratory dilution water was often different from the pH of the site waters being tested concurrently with the lab water, primarily because only one laboratory dilution water sample was run with multiple site waters that had different compositions. The composition of the water impacts the pH of the water and the ability of the water to remain at a given pH throughout the test (buffering capacity). Every effort was made to run the tests at the same pH. However, depending on the water composition, the pH of the sample often "drifted" higher or lower during the testing period and resulted in some differences in pH values across the tests. To be able to compare the toxicity in laboratory water to site water, the results of the two tests need to be adjusted to the same pH. The 1999 ammonia criteria document contains a pH relationship that could be used for the adjustment. However, the TAC for the study requested that the pH relationship for *Hyalella* be examined to determine whether or not it matched the pH relationship developed in the 1999 ammonia criteria document.

To address the TAC's concern, a separate pH investigation was conducted and the results of the investigation (as well as the results from all of the laboratory dilution water tests) were compared to the pH relationship identified in the 1999 ammonia criteria document to determine if differences existed that justified the development of a separate pH relationship for *Hyalella*. The first pH investigation was conducted in October 2002. This investigation targeted pH values that were 0.2 units apart from each other over the range of 7.6 to 8.6. Throughout the investigation it was difficult to control the pH well enough to see differences between the targeted pH ranges. Additionally, control survival during the tests was significantly less than the acceptable acute *Hyalella* survival of 90% for most of the tests. Consequently, this investigation was not considered to be acceptable and another investigation was run in January 2003. For this pH investigation, a smaller number of tests were run which targeted pH values of 6.5, 7.5, and 8.5. The control results from these tests were adequate and the wider range of target pHs allowed differences between the individual results to be assessed. However, the small number of tests run made it difficult to make significant conclusions based on these tests alone. Therefore, both the pH investigation results and all of the results from the laboratory dilution water tests run during the study were considered in assessing the pH relationship for *Hyalella*.

As a first step, the results of the pH investigation were compared to the pH relationship equation from the 1999 ammonia criteria document. The results from the pH investigation demonstrated a linear relationship for the pH values tested during the investigation (actual pHs of 7.1-8.0 based on the targets of 6.5, 7.5, and 8.5). The pH relationship in the 1999 ammonia criteria document is approximately linear for these pHs. The slopes of the two lines are similar, though the one developed through the special pH investigation is slightly less steep than the 1999 ammonia criteria document relationship. The pH investigation also demonstrated greater toxicity (lower LC50s[1]) than would have been predicted by the criteria equation, but at the higher pHs usually seen in the river, the predicted toxicity is much more similar. The following graph (Figure 1) compares the investigation to the criteria equation. In Figure 1, the solid line is a linear regression of the pH relationship from the criteria document for the pH range of 7.1-8.0, while the dotted line is the linear regression of the relationship measured in the pH investigation. The triangles represent the actual values measured in the pH investigation and the squares show the actual values of the pH relationship from the criteria document.

[1] LC50 is the concentration of ammonia that caused 50% of the test organisms to die during the testing period.

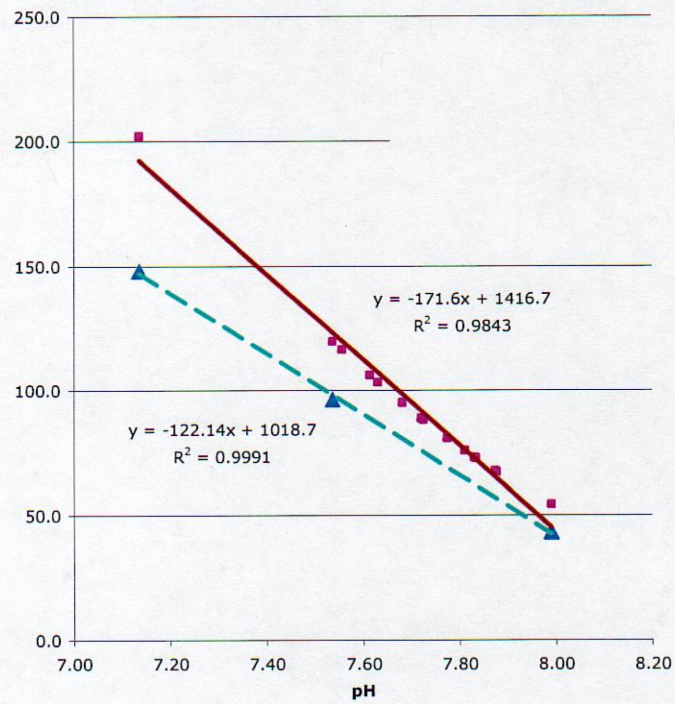

Figure 1. Comparison of pH Study Regression Line to Criteria pH Equation Regression Line

The slopes and intercepts of the two lines were compared based on the 95% confidence interval to determine if significant differences existed between the two lines. For the criteria predicted regression equation, the slope is equal to –171.6 ± 12.7 (-184.3 to –158.9) and the pH investigation slope is equal to –122.1 ± 44.4 (-166.5 to -77.7). The confidence intervals for the slopes of the two lines overlap, indicating that significant differences may not exist between the two slopes. The same is true of the intercepts for the two lines. For the criteria predicted regression equation, the intercept is equal to 1416.7 ± 97.7 (1319 to 1514.4). The intercept for the pH investigation is equal to 1018.7 ± 336 (682.7 to 1354.7). Therefore, differences between the two pH relationships (for the pHs of concern in this study) can not be determined with sufficient confidence to warrant the development of a separate relationship for this study.

Secondly, the actual results of all of the laboratory dilution water tests were combined with the pH investigation results and compared to the predicted LC50 value based on the criteria relationship. For each of the laboratory dilution water results, the LC50 value predicted by the criteria equation for that pH was calculated. The actual LC50 results were then compared to the predicted values to determine if significant differences existed. The following graph (Figure 2) shows the comparison of the actual results to those predicted by the criteria equation. In the figure, the squares represent the laboratory dilution water sample results collected during the study and the triangles are the results from the pH relationship study. The solid line is the criteria equation pH relationship with the 95% confidence intervals around the relationship represented by the dotted lines in the figure.

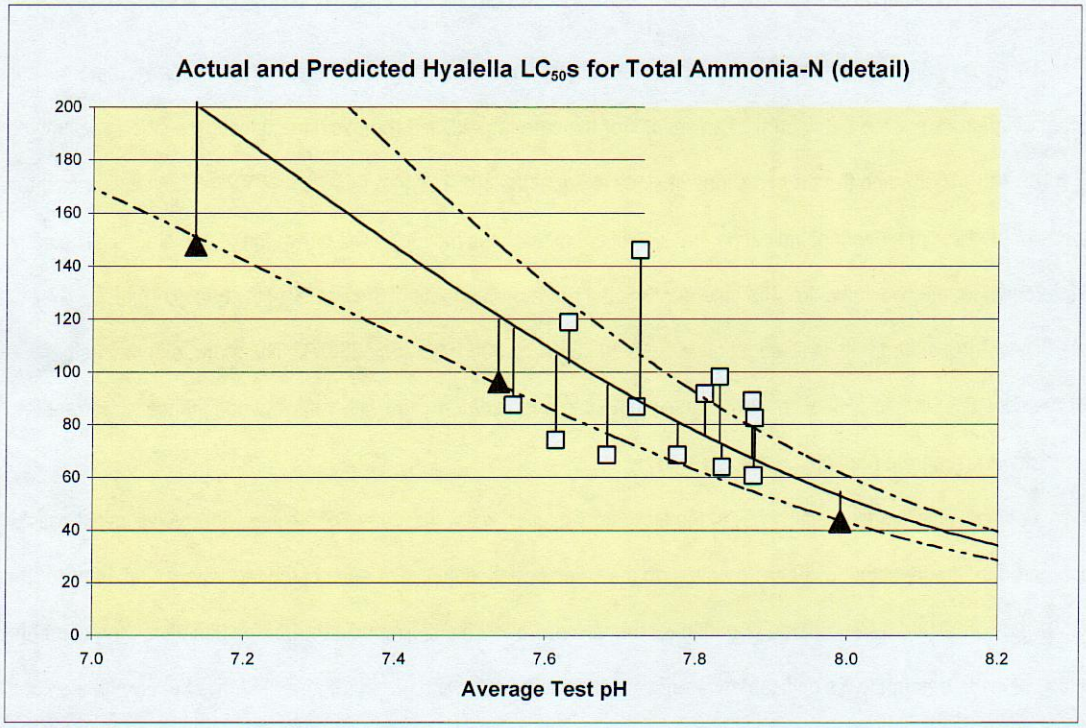

Figure 2. Comparison of Laboratory Dilution Water Results to LC50s Predicted by Criteria pH Equation

As shown in Figures 1 and 2, the pH relationship measured in this study is not different enough from the relationship in the USEPA criteria document to justify development of a separate relationship for this study. As such, a unique pH relationship for ammonia toxicity to *Hyalella* is not justified to establish SSOs in this study. Over half of the data points from this study fall within the 95% confidence interval for the EPA pH relationship, and (except for one datapoint) the remaining values are just outside of the confidence interval range. The variability of the study results is clustered around the criteria equation line and no clearly different relationship can be determined based on this data. The study results (7.1 to 8.0) cover the average pH values found in most of the waterbodies being studied (7.34 to 8.05). It is possible that outside of this range, the pH relationship may vary more significantly from the criteria relationship. However, the collected data are more similar to the EPA pH relationship at higher pHs that are of more concern in these waterbodies than the lower pH range. None of the information collected indicates that significant variation from the EPA pH relationship would occur at higher pHs where data were not collected. Therefore, the comparison demonstrated that, for the average pHs found in the waterbodies in this study (7.34 to 8.05), the pH relationship for *Hyalella* does not appear to be significantly different and, therefore, no separate pH relationship was warranted for development of WERs in this study.

In addition, the use of the pH relationship developed specifically for this study would result in higher WERs than those developed using the pH relationship from the criteria document. Table 9 provides some examples of the WERs found using the EPA pH relationship as compared to the study specific pH relationship. Based on the pH study conducted, a linear relationship provides a good fit to the available data and is the best relationship that could be determined based on the available data. .

Table 9. Comparison of WERs Based on EPA and Study-Specific pH Relationships

Site	EPA pH relationship based WERs	Study specific pH relationship based WERs
LA1	2.457	3.798
LA2	2.176	3.939
BW1	1.603	2.257
SGR1	1.407	1.425
SGR2	1.929	2.148
CC1	1.822	3.972
SJC1	1.350	1.767
RH1	2.076	2.549
SCR1	2.787	6.221
SCR2	2.296	4.476

As shown in the table, the study-specific pH relationship WERs are much higher and much more variable than the EPA pH relationship WERs. Consequently, the use of the EPA pH relationship is a conservative approach to determining the WERs for the study.

OTHER CONSTITUENT RELATIONSHIPS

The premise of this study was that ionic constituents present in waterbodies in Southern California reduced the toxicity of ammonia to *Hyalella* and potentially to other aquatic organisms. In addition to calculating a SSO based on these conditions, the water quality constituents were compared to the toxicity results and the WER results to assess if any clear relationships existed. To conduct this assessment, two approaches were taken. First, correlation coefficients were developed to determine if any water quality constituents were strongly correlated with the toxicity results and also to assess which water quality constituents were related to each other. Secondly, a stepwise, multiple regression analysis was used to determine if an equation could be developed to predict the toxicity based on water quality parameters. In order to conduct these analyses, all of the results of the study were adjusted to a pH of 8.0 using the criteria pH relationship equation.

CORRELATION COEFFICIENT ANALYSIS

Table 10 and Table 11 are correlation matrices containing all of the water quality constituents that could impact toxicity as compared to the toxicity results, the WER, and each other. Both the logarithm of the concentration and the concentration itself were compared and it was determined that the log of the concentrations were much more strongly correlated than the direct concentration and is shown in the tables. The tables show the correlation coefficients for each comparison. As the correlation coefficients get closer to ±1.0, the stronger the relationship between the two variables. Coefficients over ±0.6 are considered significant correlations that might impact the regression analysis.

Table 10. Correlation Matrix of Toxicity Results to Water Quality Constituents

Correlation Matrix
Row exclusion: WQ Stat analysis

	LC50 pH 8	ln(Sodium)	ln(Potassium)	ln(Calcium)	ln(BOD)	ln(Sulfate)	ln(TDS)	ln(Chloride)	ln(Hardness)
LC50 pH 8	1.000	.561	.435	.373	-.162	.463	.551	.560	.425
ln(Sodium)	.561	1.000	.771	.711	-.448	.809	.953	.968	.772
ln(Potassium)	.435	.771	1.000	.418	-.235	.523	.697	.828	.578
ln(Calcium)	.373	.711	.418	1.000	-.248	.877	.727	.626	.938
ln(BOD)	-.162	-.448	-.235	-.248	1.000	-.389	-.305	-.396	-.248
ln(Sulfate)	.463	.809	.523	.877	-.389	1.000	.781	.714	.919
ln(TDS)	.551	.953	.697	.727	-.305	.781	1.000	.936	.777
ln(Chloride)	.560	.968	.828	.626	-.396	.714	.936	1.000	.703
ln(Hardness)	.425	.772	.578	.938	-.248	.919	.777	.703	1.000

35 observations were used in this computation.
4 cases were omitted due to missing values.

Table 11. Correlation Matrix of WERs to Water Quality Constituents

Correlation Matrix
Row exclusion: WQ Stat analysis

	WER	ln(Sodium)	ln(Potassium)	ln(Calcium)	ln(BOD)	ln(Sulfate)	ln(TDS)	ln(Chloride)	ln(Hardness)
WER	1.000	.640	.438	.509	-.343	.604	.631	.592	.577
ln(Sodium)	.640	1.000	.771	.711	-.448	.809	.953	.968	.772
ln(Potassium)	.438	.771	1.000	.418	-.235	.523	.697	.828	.578
ln(Calcium)	.509	.711	.418	1.000	-.248	.877	.727	.626	.938
ln(BOD)	-.343	-.448	-.235	-.248	1.000	-.389	-.305	-.396	-.248
ln(Sulfate)	.604	.809	.523	.877	-.389	1.000	.781	.714	.919
ln(TDS)	.631	.953	.697	.727	-.305	.781	1.000	.936	.777
ln(Chloride)	.592	.968	.828	.626	-.396	.714	.936	1.000	.703
ln(Hardness)	.577	.772	.578	.938	-.248	.919	.777	.703	1.000

35 observations were used in this computation.
4 cases were omitted due to missing values.

As shown in the matrix, all of the ions that were analyzed for the study showed very similar correlations to the ammonia toxicity result and the WER. The results also show that the ions are all very strongly correlated to each other. This poses a potential problem for regression analysis because the correlations between the constituents can make it difficult to distinguish impacts from an individual constituent.

MULTIPLE REGRESSION ANALYSIS

To address the significant correlation between the constituents, both forward and backward stepwise techniques were used to determine if the significant correlations between constituents determined above impacted the results of the analysis. Scatter plots were developed for some of the constituents to see if anything other than a linear relationship was indicated by the data. Based on the plots and the significant correlation coefficients (which assume a linear relationship), linear regression was used for this analysis. It is possible that other, more complex, relationships exist between toxicity and water quality, but these were not assessed for this study and there was nothing that indicated another relationship was likely.

The correlations between the ions did have an impact on the regression analysis. The forward and backward analyses resulted in different equations when all of the ions were included. This indicates that the correlations between the individual constituents impacted the ability to conduct the analysis. A variety of combinations of constituents were used to try to remove the interference, but the results were generally the same. For toxicity, the forward regression resulted in sodium being the only factor impacting toxicity, while chloride showed up as the factor using the backwards regression analysis. However, both only had R^2 value for the predicted equations of 0.29. When a simple regression was conducted on the individual ions, sodium demonstrated the strongest relationship to toxicity (R^2 of 0.316), but chloride showed a similar strength relationship (R^2 of 0.314).

Stepwise regression was also used to examine the relationship of the WER to the water quality constituents. Similar results were found for the relationship to the WER, except that TDS was the determining factor in the backwards regression analysis rather than chloride. Slightly higher R^2 values were found for the relationship to the WER (0.38 for TDS and 0.391 for sodium). A simple regression analysis determined that both sodium and TDS produced equations with the exact same R^2 value (0.393). The relationships to the WER were slightly stronger than the relationships found for toxicity, but the analysis did not allow a distinction between the impacts of TDS as compared to sodium.

Finally, a multiple regression analysis was run using all of the ions and just the two that were determined from the stepwise analysis. The results of this analysis showed that the two ions alone (sodium and chloride for toxicity and sodium and TDS for the WER) have a better relationship to toxicity and the WER than all of the ions combined, but the combination produces lower R^2 values than either of the two constituents on their own.

Principal Components Analysis

Because the correlations between the ions made the regression analysis difficult to interpret, a principal components analysis was conducted to try to reduce the impact of the correlations. A principal components analysis takes all of the constituents and determines whether the relationships between them can be used to create a number of factors that represent the correlated constituents. So, rather than comparing eight or nine constituents to the toxicity and WER results, one or two factors that represent the constituents can be used in the comparison.

The analysis resulted in the development of two factors, one primarily accounting for the ions and the other representing the other constituents (i.e. BOD, TOC, hardness, etc.). A stepwise multiple regression analysis was run using these two factors to see if a better fit to the data could be found. The results of the analysis confirmed that the ions are the major factor influencing the toxicity. The other factor did not show up in the final stepwise regression equation, indicating that it was not significant. However, the predictive ability of the factor representing ions was not any better than the previous analysis. Therefore, it was determined that the use of the factor did not provide any additional information to the analysis. The use of an individual ion, such as chloride, sodium, or TDS, appears to provide the best relationship for predicting toxicity or a WER.

Site-by-Site Analysis

As a final step in the analysis of the water quality constituents, regression analyses were conducted on a site-by-site basis using the toxicity results and the WERs. The purpose of this analysis was to determine if some of the variability that could not be accounted for in the previous analysis was reduced when the results were examined on a site-by-site basis. The results of the site by site analysis indicate that different ions had the strongest impact on the toxicity and WER results in different waterbodies. Except for SCR2, all of the sites showed a relationship to at least one ion that had a R^2 value greater than 0.6. However, there was no consistency among the sites as to which ion had the strongest relationship and often the strongest relationship was different for the toxicity values at the site as compared to the WER results. For RH1 and SGR1, R^2 values over 0.9 were found in the regression relationship for almost every ion. Multiple regression analysis could not be performed because there were not enough samples at each location to compare with the multitude of constituents measured. Consequently, the site-by-site analysis clearly demonstrates that relationships exist between toxicity and ammonia WERs and ions in the water. However, the ions having the most significant impact varies by site. This variability in the ion relationships between sites might be the reason that a clear relationship for specific ions could not be determined when all of the data were analyzed together.

In almost all cases, when significant correlations occurred between a constituent and LC50 or WER values (both on a site-by-site basis and cumulatively), increasing ion concentrations resulted in higher LC50s and WERs. The only exceptions to this trend were BW-1, CC-1, and SJC-1. At each of these sites, higher concentrations of ions generally result in lower WERs. No reasons for the differences at these sites could be found, and the ion concentrations and WERs found at these sites are similar to those found at the other sites.

Analysis Conclusions

Based on these analyses, it is clear than ions play a role in determining the toxicity of ammonia, but the results of this study can not be used to develop a clear, predictive relationship. Other studies that have been conducted have found similar results, that higher ion concentrations reduce the toxicity of ammonia to invertebrates. The prevailing theory is that the ions in the water increase the ability of the organism to excrete ammonia and potentially reduce the uptake of ammonium ions by the organism (Borgmann, 1997). Other water quality constituents, such as BOD and TSS, did not demonstrate significant relationships to ammonia toxicity.

The site-by-site analysis indicates that ions may play different roles in the individual waterbodies in Southern California, though the reasons for this are unclear. However, the general trend demonstrated in all of the analyses was that increasing concentrations of ions resulted in less toxicity and higher WERs as was expected based on the review of available studies on this topic.

The statistical analysis results are included as Appendix 5-Water Quality Statistical Analysis to this report.

Calculation of Final WER (fWER)

The calculation of the final WER for the study is based on the process outlined in the WER guidance document and summarized in the work plan for this study. The process involves calculating WERs for each of the dry weather events and taking the adjusted geometric mean of those WERs. That result is then compared to the WER calculated for wet weather events (hWER) to determine the final WER (fWER). The following summarizes the calculation process.

1. Adjust the pH of the laboratory water to the pH of the site water sample using the acute criteria equation (for chronic tests use the chronic criteria equation and also adjust temperature for invertebrates).
2. Calculate WER for each sample collected by dividing site water LC50 by adjusted lab water LC50.
3. Calculate adjusted geometric mean WER from dry weather samples.
4. Calculate hWER for wet weather samples.
5. Compare dry weather WER to hWER to determine fWER.

STEPS 1 AND 2: CALCULATION OF DRY WEATHER WERS FOR EACH SAMPLING EVENT

For each site and sampling event, the laboratory dilution water sample result was pH adjusted to match the corresponding site water pH. Then, dry weather WERs were calculated by dividing the site water result by the adjusted laboratory dilution water result. Table 12 summarizes all of the individual dry weather WERs calculated for this study, including the chronic fathead minnow and *Hyalella* results. For each site, two to three dry weather WERs were calculated based on the acute *Hyalella* samples (Acute *Hyalella* WER 1, Acute *Hyalella* WER 2, Acute *Hyalella* WER 3). Additionally, at some sites, another acute *Hyalella* WER was available from the initial study in October 2000 (Initial Study WER). As shown in Table 12, the chronic *Hyalella* tests resulted in WERs that were significantly higher than the acute WERs. The results confirm that the use of acute WERs for the study is quite conservative.

Table 12. Individual WER Results for Dry Weather Samples

Site	Acute *Hyalella* WER 1	Acute *Hyalella* WER 2	Acute *Hyalella* WER 3	Initial Study WER	Chronic Fathead WER	Chronic *Hyalella* WER
LA1	2.457		1.655	2.357	1.222	
LA2	2.176		1.723	2.467	0.937	7.025
BW1	1.603	1.446	1.316			
SGR1	1.407	1.473		3.950		
SGR2	1.929	1.849	3.202	3.726	1.476	35.88
CC1	1.822	2.099	2.791		1.405	30.70
SJC1	1.350	1.767			1.714	
RH1	2.076	2.226			1.304	44.59
SCR1	2.787	2.669	1.884			
SCR2	2.296	2.009	2.760		1.393	

To assess the variability of the WERs by site, a box plot (Figure 3) was created that shows the quartiles of the acute *Hyalella* WERs determined at each site and the median value (as shown by the middle line in each box) at each site. The plot shows that for most sites, the range of WERs determined was quite small and almost all of the sites had WERs that were statistically in the same range as the other sites. Only BW-1, SGR-1, and SJC-1 had median WERs that were outside the range of the other sites, while SGR-1 and SGR-2 demonstrated the largest range in WERs. The larger range at these sites is due to the higher WERs from the initial study. The likely reason for these higher WERs is the higher TDS values at these sites during the initial study period.

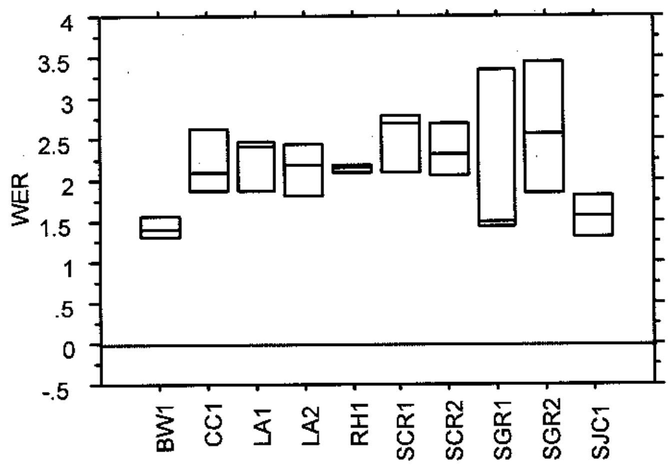

Figure 3. Box Plot of Dry Weather WERs Calculated for Each Site (WER1, WER2, WER3, and Initial Study WER)

Assessment of Initial Study Data

The initial study data were collected and analyzed using the same methods as those used to collect the remainder of the samples during the study and were subjected to the same QA/QC review. Additionally, the initial study data were accepted as the basis for developing a WER for these waterbodies and the results and sampling plan were included in the workplan for the study. Consequently, there is no reason to believe that these samples do not provide accurate information about the WER for the sampled waterbodies. However, because the samples were collected during a different time frame, the water quality and results were reviewed to determine whether or not there was any scientific reason to not use the initial study data to calculate the WERs.

First, the analytical methods, sampling methods, and QA/QC were carefully scrutinized to determine if any differences existed that would indicate that the initial study data were not valid when compared to the rest of the data. Following are the results of the analysis:

- Samples were collected at the same site for LA2, SGR1, and SGR2, but not LA1. The initial study site close to LA1 was LA-R8. LA-R8 is downstream of the Tillman POTW as is LA1 and is downstream of LA1, but is within the same reach as LA1. One additional site was sampled during the initial study, but is not included in the final analysis (LA-R4). Only those data collected from the same sites as the rest of the samples or a nearby site within the same reach will be used in the analysis.
- Two samples were collected at each site. The lowest WER obtained during the sampling will be used for the analysis.
- The same bottles and cleaning methods were used for the sampling. All of the samples collected during the initial study were collected using a clean intermediate container grab collection method. The remaining samples were collected using a combination of the intermediate container method and a pump with specially cleaned tubing. Additional sample volume was needed during later sampling events to ensure the ability to run the sample even if bottle breakage or other sample loss occurred. This resulted in the need to pump some of the samples to expedite sample collection time.
- The laboratory that conducted the testing for the initial study is the same laboratory that conducted the remainder of the tests.
- The laboratory used the same analytical methods for both sets of testing. The initial study samples were adjusted for pH using aeration. For the remainder of the study, pH adjustments were based on a combination of aeration and buffer addition.
- Dissolved oxygen, temperature, and pH were all measured on a daily basis during the testing.
- Daily observations were made of the condition of the *Hyalella.*
- Chloride, calcium, settleable solids, sulfate and BOD analyses were not run during the initial testing, but the remainder of the analytes tested during the rest of the study were analyzed.
- All QA/QC requirements for the testing were met (See Appendix 3).

Based on this review, the only substantial variation in the study protocol was the analysis of additional water quality parameters during the remainder of the study. Although the addition of the parameters allowed a more detailed analysis of the potential causes of the WER, the analysis does not impact the calculation of the WER. Therefore, for the samples collected at the same monitoring location or within the same reach as the rest of the study, no sampling or analysis method variations occurred that provide any reason to invalidate the initial study data.

Secondly, the water quality during the sampling period was examined to determine if any unusual conditions existed during the sampling. To assess this, the water quality during the initial sampling was compared to both the typical conditions discussed previously and the average conditions found during the work plan sampling. Table 13 summarizes those results.

Table 13. Water Quality Conditions During Initial Study as Compared to WER Study and "Typical" Conditions (1)

Discharger	Station		Average Ammonia (mg/L-N)	Average Hardness (mg/L)	Average Alkalinity (mg/L)	Average DO (mg/L)	Average TDS (mg/L)	Average Chloride (mg/L)	Average Conductivity (µS/cm)	Average pH
San Jose Creek	Initial Study (SGR-R4)		8.98	244	226		880			8.0
	WER Study (SGR1)		4.4	181	159	8.7	498	114	816	7.5
	Typical Conditions (R3)	Average		200						
		Range[2]		198-202						
		Number Samples		4						
Los Coyotes	Initial Study (SGR-R9W)		4.14	236	226		781			8.1
	WER Study (SGR2)		4.2	242	198	9.8	664	175	1184	8.3
	Typical Conditions (R5)	Average	5.6	224						
		Range[2]	1.42-9.82	218-230	219-230					
		Number Samples	6	2						
LA Glendale	Initial Study (LA-R7)		4.33	236	146		595			7.7
	WER Study (LA2)		7.8	251	199	8.5	563	134	1019	7.8
	Typical Conditions (R7)	Average	6.5	284		9.3	644	107	1034	7.61
		Range[2]	2.5-10.5	216-352		6.45-12.05	546-742	83-131	838-1230	7.42-7.81
		Number Samples	9	9		27	9	9	9	27
DC Tillman	Initial Study (LA-R8)		13.6	218	187		619		1100	7.5
	WER Study (LA1)		11.5	174	188	8.3	511	147	1010	7.9
	Typical Conditions (R8)	Average	8.8	282		11	689	109	1079	8.05
		Range[2]	4.03-13.63	132-432		6.0-16.0	471-907	88.4-129.6	[illegible]	7.51-8.62
		Number Samples	9	9		27	9	9	[illegible]	27

1. The stations that start with R (i.e. RA, RB, RE, etc.) are the "typical" conditions used for comparison in this analysis. These represent the POTW receiving water monitoring location that is closest to the chosen sampling location. The average conditions were taken from the work plan for this study. For the most part, the averages and standard deviations are based on data from 1996 to 2000. In some cases there are only a few data points during this period of time.
2. The range is equal to the mean plus or minus two standard deviations and is used to assess whether the sampling results are within the range of typical conditions.

On the Los Angeles River, the water quality constituents were all within the range of the rest of the study and the typical conditions for the study. On the San Gabriel River, TDS was higher than the TDS measured during the remainder of the sampling events, but the remainder of the constituents were similar to the rest of the study. The higher TDS measurements could account for the higher WERs seen during the initial study on the San Gabriel River. The Los Angeles River initial study WERs are similar to the WERs found during the rest of the study.

Finally, the impact on the final WER (fWER) calculated from the individual results was assessed. Because the fWER is equivalent to an adjusted geometric mean, the final calculation is partially dependent on the sample size. Therefore, as the number of samples increase, so does the adjusted geometric mean even if the other components of the calculation (average and standard error for the samples) remain the same. Table 14 lists the different fWERs calculated based on adjusting the sample size with and without the initial study results.

Table 14. Analysis of Impact of Additional Sample Number on fWER with Initial Study Data

Site	Initial Study Data	No Initial Study, but extra sample	Initial study, but one less sample	No initial study
LA1	1.966	1.858	1.891	1.83
LA2	1.967	1.826	1.904	1.77
SGR1	1.637	1.423	1.475	1.41
SGR2	2.303	2.059	2.251	2.02

The results show that the sample size does impact the fWER calculation, though it is more significant in the San Gabriel River than in the Los Angeles River.

The review shows that the methods and analysis techniques did not vary between the two sets of sampling events. The TDS concentrations during the initial sampling event on the San Gabriel River were higher than the average observed during the remainder of the sampling events, but the remainder of the water quality constituents were similar. By including the initial study data, a wider range of conditions in the river is represented by the WER. Additionally, although the initial study WERs are higher than the remainder of the study results, at least a portion of the impacts on the fWERs is based on the additional sample, not the higher value of the WER. Because the methods and analysis techniques are similar between the two sampling periods, there is no scientifically valid reason to exclude the initial study data. Although the fWERs for these four sites are higher with the initial study data than without the data, there is no evidence that these results do not represent an actual condition in the waterbody that should be captured by the fWER. Because of the number of conservative assumptions that have been built into the calculation of the fWERs (acute studies rather than chronic studies, the use of the EPA pH relationship, the use of an adjusted geometric mean rather than an unadjusted geometric mean or median value), the use of the initial study data will not result in a fWER that is not protective of the waterbody. As a result, the initial study data with the exception of LA-R4 will be included in the calculation of the fWERs.

STEP 3: CALCULATE THE ADJUSTED GEOMETRIC MEAN OF THE DRY WEATHER *HYALELLA* ACUTE WERS

For each site, a number of dry weather WERs were calculated (as shown above). To determine one dry weather WER applicable to the site, the WER guidance recommends the use of the adjusted geometric mean of the dry weather results. Using the individual acute *Hyalella* WERs listed in Table 12, the adjusted geometric mean WER for dry weather for each site was determined using the following process (1994 guidance page 71):

- Take the natural logarithm of each of the WERs.
- Calculate the arithmetic mean of the logarithms ($\bar{x}$).
- Calculate the sample standard deviation of the logarithms (s): $s = \sqrt{\frac{(x-\bar{x})^2}{n-1}}$
- Calculate the standard error of the arithmetic mean (SE): $SE = \frac{s}{\sqrt{n}}$
- Calculate the adjusted geometric mean (A): $A = \exp(\bar{x} - (t_{0.7})(SE))$ where $t_{0.7}$ is the value of the Student's t statistic for a one-sided probability of 0.70 with n-1 degrees of freedom (df). The following table summarizes some typical values of $t_{0.7}$.

Degrees of Freedom	$t_{0.7}$
1	0.727
2	0.617
3	0.584
4	0.569
5	0.559
6	0.553
7	0.549
8	0.546
9	0.543
10	0.542
11	0.540
12	0.539

Table 15 summarizes the dry weather adjusted geometric means for each site along with the geometric mean and median value for comparison.

Table 15. Adjusted Geometric Mean, Geometric Mean, and Median WERs of Dry Weather *Hyalella* Acute Samples[1]

Site	Adjusted Geometric Mean	Geometric Mean (not adjusted)	Median
LA1	1.966	2.124	2.357
LA2	1.967	2.099	2.176
BW1	1.400	1.450	1.446
SGR1	1.637	2.015	1.473
SGR2	2.303	2.554	2.485
CC1	2.038	2.202	2.099
SJC1	1.395	1.544	1.544
RH1	2.094	2.150	2.150
SCR1	2.233	2.411	2.669
SCR2	2.206	2.335	2.296

1. Calculated from WER 1, WER 2, WER 3, and Initial Study WER.

STEP 4. CALCULATE THE WET WEATHER HWERS

For the wet weather samples, the WER guidance provides a calculation procedure to determine a wet weather WER that is protective of the different conditions that occur during wet weather and is also comparable to the dry weather WER results. The following equations are used to calculate the hWER for wet weather samples:

$$HCE = \frac{[(CCC)(WER)(eFLOW + uFLOW)] - [(uCONC)(uFLOW)]}{eFLOW}$$

$$hWER = \frac{(HCE)(eFLOWdf) + (uCONCdf)(uFLOWdf)}{(CCC)(eFLOWdf + uFLOWdf)}$$

where:

HCE	=	the highest concentration of ammonia in the effluent.
CCC	=	the chronic criteria to be adjusted.
eFLOW	=	the effluent flow at the time of sample collection
uFLOW	=	the upstream flow at the time of sample collection
uCONC	=	the concentration of ammonia in the upstream water
eFLOWdf	=	the effluent flow at design flow conditions
uCONCdf	=	the upstream concentration at design flow conditions
uFLOWdf	=	the upstream flow at design flow conditions

The calculation of the hWER for wet weather events is dependent on the effluent and river flow (eFLOW and uFLOW) at the time of sampling, the design flow of the effluent and river (eFLOWdf and uFLOWdf), the concentration of ammonia upstream of the discharge (uCONC), and the chronic criterion (CCC). In Southern California waterbodies, these values vary significantly during rain events. For example, a sudden downpour could cause the flow in the river to increase by a factor of two or more during the period of time while samples were being collected.

During sampling, estimates of flow were made during sample collection, but the magnitudes of the flows made it very difficult to make estimates with significant accuracy. Direct flow measurements during wet weather events were not possible because of safety concerns. Except for the Santa Clara River, these waterbodies are channelized high flow rivers with very high velocities and flow rates during wet weather. Sampling was conducted from a bridge or the side of the channel to prevent the sampling crew from being swept away in the flows. Portable flow measuring equipment was not available that was capable of measuring flows of the magnitude that occur during wet weather events. Additionally access to the entire width of the river is restricted in some cases during high flows, and it is not possible to get estimates from all portions of the river. For this reason, gauging stations near the sampling location were used to estimate the flow at the time of sample collection. However, the gauging stations did not always collect flow measurements during the sample collection time and were different distances from the sample locations. It is possible that the flows at the gauging stations could have been influenced by a shower in the vicinity of the station that did not impact the sample location. Consequently, though the flow measurements that were obtained are considered to be the best estimate of flows at the time of sampling, there is some error associated with these measurements and choices had to be made as to how to use the flow data in the calculations. For example, if the gauge recorded a flow an hour before the sampling period and two hours after the sampling period, should the actual measurement of flow closest to the sample collection be used or should an interpolation of the possible flow at the time of sample collection be used?

Another area of possible variability is the choice of the chronic objective to use in the comparison. The WER guidance is unclear as to whether the chronic objective that applies during defined design flow conditions (dry weather) or the chronic objective that was applicable during the wet weather event be used for the calculation. Because of the possible variations in the way in which the wet weather hWER could be calculated, different scenarios were reviewed to assess the impact of the assumptions on the calculation of the hWER. The following scenarios were assessed:

- Scenario 1: Use the criteria applicable to the design flow condition (dry weather) and the recorded gauge flow measurement from the time closest to the actual sample time.
- Scenario 2: Use the criteria applicable to the wet weather event sampled and the recorded gauge flow measurement from the time closest to the actual sample time.
- Scenario 3: Use the criteria applicable to the design flow condition (dry weather) and the flow measurement interpolated from the recorded gauge measurements for the actual sample time.
- Scenario 4: Use the criteria applicable to the wet weather event sampled and the flow measurement interpolated from the recorded gauge measurements for the actual sample time.

The following table (Table 16) shows the hWERs for each of the scenarios.

Table 16. Wet Weather hWER Variability Based on Flow and Criteria Assumptions

Site	Sample Date	Scenario 1	Scenario 2	Scenario 3	Scenario 4
LA1	2/13/03	8.0	8.0	9.4	9.4
LA2	12/17/02	1.6	1.7	1.1	1.4
BW1	12/17/02	6.3	4.3	13.7	13.7
SGR1	2/13/03	8.4	8.4	8.8	8.8
SGR2	12/17/02	4.7	4.7	4.8	4.8
CC1	12/17/02	8.5	8.6	8.6	8.7
SJC1*	12/17/02	3.9	3.9	N/A	N/A
RH1	2/13/03	5.1	5.1	3.9	3.9
SCR1*	2/13/03	12.5	12.5	N/A	N/A
SCR2*	2/13/03	9.9	9.8	N/A	N/A

*The only flow measurements available for these sites were mean daily discharge so the hWERs could not be calculated at different flows. Therefore, Scenario 3 and 4 are not applicable to these sites (N/A).

The assessment determined that the hWERs were sensitive to the choice of assumptions, especially the flow used to calculate the hWER. For example, at BW-1, the hWERs range from 4.3 to 13.7 depending on the assumptions used.

In addition, the hWER is partially dependent on the upstream ammonia concentration. Just as flows can change rapidly over time during the course of a wet weather event, so can the upstream ammonia concentration as discharges are diluted to different degrees by the river flow. Therefore, the hWER is very dependent on the exact conditions that occurred during sample collection. To demonstrate this, the flow measurements collected over the course of the storm at the gauge nearest to LA2 were used to determine the hWERs that would occur at that site during the course of the storm (assuming no change in upstream ammonia concentrations). The following graph shows the flows and the associated hWERs.

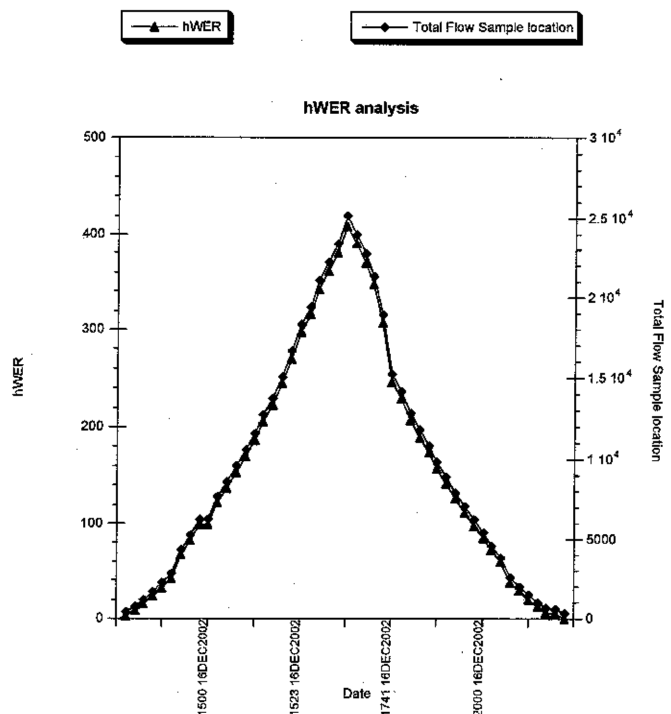

Figure 4. Estimated hWERs at LA2 during 12/17/02 Storm Event Based on Changing Flow Rates

Over the course of the storm, the hWERs were estimated to range from 1.0 to 409 depending on the flow and estimated upstream ammonia concentration. As shown in Figure 4, the hWERs track the flows almost exactly. Therefore, samples collected at the beginning or end of the storm have lower hWERs than those collected during the storm peak.

For calculation purposes, the measured flow closest to the sampling period and the chronic criteria calculated during the wet event were used to determine the hWER for the study. Table 17 summarizes the calculated hWER (in bold) and the information that was used to calculate the hWER during wet weather events.

Table 17. Flow and hWER Results for Wet Weather Samples

Site	Date	Wet Weather WER (hWER)	NH3 Criteria (CCC)	WER	Effluent flow (eFLOW)	Upstream flow (uFLOW)	Upstream NH3 Conc. (UCONC)	Design effluent flow (eFLOWdf)	Design upstream NH3 conc. (uCONCdf)	Design upstream flow (UFLOWdf)	Highest Effluent NH3 Conc. (HCE)
LA1	2/13/03	**8.027**	4.73	2.3	66	167	0.0	125	0.42	0.0	38.0
LA2	12/17/02	**1.740**	2.87	1.4	24	127	5.1	31	7.3	79.6	-0.8
BW1	12/17/02	**4.314**	2.35	2.0	9	10	0.0	14	0.0	0.0	10.2
SGR1	2/13/03	**8.378**	2.17	0.4	61	1345	0.0	156	0.46	0.0	18.2
SGR2	12/17/02	**4.736**	2.17	2.0	54	71	0.0	59	4.2	0.0	10.3
CC1	12/17/02	**8.622**	2.43	1.9	30	176	0.37	39	0.41	16.1	29.4
SJC1	12/17/02	**3.938**	2.78	1.6	9	12	0.0	23	0.0	0.0	11.0
RH1	2/13/03	**5.084**	3.09	1.0	15	61	0.0	23	0.0	0.0	15.7
SCR1	2/13/03	**12.54**	4.01	2.5	14	56	0.0	10	0.05	0.0	50.2
SCR2	2/13/03	**9.845**	3.58	2.5	20	94	0.0	20	0.53	8.4	50.1

HCE = the highest concentration of ammonia in the effluent.
CCC = the chronic criteria to be adjusted.
eFLOW = the effluent flow at the time of sample collection
uFLOW = the upstream flow at the time of sample collection
uCONC = the concentration of ammonia in the upstream water (if the value was not detected, the concentration was set equal to zero).
eFLOWdf = the effluent flow at design flow conditions
uCONCdf = the upstream concentration at design flow conditions
uFLOWdf = the upstream flow at design flow conditions

STEP 5. DETERMINE THE FWER

The WER guidance lays out a proposed procedure for determining the fWER from the calculated dry and wet weather WERs. Assuming that at least 19% of the data were collected during flows two to ten times higher than design flow of the waterbody, and the range of the WERs are not more than a factor of five apart, the fWER is the lower of the adjusted geometric mean of all the design flow (dry weather) WERs and the lowest hWER. Based on the analysis presented in this document and input from the TAC, two deviations from this procedure were used to determine the fWER for the study. The deviations are discussed in detail in the next two sections.

Use of Wet Weather hWER

The WER guidance procedure places a large emphasis on the wet weather sample and the results obtained during wet weather. During the calculation of the wet weather hWERs, it became clear that the determination of the hWER was significantly impacted by the assumptions used in calculating the hWER, especially the flow conditions (see Step 4 discussion above). Because the flow conditions are highly variable in Southern California, the use of a hWER based on a flow condition that could change dramatically over a very short period of time is difficult to justify. Consequently, the appropriateness of using the wet weather hWER versus the adjusted geometric mean of the dry weather WERs was evaluated.

As shown in the discussion of the wet weather hWER (Step 4 above), the hWER calculations generally result in wet weather hWERs that are significantly higher than the adjusted geometric mean of the dry weather WER. The one exception is LA2 where the hWER drives the fWER using the calculation conditions chosen. However, because the choice of calculation conditions causes such variability in the hWER, under other wet weather conditions, the hWER may not be the lowest value. Over the course of the storm at LA2, the hWER was estimated to range from 1.0 to 409 based on the changing flow conditions in the river.

Additionally, the chronic objectives are the only objectives being adjusted by the fWER. The chronic objective is based on a 30-day averaging period. Wet weather events in Southern California occur over a matter of hours to days, but generally do not last for weeks at a time. Therefore, the application of a hWER based on a short term condition to a 30-day chronic objective is not appropriate. Therefore, it was determined that the appropriate approach for this study was to use the adjusted geometric mean of the dry weather events as the fWER for all of the sites.

Use of Fathead Minnow Tests

The WER guidance uses the results of toxicity tests on a primary and secondary species to determine the fWER. However, as the results for this study were gathered, it became clear that the secondary species in this study (the fathead minnow) demonstrated lower WERs than the primary test species results (0.9-1.7). Because the fathead minnow is a less sensitive species than *Hyalella*, a lower WER was expected during the testing. Based on the differences in sensitivities between the two species (*Hyalella* is two times more sensitive to ammonia than fathead based on the 1999 Update) , the WERs found for fathead confirm the results of the *Hyalella* testing because they are approximately half of the WERs found for *Hyalella*. However, since the fathead minnow was less sensitive than *Hyalella* (i.e. ammonia toxicity was observed at a significantly higher concentration, above the range of the probable SSO value), the question was raised whether the fathead minnow WER value should be given equal weight in the final WER calculation. Consequently, the TAC recommended, and the study participants and the Regional Board agreed, that an alternative approach should be used for calculating ammonia SSOs would be undertaken for this particular study. Using the alternative approach would guarantee the protection of both invertebrates and fish in the waterbodies based on the results of the WER testing.

To calculate the 1999 EPA chronic criteria equation for ammonia, data that reflects the toxicity of ammonia to invertebrate species (such as *Hyalella*) and vertebrate species (such as the fathead minnow) were compiled. Then, the basic procedure outlined in the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (USEPA, 1985b) was used to compare the invertebrate and vertebrate data and calculate the chronic criteria equation for ammonia. The TAC recommended that the *Hyalella* WER results be used to adjust the invertebrate data used to calculate the 1999 ammonia criteria. However, to be protective of the fish species, the data for the vertebrate species should not be changed based on this study. Then, the criteria would be recalculated based on the adjusted invertebrate data to determine a new criteria equation that would be protective of vertebrates and invertebrates alike. Based on this recommended approach from the TAC, the fWERs calculated for this study were based exclusively on the acute *Hyalella* results and only the invertebrate data was adjusted by these fWERs in the calculation of the recommended SSOs.

Although it was determined that the fish data would not be adjusted based on the results of the study, the fathead minnow data were examined to ensure that the data collected was adequate for the study. Tests were collected in the month of July and the month of September. However, the results collected in September could not be used because a parasite was found in the laboratory dilution water sample. Because the successful fathead minnow samples were all collected during one month, the *Hyalella* results were examined to determine if any significant differences occurred during different times of the year that might suggest the need for additional fathead monitoring. For the analysis, dry weather wet season and wet weather events were compared to the results from the dry season, dry weather events to assess if any differences existed.

At all but one site, the dry weather wet season sample was the highest or second to highest result for the site (in terms of total ammonia-N LC50s). In all cases, the pH of the dry weather wet season sample was similar to or slightly higher than the dry season samples. Additionally, the dry weather wet season sample results were generally similar to results from the dry season events. The dry weather wet season data fit well within the spread of the results of all of the data and does not appear to have significant differences from the dry season data. Also, as discussed in the analysis of the hWERs, the wet weather data demonstrate that at all but one site, the toxicity of ammonia is significantly reduced during wet weather events. Based on these two analyses, differences between dry weather samples during different seasons were not significant and wet weather samples demonstrated that toxicity was likely to be reduced during wet weather. Consequently, the lack of samples in any month other than July is not likely to have not accounted for a condition that would significantly alter the results obtained. Additionally, because the fathead minnow data were not used to adjust the criteria and determine SSOs, the small dataset does not impact the WER and SSO calculations.

FWER Analysis

Based on the two deviations described above, fWERs were calculated as the adjusted geometric mean of the dry weather acute *Hyalella* WERs. Due to the complexity of the study and number of samples collected, a number of fWERs were calculated and are presented in this report to illustrate how different approaches affect the study results. Then, based on the analysis, recommendations for the fWERs were determined. Different fWERs were calculated for each individual sampling station, each waterbody in the study and all sampling stations. Based on the individual WERs shown in Table 12, the following fWERs were calculated.

Table 18. fWERs for All Scenarios

Site	fWER
LA1	1.966
LA2	1.967
BW1	1.400
SGR1	1.637
SGR2	2.303
CC1	2.038
SJC1	1.395
RH1	2.094
SCR1	2.233
SCR2	2.206
LA River	1.783
San Gabriel River	2.032
Santa Clara River	2.282
Upper San Gabriel River	1.708
Lower San Gabriel River	2.134
Overall WER for Study	1.956

The watershed fWERs and overall fWER for the study were determined by using the individual dry weather WERs for the watershed and the whole study and calculating the adjusted geometric mean of all of the appropriate values. For example, for the Santa Clara River, the fWER is equal to the adjusted geometric mean of the three WERs from SCR1 and the three WERs from SCR2.

Site Analysis

The variability in fWERs between sites and watersheds is not very significant, ranging from 1.395 to 2.303. For the most part, the watershed fWERs and overall fWER for the study are all around 2. To determine whether or not the differences between the sites were significant, an analysis of variance (ANOVA) was conducted. This analysis basically compares the means of the WERs collected at each site, the variance of the WERs, and information about the entire dataset to determine if the results are statistically different at a 95% confidence level. The results demonstrated that all of the WERs were statistically similar at the 95% confidence level except BW1 and SGR2.

Based on these results, it would be possible to recommend one SSO that applied to all waterbodies that was equal to the overall watershed fWER for the study (1.956). However, because differences were seen between the Burbank Western Wash and the San Gabriel River, the chosen approach for this study was to use a site-by-site approach to account for the variability observed in the waterbodies and account for the possible differences in the ions causing the WER as demonstrated by the water quality analysis comparison.

Connection to Water Quality Analysis

Based on the results of the water quality constituent analysis described earlier, ions were found to be a factor contributing to the reduced toxicity and WERs found in the study. In particular, sodium and TDS were demonstrated to have the most significant relationship to the WER. To confirm this analysis, the final WERs were plotted against average site TDS and sodium concentrations to see if increasing ion concentrations resulted in higher WERs.

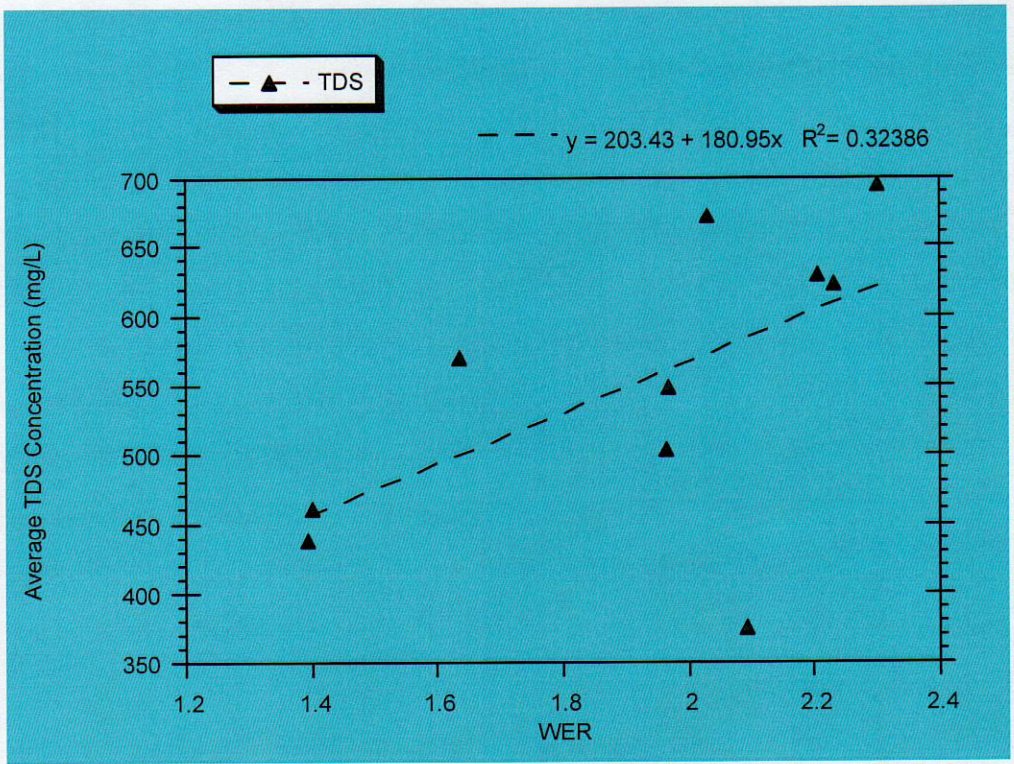

Figure 5. Comparison of Final WERs to Average TDS Concentrations at Each Site

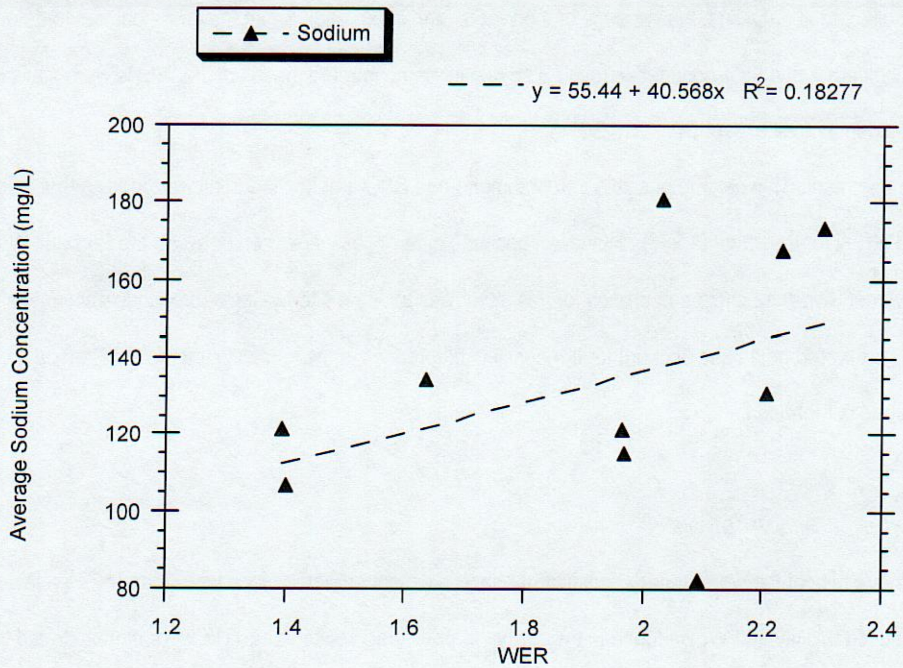

Figure 6. Comparison of Final WERs to Average Sodium Concentrations at Each Site

Both TDS and sodium confirmed the expected analysis results when compared to the final calculated WERs. At higher concentrations of sodium and TDS, higher WERs were found at almost every site.

Sensitivity of fWER Calculations

The laboratory that conducted all of the toxicity testing (MEC Analytical Systems, Inc.) during the study provided comprehensive reports and analysis of the data for review. As part of the reports, they calculated the toxicity results using both the average and maximum ammonia concentrations observed during testing and provided all of the pH and temperature information collected during the tests. Although the TAC recommended the use of the average conditions, because ammonia, pH, and temperature all varied to some degree during each testing period, the change in fWERs based on this variability was assessed. For the analysis, fWERs were calculated based on the maximum ammonia results and compared to the fWERs calculated above. The impact of pH variability was also examined. The maximum and minimum pH for each test was used to calculate the fWERs for comparison. Table 19 shows the results of this analysis.

Table 19. Variability of fWERs Based on Ammonia and pH Variability

Site	fWER by Site	fWER based on Maximum Ammonia Values	fWER based on Maximum pH Values	fWER based on Minimum pH Values
LA1	1.966	NC	2.555	1.473
LA2	1.967	NC	1.190	1.640
BW1	1.400	1.312	1.584	1.443
SGR1	1.637	1.434	1.491	1.623
SGR2	2.303	2.097	2.331	2.608
CC1	2.038	2.012	2.395	2.372
SJC1	1.395	1.473	0.353	1.360
RH1	2.094	2.027	2.216	2.042
SCR1	2.233	1.893	2.267	1.969
SCR2	2.206	2.057	2.625	2.192

NC-Could not calculate a fWER because the laboratory did not provide LC50s based on maximum ammonia concentrations for some of the sampling events.

Based on this analysis, the impact of maximum ammonia concentrations and maximum and minimum pH values is not significant in most cases. In almost all cases, the alternative calculations result in similar or higher fWERs. Under all of the scenarios, the bulk of the fWERs are approximately 2 and do not change significantly from the fWERs calculated using average conditions. The average conditions are the most appropriate values to use because they are the conditions to which the organisms are exposed over the course of the entire test. The extreme conditions represent a value to which the organisms were only exposed for a short period of time and the impact of the short term exposures cannot be extrapolated from the test results that represent the overall conditions during the test. Additionally, average ammonia, pH and temperature conditions during testing are the values used to determine the 1999 Ammonia Criteria that are being adjusted by the WER. Therefore, the fWERs calculated using the average concentrations were used for this study.

Recommended fWERs

Based on the analysis conducted above, the recommended fWERs for this study are the site-by-site fWERs calculated using average pH and ammonia results and including the initial study data from 4 of the 5 initial study sites. The recommended fWERs are listed in Table 20.

Table 20. Recommended fWERs for Study

Site	Recommended fWER by Site
LA1	1.966
LA2	1.967
BW1	1.400
SGR1	1.637
SGR2	2.303
CC1	2.038
SJC1	1.395
RH1	2.094
SCR1	2.233
SCR2	2.206

Site-Specific Objectives

The final step in the process is the calculation of a site-specific objective (SSO) for the sites based on the fWERs. The traditional approach to calculating a SSO is to multiply the fWER times the existing objective to obtain the SSO. Because of the alternative approach taken under this study (i.e. invertebrate and vertebrate data being adjusted independently within the chronic criteria equation calculation), the method for calculating the SSO is more complicated. The approach taken included a recalculation of the criteria using the 1999 Ammonia Criteria document and the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (Guidelines) (USEPA, 1985b). In this section, a basic summary of the calculation process based on these two documents is presented along with the proposed SSOs calculated from the recommended fWERs.

The process outlined in the Guidelines for calculating criteria is driven, in most cases, by the toxicity results for the four lowest tested genera. For the acute criterion, invertebrates are not among the most sensitive genera tested and do not drive the calculation of the acute criterion. Although the 1999 Criteria Update discusses the fact that under soft water conditions, *Hyalella* may be more sensitive than other species (1999 Update pp. 31 and 40), this information was not used to adjust the criteria. Consequently, it is not possible to adjust the acute criteria using the WER without recalculating the criteria using the information that EPA chose not to include in the criteria. Additionally, because conditions in Southern California do not include low hardness waterbodies, this information is not applicable to the SSOs for these waterbodies. As a result, the acute criterion was not adjusted based on the results of this study. The chronic criterion is driven by invertebrate test results and chronic SSOs are being proposed based on the study results. The calculation process described here is for the chronic criterion calculations.

In the 1999 Ammonia Criteria, chronic tests on 10 genera and the associated genus mean chronic values (GMCVs) are used to calculate the chronic criteria. Of these species, four are invertebrates and five are fish genera. The first step in the SSO calculation process was to multiply the fWERs by the four invertebrate GMCVs in the criteria. The fish GMCVs were not multiplied by the fWER. The next step was to recalculate the Final Chronic Value (FCV)[2] using the steps presented in the Guidelines as follows.

1. Order the invertebrate data (multiplied by the fWER) and the fish data from lowest to highest.
2. Assign ranks (R) from 1 to 10 to the ordered data.
3. Calculate the cumulative probability (P) for each data point as R/(N+1).
4. Select the four data points that have cumulative probabilities closest to 0.05.
5. Using those values, calculate the FCV using the following equations:

$$S^2 = \frac{\sum((\ln GMCV)^2) - ((\sum(\ln GMCV)^2/4)}{\sum(P) - ((\sum(\sqrt{P}))^2/4)}$$

$$L = \frac{(\sum(\ln GMCV) - S(\sum(\sqrt{P}))}{4}$$

$$A = S(\sqrt{0.05}) + L$$

$$FCV = e^A$$

The design of the calculation process listed above is to determine a criteria value that will protect 95% of aquatic species. Because there were only 10 genera used to calculate the FCV for ammonia, the calculation process results in a FCV that is lower than any of the ammonia concentrations (GMCVs) demonstrated to cause toxicity to the tested organisms (i.e. the calculation process "assumes" that a hypothetical aquatic species exists that is more sensitive than those that have been tested because of the small data set used in the calculation).

To calculate the FCV, all of the toxicity results were normalized to a pH of 8.0 and temperature of 25°C. Therefore, the FCV calculated from this dataset is determined at this pH and temperature. In the 1999 criteria calculations, this dataset results in a FCV that is lower than the lowest GMCV (*Hyalella*) by about 15% (i.e., the FCV is 85.4% of the *Hyalella* GMCV). Calculating the FCV using datasets normalized to different pHs and temperatures results in different degrees of extrapolation below the lowest GMCV. For that reason, the 1999 ammonia criteria document assumed that it was appropriate to use the FCV at pH 8.0 and temperature 25 °C to calculate the criteria equation for all pH and temperature values. To accomplish this, the difference

[2] The FCV is the value used to determine the criteria that is estimated to be protective of 95% of all species that could be impacted by ammonia.

between the FCV and the lowest GMCV was calculated and incorporated into the criteria equation. The criteria were then determined to be the chronic pH relationship multiplied by 85.4% of the lower of (1) the appropriate fish GMCV (different depending on whether or not early life stages of fish are present) and (2) the temperature adjusted *Hyalella* GMCV.

For the purposes of recalculating the criteria, new FCVs were calculated using datasets in which the invertebrate GMCVs had been multiplied by the fWER. Then, the difference between the FCV and the lowest GMCV (determined after multiplying the invertebrate data by the fWER) was calculated. If the difference was lower than 85.4% (as assumed in the 1999 ammonia criteria), the criteria value of 85.4% was used because it is not appropriate to have a greater degree of extrapolation below than the lowest GMCV value than that assumed in the original criteria calculations. The 1999 Criteria Update discusses the appropriate degree of extrapolation for the criteria (p. 76). Because the degree of extrapolation varies depending on the conditions chosen to determine the criteria (i.e. if the data is adjusted to a different pH and temperature before calculating the criteria), using the same approach as provided in the criteria document was chosen as the appropriate degree of extrapolation for this study. If the difference was higher than 85.4%, the criteria were calculated as the chronic pH relationship multiplied by this new difference (percentage) multiplied by the lower of (1) the lowest appropriate fish GMCV (early life stage present or absent) and (2) the new temperature-adjusted *Hyalella* GMCV.

The net effect of this calculation procedure in most cases is that for waterbodies without early life stages of fish present, the site specific objective basically becomes the national criterion multiplied by the fWER. However, when early life stages of fish are present, the objective is dependent on the fish data and will not always be the national criterion multiplied by the fWER. The calculations for the various stations are included as Appendix 4-Site-Specific Objective Calculations. An example calculation is presented below for SGR1.

1. Multiply the invertebrate data by the fWER of 1.64 for SGR1 and rank the results from lowest to highest:

Genus/Species	GMCV	Rank	Cumulative Probability (P)	GMCV*fWER (1.64) for invertebrates	New Rank	New P
Hyalella	1.45	1	0.09	2.37	1	0.09
Musculium	2.26	2	0.18	3.70	4	0.36
Lepomis	2.85	3	0.27	2.85	2	0.18
Pimephales	3.09	4	0.36	3.09	3	0.27
Micropterus	4.56	5	0.45	4.56	5	0.45
Catostomus	4.79	6	0.55	4.79	6	0.55
Ictalurus	8.84	7	0.64	8.84	7	0.64
Daphnia	12.3	8	0.73	20.1	8	0.73
Ceriodaphnia	16.1	9	0.82	26.4	9	0.82

2. Calculate the FCV using the equations above:

$$S^2 = \frac{\sum((\ln(2.37)^2, \ln(2.85)^2, \ln(3.09)^2, \ln(3.70)^2) - ((\sum((\ln(2.37), \ln(2.85), \ln(3.09), \ln(3.70))^2/4)}{\sum(0.09, 0.18, 0.27, 0.36) - ((\sum(\sqrt{0.09}, \sqrt{0.18}, \sqrt{0.27}, \sqrt{0.36})^2/4)} = \mathbf{2.01}$$

$$L = \frac{(\sum(\ln(2.37), \ln(2.85), \ln(3.09), \ln(3.70)) - \sqrt{2.02}(\sum(\sqrt{0.09}, \sqrt{0.18}\sqrt{0.27}\sqrt{0.36})}{4} = \mathbf{0.43}$$

$$A = \sqrt{2.01}(\sqrt{0.05}) + 0.43 = \mathbf{0.75}$$

$$FCV = e^{0.75} = \mathbf{2.1}$$

3. Calculate the difference between the lowest ranked GMCV and the FCV:

$$\frac{FCV}{Lowest\ \mathrm{GMCV}} = \frac{2.1}{2.37} = 0.89$$

4. Replace 0.854 in the criteria equation with the difference calculated in Step 3. Multiply the Hyalella GMCV from the criteria document (1.45) by the fWER and replace 1.45 in the equation with the new GMCV.

Original criteria equation with Early Life Stages of Fish Present:

$$CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * \mathbf{0.854} * MIN(2.85, \mathbf{1.45} * 10^{0.028*(25-T)})$$

Site-Specific Objective Equation:

$$CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * \mathbf{0.89} * MIN(2.85, \mathbf{2.37} * 10^{0.028*(25-T)})$$

As shown in this example calculation, the component of the criteria equation designed to protect fish species (2.85 in the last part of the equation) is not adjusted by the site-specific objective calculation.

PROTECTION OF FISH SPECIES

Even though the WER used to determine site-specific objectives is only based on the *Hyalella* results, the calculation of site-specific objectives described above is inherently protective of fish species. The calculation process described above is based on national EPA guidance for calculating aquatic life criteria. Through the calculation process, the toxicity values for invertebrates were adjusted based on the WER, but the fish toxicity values were not changed. The calculation process uses these toxicity values to determine a site-specific objective that is protective. The resulting SSOs are the pH relationship multiplied by the lower of 1) the *Hyalella* value adjusted by the WER and 2) the most sensitive fish value. Because the toxicity values for fish species were not changed as a result of the WER, the site-specific objectives are protective of fish at the same level as the 1999 Ammonia Criteria.

As an additional step to ensure the protection of fish species in the local waterbodies, the calculated site-specific objectives were compared to the toxicity values (EC20ss) for fathead minnows found during the toxicity testing. The following table summarizes the toxicity result and the corresponding site-specific objective for the site at the same pH.

Table 21. Comparison of Fathead Toxicity to Proposed SSOs

Site	Test Date	Endpoint	EC20 (Total Ammonia mg-N/L)	pH	Temperature	Recommended SSO
LA1	7/23/02	Biomass	18.2	7.7	20.1	4.9
LA2	7/23/02	Biomass	13.4	7.7	19.7	5.0
BW1	9/24/02	Biomass	12.4	7.8	19.0	3.6
SGR1	9/24/02	Biomass	13.0	7.8	19.0	4.1
SGR2	7/23/02	Biomass	20.4	7.8	19.5	5.3
CC1	7/9/02	Biomass	15.2	7.8	20.5	4.4
SJC1	7/9/02	Biomass	18.4	7.8	20.2	3.3
RH1	7/9/02	Biomass	15.5	7.7	19.8	5.3
SCR1	9/24/02	Biomass	13.5	7.8	20.0	5.0
SCR2	7/9/02	Biomass	14.8	7.8	20.7	4.7

As shown in Table 21, the levels observed to cause toxicity to fathead minnows at the various sites are three to four times higher than the proposed site-specific objectives. Consequently, the proposed SSOs are protective of fish species based on the tests conducted for this study and the method for calculating the SSOs.

PROTECTION OF RARE, ENDANGERED, THREATENED OR LOCALLY IMPORTANT SPECIES

The final step in the development of a SSO is to determine if it remains protective of any rare, endangered, threatened or locally important species (important species). For the watersheds in this study, three species were identified that fit into this category: unarmored three-spine stickleback (*Gasterosteus aculeatus williamsoni*), Santa Ana sucker (*Catostomus santaanae*), and steelhead trout (*Oncorhynchus mykiss*). To determine if the new objectives were protective of these species, available information on ammonia sensitivity was compiled and compared to the FCV calculated above for each site for which possible habitat exists for one or more of these important species. If the available ammonia toxicity data demonstrated that the ammonia sensitivity for one or more of the important species is lower than the FCV, the FCV for the site would be lowered to the lowest species sensitivity and the objectives recalculated.

In the criteria document, acute and chronic data are available for three species in the same genus as steelhead trout (*Oncorhynchus clarki, Oncorhynchus mykiss, and Oncorhynchus nerka*) and one species in the same genus as the Santa Ana sucker (*Catostomus commersoni*). Because the criteria are based on genus values and not species values, the use of data from species in the same genus as the important species is appropriate. For the unarmored three-spine stickleback, data are not available in the criteria document for this species or any species in the same genus. A review of other available data was conducted to identify other sources of information on the ammonia toxicity of the stickleback. Only one study was found on a species related to the unarmored threespine stickleback, the three-spine stickleback (*Gasterosteus aculeatus*). The data are presented in the 1989 Saltwater Ammonia Criteria for salinities of 11 g/kg and 34 g/kg. Additionally, the data are acute data and presented as unionized ammonia rather than total ammonia. Because the data are saltwater data, the conversion of unionized data to total data is difficult and the data are not directly comparable to the freshwater data. However, the acute saltwater data are the only data available for this genus for comparison. Data were also found in the Ecotox database on a species in the same family as the unarmored stickleback, the ninespine stickleback (*Pungitius pungitius*). The endpoint for this test was general histological changes and the temperature and pH data for the test were not available. If general histological changes are considered to be a chronic endpoint, the result can be used as an approximation of the freshwater chronic sensitivity level. However, it is not known whether an adjustment is needed to make a direct comparison at pH 8.0 and temperature 25°C. Although neither of these studies provides data that are directly comparable to the site-specific FCVs, the results provide an indication as to whether or not the unarmored three-spine stickleback is significantly more sensitive than the other species and might need additional protection. Table 22 summarizes the sensitive levels for the important species.

Table 22. Total Ammonia Sensitivities of Important Species

Species	Chronic toxicity level at pH 8, temp 25 (mg-N/L)	Acute toxicity level at pH 8 (mg-N/L)
Santa Ana sucker	>4.79	38.1
Steelhead trout	<4.16 (8.5) [1]	11.23 [2]
Unarmored three-spine stickleback	14[4]	12.2 [3]

1. The data for the genus *Oncorhynchus* were not included in the calculation of the chronic criteria because of the variability in the testing results and the different lengths and endpoints of the studies conducted. Only one species had a result that was used to calculate a species mean chronic value (*Oncorhynchus nerka*). This value is the value used for comparison in this analysis. The value in parentheses is the genus mean chronic value that would be calculated if all of the results were used from all of the species.
2. Value for *Oncorhynchus mykiss* (rainbow trout) to which the final acute value was lowered in the calculation of the 1999 Ammonia Criteria to ensure protection of this species.
3. Estimated total ammonia concentration for lower salinity value (11 g/kg). Unionized value is 2.09 mg-N/L. This value is significantly higher than the most sensitive saltwater species (0.434 mg-N/L unionized ammonia).
4. Value for *Pungitius pungitius* at an unknown pH and temperature. Converted from 1.0 meq/L result in Ecotox.

The FCVs calculated for the site-specific objectives range from 1.88 to 2.38 mg-N/L. None of the FCVs are higher than the chronic toxicity levels presented in Table 22 and the acute criteria were not adjusted based on this study. The data used to assess the unarmored three-spine stickleback do not indicate that this species is significantly more sensitive than either of the other important species or than the calculated FCVs. Based on the above discussions, no adjustments are necessary to make the SSO calculations protective of important species.

RECOMMENDED SITE-SPECIFIC OBJECTIVES FOR AMMONIA

Based on the procedure discussed in this section, the proposed SSO criteria equations for each site based on the recommend fWERs in Table 20 are shown in Table 23.

Table 23. Proposed Site-Specific Objective Equations for Ammonia by Site

Site	Equation
LA1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * MIN(2.85, 2.85 * 10^{0.028*(25-T)})$
	ELS Not Present $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * 2.85 * 10^{0.028*(25-Max(T,7))}$
LA2	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * MIN(2.85, 2.85 * 10^{0.028*(25-T)})$
	ELS Not Present $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * 2.85 * 10^{0.028*(25-Max(T,7))}$
BW1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.92 * MIN(2.85, 2.03 * 10^{0.028*(25-T)})$
	ELS Not Present $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.92 * 2.03 * 10^{0.028*(25-Max(T,7))}$
SGR1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.89 * MIN(2.85, 2.37 * 10^{0.028*(25-T)})$
	ELS Not Present $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.89 * 2.37 * 10^{0.028*(25-Max(T,7))}$
SGR2	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}}\right) * 0.854 * MIN(2.85, 3.34 * 10^{0.028*(25-T)})$
	ELS Not Present

$$CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.854 * 3.34 * 10^{0.028*(25-Max(T,7))}$$

Table 23 cont'd. Proposed Site-Specific Objective Equations for Ammonia by Site

Site	Equation
SCR1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.854 * MIN(2.85, 3.24 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.854 * 3.24 * 10^{0.028*(25-Max(T,7))}$
SCR2	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.854 * MIN(2.85, 3.20 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.854 * 3.20 * 10^{0.028*(25-Max(T,7))}$
SJC1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.92 * MIN(2.85, 2.02 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.92 * 2.02 * 10^{0.028*(25-Max(T,7))}$
RH1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.854 * MIN(2.85, 3.04 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.854 * 3.04 * 10^{0.028*(25-Max(T,7))}$
CC1	**ELS Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.854 * MIN(2.85, 2.96 * 10^{0.028*(25-T)})$ **ELS Not Present** $CCC = \left(\frac{0.0676}{1+10^{7.688-pH}} + \frac{2.912}{1+10^{pH-7.688}} \right) * 0.854 * 2.96 * 10^{0.028*(25-Max(T,7))}$

Table 24 provides example objectives based on the site-specific equations listed above for different pHs. The table allows comparison of the site-specific objectives determined in this study at each of the sampling locations.

Table 24. Example Site Specific Objectives (Total Ammonia-N in mg/L) at Different pHs

		pH							
	Temperature	**6**	**6.5**	**7**	**7.5**	**8**	**8.5**	**9**	**9.5**
LA1	20	9.6	9.2	8.2	6.0	3.4	1.5	0.67	0.37
LA2	20	9.6	9.2	8.2	6.0	3.4	1.5	0.67	0.37
BW1	20	7.4	7.1	6.3	4.6	2.6	1.2	0.52	0.29
SGR1	20	8.3	8.0	7.1	5.2	2.9	1.3	0.58	0.32
SGR2	20	11.2	10.8	9.6	7.1	3.9	1.8	0.79	0.44
CC1	20	9.9	9.5	8.5	6.2	3.5	1.6	0.70	0.39
SJC1	20	7.4	7.1	6.3	4.6	2.6	1.2	0.52	0.29
RH1	20	10.2	9.8	8.7	6.4	3.6	1.6	0.72	0.40
SCR1	20	10.9	10.5	9.3	6.8	3.8	1.7	0.76	0.42
SCR2	20	10.8	10.3	9.2	6.8	3.8	1.7	0.75	0.42

References

Ankley GT, Schubauer-Berigan MK, and Monson PD, 1995. Influence of pH and Hardness on Toxicity of Ammonia to the Amphipod Hyalella azteca. Can J Fish Aquat Sci. 52:2078-83.

Borgmann U, 1994. Chronic Toxicity of Ammonia to the Amphipod Hyalella azteca; Importance of Ammonium Ion and Water Hardness. Environ Pollut. 86:329-35.

Borgmann U and Borgmann AI, 1997. Control of Ammonia Toxicity to Hyalella azteca by Sodium, Potassium and pH. Environ Pollut. 95:325-31.

USEPA, 1985a. Ambient Water Quality Criteria for Ammonia -1985. National Technical Information Service, Springfield, VA.

USEPA, 1985b. Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses. National Technical Information Service, Springfield, VA.

USEPA, 1989. Ambient Water Quality Criteria for Ammonia (Saltwater) -1989. National Technical Information Service, Springfield, VA.

USEPA, 1994. Interim Guidance on Determination and Use of Water-Effect Ratios for Metals. National Technical Information Service, Springfield, VA.

USEPA, 1997. Use of the WER Procedure with Hardness Equations. Washington, D.C.

USEPA, 1999. Ambient Water Quality Criteria for Ammonia – 1999. Office of Water and Office of Science and Technology. Washington, D.C.

USEPA, 2001. Streamlined Water-Effect Ratio Procedure for Discharges of Copper. Office of Water. Washington, D.C.