CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENTS TO THE WATER QUALITY CONTROL PLAN FOR
THE SACRAMENTO RIVER AND
SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF DIAZINON AND CHLORPYRIFOS RUNOFF
INTO THE SACRAMENTO AND FEATHER RIVERS

Responses to Comments on the March 2007 Public Review Draft Staff Report

ITEM 9

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1. Debra L Denton, U.S. EPA 1

2. William J. Thomas, Jr., Best, Best & Kreiger, LLP 2

3. Ephraim Gur, Vice President of Regulatory and Scientific Affairs, Makhteshim Agan of North America, Inc (MANA) 9

1. Debra L Denton, U.S. EPA

COMMENT 1-1: We have reviewed the proposed actions in the report and conclude they are consistent with applicable federal regulations concerning TMDLs.

RESPONSE 1-1: The Regional Board appreciates U.S. EPA's support of the proposed Basin Plan Amendment.

COMMENT 1-2: We support and [are] pleased to see that this report builds upon the technical and policy foundation of the State Board adopted and USEPA approved San Joaquin River diazinon and chlorpyrifos TMDL, and the Regional Board adopted Delta diazinon and chlopyrifos TMDL. In particular, we support the application of the Board's additivity formula, and the diazinon and chlorpyrifos water quality objectives, which are based on USEPA water quality criteria guidelines. We support the calculation of toxic equivalents according to the Board's Basin Plan's method for considering additive toxicity as this approach applies to both acute and chronic endpoints. In addition, this approach is easily applicable to additional chemicals besides the two pesticides currently being addressed in this action. It is also appropriate to have included chlorpyrifos, as diazinon and chlorpyrifos co-occur in this watershed and this is consistent with the San Joaquin River in Delta TMDLs. The consideration of chemical mixtures is important, because regulatory TMDLs are typically developed for a single chemical in a waterbody, although it is likely that a mixture of chemicals exist in the waterbody (Lydy et al., 2004)[1].

RESPONSE 1-2: The Regional Board appreciates U.S. EPA's support of the technical basis of the proposed Basin Plan Amendment.

[1] Lydy MJ, Belden JB, Wheelock CE, Hammock BD, Denton, DL. 2004. Challenges in regulating pesticide mixtures. Ecology and Society. 9(6):1.

2. William J. Thomas, Jr., Best, Best & Kreiger, LLP

COMMENT 2-1: There is an insufficient presence of Chlorpyrifos upon which to justify a new regulatory TMDL.

…[T]he amount of Chlorpyrifos detected on the Feather River falls well below any reasonable level which would justify a new regulatory TMDL on the Feather River. According to the Basin Plan Amendment, Board staff detected only two Chlorpyrifos exceedances, and one reported at the established objective level, since 1996 and no exceedances since 2004. …

…Other similar pesticides have had more exceedances than Chlorpyrifos in other watersheds yet no TMDLs have been initiated for those chemicals. Additionally, establishing a TMDL for any pesticide based on these two exceedances within the past eleven years would be unprecedented, DAS can recall of no other TMDL being initiated on so little data. Finally, there is no reason to believe that an exceedance at any level of Chlorpyrifos or with the additivity formula is necessarily biologically significant.

As the Board's staff said itself at the Public Workshop, one of the reasons why Chlorpyrifos likely has not been detected since 2004 is due in part to the labeling and spray regulations enacted in that same year. Because those regulatory measures, as the Board's staff has conceded, have prevented Chlorpyrifos from entering the Feather River watershed, there would be no additional value to implementing a TMDL for Chlorpyrifos on the Feather River. Those regulatory measures are having their intended effect and a Chlorpyrifos TMDL would do nothing more than likely impose unnecessary and expensive regulatory requirements on a number of parties. Additionally, DAS cautions the Board from implementing a TMDL for Chlorpyrifos on the Feather River because such an unnecessarily new regulatory program could have the unintended consequence of causing Chlorpyrifos users in the field to use alternative pesticides which may not have the existing regulatory framework which currently governs Chlorpyrifos and could therefore cause greater environmental harm than the highly regulated Chlorpyrifos.

RESPONSE 2-1: At times, both chlorpyrifos and diazinon are concurrently present in detectable concentrations in the Sacramento and Feather Rivers. Current Basin Plan Policies require that the Regional Board consider the cumulative impact of diazinon and chlorpyrifos on aquatic life, since the two pesticides have the same mode of action. In addition, the narrative pesticide objective requires that “no … combination of pesticides shall be present in concentrations that adversely affect beneficial uses.”

The Basin Plan provides a formula to determine whether the presence of two pesticides causes an exceedance of water quality objectives. This formula is used to establish the loading capacity for chlorpyrifos and diazinon.

The Staff Report includes a summary of exceedances when the joint presence of diazinon and chlorpyrifos is considered (Tables 2.7 and 2.8). There were seven instances in which chlorpyrifos caused or contributed to an exceedance of the loading capacity in the Sacramento or Feather Rivers, based on the proposed acute water quality objectives. There were nine instances in which chlorpyrifos caused or contributed to an exceedance of the loading capacity based on the proposed chronic water quality objectives. These would also be considered exceedances of the existing narrative water quality objectives. The scientific evidence of a common mode of action between diazinon and chlorpyrifos, the requirements of the Basin Plan, and the available data all suggest that chlorpyrifos must be considered as part of this Basin Plan Amendment.

The Commenter suggested that TMDLs have not been initiated for other pesticides with more exceedances. It should be noted that the Regional Board has initiated a comprehensive Basin Planning/TMDL effort to address all 303(d) listed pesticides, as well as pesticides that pose a potentially high risk to water quality (see http://www.waterboards.ca.gov/centralvalley/programs/tmdl/pest-basinplan-amend/index.html). Should the Commenter be aware of any pesticides that are not addressed by that effort, staff would appreciate having those pesticides identified.

The Commenter also suggests that attention on chlorpyrifos could lead to the use of other pesticides that would cause greater environmental harm. The proposed Basin Plan Amendment requires dischargers to ensure alternative pesticides do not cause violations of water quality objectives and requires dischargers to monitor to determine whether such violations are occurring.

The commenter also identified concerns regarding potential unnecessary costs. However, according to the proposed amendment, if chlorpyrifos dischargers are not causing or contributing to exceedances of the loading capacity, they will not need to change their management practices [i.e., the cost would be “0”]. The Sacramento Valley Water Quality Coalition is already conducting monitoring of diazinon and chlorpyrifos, so there should not be significant changes in cost of monitoring.

Staff analysis suggests that current regulatory requirements (i.e the diazinon label and DPR dormant spray regulations) should be sufficient to prevent future exceedances of the proposed water quality objectives. However, loading capacity exceedances, and thus narrative pesticide and toxicity objective exceedances, may continue despite these regulatory requirements. In the event that additional actions be required, the Coalition has already prepared a management plan for diazinon, which can likely be altered to address chlorpyrifos as well.

In response to the cost concerns, the proposed Amendment has been changed with respect to the requirement to submit revisions to the management plan. When requiring management plan revisions, the Executive Officer will have the flexibility to consider the relative contribution of diazinon and chlorpyrifos to any exceedances of the loading capacity. Therefore, if exceedances of the loading capacity occur, the Executive Officer could require management plan changes that are focused on the pesticide that is the primary cause of the exceedance. Based on the existing efforts and the discretion provided to the Executive Officer in requiring management plan revisions, the incremental increase in cost is likely to be minor.

> **COMMENT 2-2**: A TMDL May Not Be Initiated Until A Pesticide's Presence In A Watershed Is Established At A Minimum Threshold
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> Board staff suggests that it may initiate a TMDL for Chlorpyrifos even though Chlorpyrifos is not present in a concentration which violates the proposed objective and despite the fact that it is virtually non existent in the Feather River. …[U]nder the staff's reasoning, a Regional Water Quality Control Board could expend vast sums of money to initiate a TMDL even though, as here, there is a quantitative lack of data which would objectively justify such an expense.
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> Instead, there must be some threshold level at which a TMDL may be initiated. That objective threshold must be above the minimal data (2 historical exceedances) upon which the Board's staff relies for its proposed Chlorpyrifos TMDL. Otherwise, the Board's staff could recommend establishing costly TMDLs for chemicals that are non-existent in Central Valley watersheds and which are not currently exceeding objective levels.

RESPONSE 2-2: The loading capacity and allocations established in the Basin Plan serve a dual purpose. Their primary purpose is to provide a clear basis for the actions to be taken by dischargers to meet water quality objectives. The primary authority for these provisions is found in the Porter-Cologne Water Quality Control Act (Porter-Cologne, California Water Code § 13000 et seq.) at section 13242(a), which requires the program of implementation to include a description of the actions necessary to comply with water quality objectives. This requirement exists regardless of whether a waterbody is defined as impaired under section 303(d) of the federal Clean Water Act.

Staff is recommending elements similar to those required for a TMDL to satisfy the Porter-Cologne program of implementation requirements. The loading capacity and allocations provide direction to dischargers on the diazinon and chlorpyrifos levels their actions should strive to meet. Porter-Cologne also requires a description of the surveillance to be undertaken to determine compliance with water quality objectives (Water Code § 13242(c)). The loading

capacity and allocations provide a basis for evaluating monitoring data to determine compliance with the water quality objectives.

The secondary purpose of the loading capacity and allocations is to meet federal Clean Water Act requirements to establish TMDLs. The "threshold" for establishing a total maximum daily load (TMDL) is defined by the Clean Water Act. TMDLs must be established for waters identified by the State as not meeting water quality standards (Clean Water Act § 303(d)(1)(C)). The State Water Board recently identified the Feather River as not meeting water quality standards for diazinon and chlorpyrifos. The Sacramento River has been identified as not meeting water quality standards for diazinon. The loading capacity defines the assimilative capacity of the water body (the "TMDL"). Waste load and load allocations are established to ensure the sum of all discharges does not exceed the assimilative capacity.

In summary, Regional Board staff believes it is appropriate to identify the loading capacity and allocations to ensure attainment of water quality objectives as required by Porter Cologne. The loading capacity and allocations provide a clear basis for evaluating the actions taken by dischargers to meet both narrative and numeric water quality objectives. Establishing the loading capacity and allocations is especially critical when regulating mixtures of contaminants with a common mode of action, such as diazinon and chlorpyrifos. The loading capacity allows the Regional Board to consider the cumulative impact of diazinon and chlorpyrifos, which cannot be determined by comparing water quality data to individual objectives alone. In addition, the proposed action allows the Central Valley Water Board to meet its Clean Water Act mandate to establish TMDL's for those water bodies found by the State Water Board to be impaired under Clean Water Act section 303(d).

> **COMMENT 2-3**: A TMDL May Not Be Initiated On One Watershed Simply To Create Regulatory Consistency With Another Watershed
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> Board staff asserts that one of the reasons to establish a Chlorpyrifos TMDL on the Feather River is to create regulatory consistency with the Basin Plan for the San Joaquin River and Delta. This desire, however, cannot justify establishing a TMDL. …
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> Establishing a TMDL must be based on a justified need for the regulatory program, not on administrative convenience. The proposed changes to section 3.2 of the Basin Plan regarding load calculations, alternative pesticides, implementation of the waivers, additivity formulas, management plans, and increased monitoring, compel significant increased responsibilities and costs on coalitions, farmers, and water districts, all without justification. …

RESPONSE 2-3: See responses to comments 2-1 and 2-2 for the other legal and technical reasons for addressing both diazinon and chlorpyrifos through a

Basin Plan Amendment. In addition, the Regional Board has adopted a Basin Plan Amendment for the Delta that includes allocations for discharges to the Delta. Ensuring that discharges from the Sacramento River at I Street (the legal Delta boundary) will not exceed the loading capacity of the Delta is done to protect the Delta.

Establishing consistent requirements for the Sacramento, Feather, and San Joaquin Rivers and the Delta is appropriate since the aquatic life uses to be protected are similar. A consistent framework for regulating diazinon and chlorpyrifos discharges is also reasonable, since the relevant legal and technical issues do not differ in any substantive way. In summary, establishing a consistent framework is based on the particular circumstances in the Sacramento and Feather Rivers and not administrative convenience.

Finally, the Commenter suggests that significant costs will be incurred by a variety of parties. If chlorpyrifos dischargers are not causing or contributing to exceedances of the loading capacity, they will not need to change their management practices [i.e., the cost would be "0"]. The Sacramento Valley Water Quality Coalition is already conducting monitoring of diazinon and chlorpyrifos, so there should not be significant changes in cost of monitoring. The Coalition has already prepared a management plan for diazinon, which can likely be altered to address chlorpyrifos as well. Based on these existing efforts, the incremental increase in cost is likely to be minor.

> **COMMENT 2-4**: Objective Levels For Chlorpyrifos Have Already Been Established
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> While DAS disagreed with the objective levels established, and continues to disagree with the established levels, the objective levels for Chlorpyrifos have been settled by the Board for several years and have been in the Basin Plan since the San Joaquin River and Delta TMDLs were established. (See Chapter 3.2, Table III 2A.)

RESPONSE 2-4: The Regional Board has not established chlorpyrifos water quality objectives for the Sacramento and Feather Rivers. Establishing water quality objectives requires the adoption of a Basin Plan Amendment by the Regional Board (as is currently proposed) and approval by the State Water Resources Control Board, Office of Administrative Law and U.S. Environmental Protection Agency. Chlorpyrifos objectives have been approved for the San Joaquin River and are pending approval for the Delta.

> **COMMENT 2-5**: The Proposed Additivity formula is scientifically unsound
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> … [T]he proposed additivity formula does not account for the fact that if a chemical is present at low levels where there is no biological influence from that chemical, there is no scientific basis for applying the additivity formula. … The peer reviewer, engaged by the Regional Board during the

San Joaquin River and Delta Basin Plan amendments also pointed out this defect.

In the Staff Report reference is made to Deener [sic] et al., 1988, a journal article purporting to support the Board's staff position that there is no concentration below which Chlorpyrifos or Diazinon will no longer contribute to the overall toxicity of the mixture[2]. After careful review of this paper, it is obvious that the sweeping conclusion that any compound will contribute to the toxicity of the mixture, even if it is present at an extremely low concentration, is not applicable to the situation under consideration in the Staff Report. First, the chemicals tested in Deneer et al., 1988 are all industrial chemicals with non specific mechanisms of action eliciting general narcosis effects. In contrast, Chlorpyrifos and Diazinon have specific mechanisms of action related to inactivation of acetylcholinesterase at neural junctions. Second, in their discussion Deneer and co workers state, ". . . every specific acting chemical obviously possesses some aneasthetic potency, depending on its hydrophobicity. Under normal circumstances, the concentrations of these chemicals will be too low to cause the biological response through their specific mode of action. They will however, contribute to the total anaesthetic potency of the mixture."

…Thus, when either Chlorpyrifos or Diazinon are present only in very low concentrations, there is no basis to apply the proposed additivity formula.

DAS again comments that the selection of a numeric water quality criteria as the denominator in the additivity formula is not supported by general principles of toxicology. Additivity expressions generally compare endpoints obtained from testing on the same organism[3], not derived values such as numeric criteria which may or may not be comparable, since they probably come from different sets of test species.

RESPONSE 2-5: As the Commenter indicated, diazinon and chlorpyrifos are organophosphorus (OP) pesticides that have a specific mode of action – inactivation of acetylcholinesterase at neural junctions. The inactivation occurs when diazinon or chlorpyrifos binds to a site that would normally be occupied by acetylcholine, which would then break down. Since acetylcholine cannot break down at the neural junction, it keeps stimulating the synapse (e.g., signaling a

[2] Deneer, J.W., Sinnige, T.L., Seinen, W. Herments, J.L.M. 1988. The joint acute toxicity to Daphnia magna of industrial organic chemicals at low concentrations. Aquatic Toxicol 12:33 38.

[3] Lloyd, R. 1987 Special tests in aquatic toxicity for chemical mixtures: interactions and modification of response by variation of physicochemical conditions. Pages 491 507 in Methods for Assessing the Effects of Mixtures of Chemicals, ed. by V.B. Vouk, G.C. Butler, A.C. Upton, D.V. Parke and S.C. Asher. Scientific Committee on Problems of the Environment, SCOPE 30, John Wiley & Sons, New York.

muscle to contract)[4]. A certain number of these neural junctions will need to be occupied by diazinon or chlorpyrifos before an effect is observed in a laboratory test.

However, even a small amount of chlorpyrifos (or diazinon) will have a cumulative effect when combined with a larger amount of diazinon (or chlorpyrifos) that is concurrently present in the organism. If relatively few neural sites are blocked by chlorpyrifos and many blocked by diazinon, the inhibition of acetylcholinesterase is still being caused by both chemicals. The effect on the organism is in reaction to the total number of neural sites that are blocked by the OP pesticides.

A second point the Commenter makes is with respect to the peer review performed on the San Joaquin River Basin Plan Amendment. The same peer reviewer expanded on his comment, when later reviewing the Delta Basin Plan Amendment that had the same additivity formula. "To be conservative, however, the proposed amendment does have a formula to allow additivity for co-occurring residues, and from a risk management perspective this application is reasonable." The peer reviewer, therefore, supported the Regional Board's approach to addressing the co-occurrence of diazinon and chlorpyrifos.

The third point the Commenter makes appears to suggest that the Deneer, et al (1988) paper came to a different conclusion regarding low concentrations in a mixture. However, Deneer, et al (1988; pg 37) unequivocally state "If all compounds in a mixture act through the same mechanism, there is no concentration below which a compound will no longer contribute to the overall toxicity of the mixture." As discussed above (and by the Commenter), diazinon and chlorpyrifos act through the same mechanism on organisms – acetylcholinesterase inhibition.

The quote identified by the Commenter was discussed by Deneer and his colleagues in a different context. Deneer, et al, were suggesting that even when concentrations of a chemical were too low to cause a biological response via a specific mode of action, the chemical would contribute to a general anaesthetic effect.

Also, it should be noted that the formula is not structured to predict toxicity test results. The formula is meant to ensure beneficial uses are protected when two pesticides with the same mode of action are present concurrently. The proposed numeric water quality objectives are meant to protect beneficial uses when each pesticide is present alone. Therefore, the same objectives should be used in the additivity formula to ensure protection of beneficial uses when the pesticides co-occur.

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[4] For a description of acetylcholinesterase inhibition in mammals, see Abou-Donia, M.B. 2003. Organophosphorus ester-induced chronic neurotoxicity. *Archives of Environmental Health, 58*(3),

COMMENT 2-6: Proposed Changes

DAS does not believe the proposed water quality objectives for Chlorpyrifos as provided in Basin Plan 3.1, Table III 2A are appropriate. In addition, DAS objects to the Board initiating a new formal TMDL for Chlorpyrifos on the Feather River. DAS, therefore objects to the proposed amendments as discussed in the second paragraph of Comment No. 3.

RESPONSE 2-6: See response to Comments 2-1 through 2-5. The Regional Board believes it is appropriate to establish water quality objectives for chlorpyrifos and the accompanying program of implementation. It should be noted that the Commenter has not provided any evidence to suggest why the chlorpyrifos water quality objectives are not appropriate.

3. Ephraim Gur, Vice President of Regulatory and Scientific Affairs, Makhteshim Agan of North America, Inc (MANA)

COMMENT 3-1: MANA Generally Applauds the Staff's Proposals

As a general matter, MANA applauds the revisions proposed in this Draft Staff Report. MANA brought to the Regional Water Quality Control Board's attention in 2004 the mathematical reporting error in a key report on which the Board had relied in establishing the current plan provisions, and eagerly has been awaiting the corrective action reflected in this proposal. The levels proposed by the staff (0.16 pg/L acute and 0.10 pg/L chronic), and the related changes to the Basin Plan which the staff now describes, are a considerable improvement over existing provisions.

Of central importance to the reasonableness of the revisions is the proposal to add to Section 7 of the "Regional Water Board Prohibitions" the proposed clarification that "[tlhese prohibitions apply only to dischargers causing or contributing to the exceedance of the water quality objective or loading capacity." The staff also has appropriately recognized the uncertainties surrounding assertions that very low levels of organophosphate pesticides may have an adverse impact on some endangered or threatened species.

RESPONSE 3-1: The Regional Board appreciates MANA's general support for the Basin Plan Amendment.

COMMENT 3-2: MANA Recommends Adopting the US EPA criteria as Water Quality Objectives

Nonetheless, MANA continues to believe, as it has explained in the past, that it would be more appropriate to set the diazinon acute and chronic water quality objectives at 0.17 ug/L levels that have been endorsed by

USEPA. Diazinon is used throughout the United States and overseas, and maintaining harmonized, identical standards throughout the world would simplify stewardship efforts and avoid unnecessary confusion. Moreover, the rationale offered by the Staff for relying on the CDFG's calculations - which produce a different outcome because CDFG excluded two data points - is not reasonable.

RESPONSE 3-2: As discussed in the Staff Report (Section 5.1.3), the reasons for excluding the two acute toxicity studies from the diazinon criteria were based on data quality concerns. The proposed acute diazinon objective is 6% lower than the U.S. EPA acute criterion (0.16 μg/L vs. 0.17 μg/L). The two excluded studies, therefore, have very little effect on the final calculated acute criteria.

With respect to the proposed chronic diazinon objective, the difference with the U.S. EPA chronic criterion is not related to the acute toxicity studies mentioned. The U.S. EPA included only two chronic values in calculating the acute-to-chronic ratio (ACR), whereas, the CDFG included three chronic values. The U.S. EPA calculated an ACR of 2 and the CDFG calculated and ACR of 3. Since the CDFG included more valid chronic toxicity studies than U.S. EPA, staff concluded the scientific basis for the CDFG chronic criterion was more robust.

The Regional Board has already adopted the proposed diazinon water quality objectives for the San Joaquin River and Delta. The information provided by the Commenter was available to the Regional Board when those previous actions were taken. No new information has been provided to justify different diazinon objectives for the Sacramento and Feather Rivers, then for the San Joaquin River and Delta waterways.

COMMENT 3-3: The Proposal Properly Gives Chlorpyrifos and Diazinon Equivalent Regulatory Treatment

MANA concurs with the Staffs proposed choice of Implementation Framework Alternatives (i. e., Inclusion of Chlorpyrifos into Existing Framework). Growers in the Central Valley have become familiar with that framework, and there is no rational basis to impose different obligations on growers who use chlorpyrifos than on those who use diazinon. It is in the public interest for regulatory agencies to maintain as level a playing field as possible among potentially-competitive products.

RESPONSE 3-3: The Regional Board appreciates MANA's support of the inclusion of chlorpyrifos into the Basin Plan Amendment.

COMMENT 3-4: The Chosen Load Allocation Methodology is Appropriate, but Measurement Locations Should be Identified More Clearly in the Basin Plan Itself

Under the circumstances presented by diazinon and chlorpyrifos usage in the Sacramento and San Joaquin River basins, the load allocation methodology proposed in the Draft Staff Report is reasonable. As noted above, however, a crucial reason for this is the proposed amendment to the "prohibitions" section of the Basin Plan that would confirm that "prohibitions apply only to dischargers causing or contributing to the exceedence of the water quality objective or loading capacity." …

Another key reason for the appropriateness of the chosen load allocation methodology is the Draft Staff Report's confirmation that compliance is to be determined where flows are "coming into the Sacramento and Feather River from each subwatershed" (p. 88) and that "[tlhe only data that would be necessary to assess compliance with the proposed load allocations would be diazinon and chlorpyrifos concentration data at the points of discharge to the Sacramento and Feather Rivers." (p. 88-89). That is, compliance is not to be measured upst[r]eam in tributaries or at the edge of fields that drain into them. See also p. 124 ("Water quality monitoring will need to be conducted where tributary waters discharge into the Sacramento and Feather Rivers.")

To avoid any future confusion on this issue, however, it would be helpful to make this point in the Basin Plan itself, just as the point about discharger responsibility is made. A logical place to do so would be in paragraph 3 of the revised "Pesticide Discharges from Nonpoint Sources, Control of Diazinon and Chloropyrifos Runoff into the Sacramento and Feather Rivers," which appears at the top of page 5 1 of the Draft Staff Report.

RESPONSE 3-4: The Regional Board appreciates MANA's support of the load allocation methodology. The Basin Plan Amendment language has been modified to clarify the point of compliance for load allocations.

COMMENT 3-5: The Additivity Formula Should be Revisited

There appear to be two aspects of the additivity formula discussed at pages 44 and 59 of the draft report that are inappropriate and should be revised.

First, as drafted the principal would be invoked whenever two related pesticides are present in a given water body. This is not logical. It should invoked where more than one related pesticide has been found to be present in the same sample (either water or sediment). For example, as the plan is written, two samples taken 20 miles apart within the same water body would be evaluated for additive toxicity. This is obviously incorrect, as one cannot assume that these pesticides are co-occurring within the same spatial scale.

Second, the use of water quality objectives in the denominators should be reconsidered. These are inappropriate for this use because these values contain safety factors (final toxicity values are divided by 2). The denominators should be the actual LC50/EC50 values from toxicity tests for the specific pesticides and these acute values for different pesticides should be from similar taxa (i.e. fish, invertebrates or plants). It is also incorrect to assume that additive toxicity exists if reported pesticide concentrations are well below established thresholds.

RESPONSE 3-5: With respect to the first point, the Basin Plan Amendment language has been changed to clarify how analytical results should be applied to the additivity formula.

With respect to the second point, see response to Comment 2-5.