Appendix K. Response to Peer Review No. 1 Comments

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: The approach presented in Sections 4.0 and 5.0 on the calculation of nutrient loading to the creek seems valid and reasonable given the available data. It is clear and easy to follow. The uncertainties about linking the mass loading throughout the watershed to observed concentrations of nitrogen and phosphorus in the creek are explained well. The decision to implement an iterative approach to determine appropriate load reductions of nitrogen and phosphorus seems reasonable.

Response: Comment noted.

Section: **Subsection:**

Commentor: Professor David Jenkins

Comment: The report should show historic trends of all nutrient forms being addressed (NO3-N, total N, ortho P, total P).

Response: While it would be optimum to include historic data for total N, ortho P, and total P, this information is not available.

Section: **Subsection:**

Commentor: Professor David Jenkins

Comment: Assuming an N:P ratio of 10:1 is unfounded. Rather than making across-the-board reductions of both, the TMDL targets (and associated load reductions) should be set based on whichever nutrient is determined to limit algal growth in the Creek.

Response: Federal regulations require that TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical water quality standards [40 CFR 130.7(c)(1)]. As stated in the staff report (Section 2.5 Water Quality Objectives) the Basin Plan's water quality objective for Biostimulatory Substances allows for the use of a weight to weight ratio of 10:1 (N:P) for determination of a threshold value for total nitrogen, in absence of data to determine the natural ratio. Since historic values of P were not available to calculate the natural ratio, the ratio of 10:1 is assumed.

Section: **Subsection:**

Commentor: Professor David Jenkins

Comment: The approach to meeting the municipal water supply NO_3-N limit of 10 mg N/L in the initial step of the TMDL is reasonable.

Response: Comment noted.

Section: **Subsection:**

Commentor: Professor David Jenkins

Comment: The report does not adequately establish that either N, P or both, affect the growth of algae.

Response: Language has been added to clarify this issue in two sections of the report. The discussion in Section 2.1 Nutrients and Nutrient Cycling has been clarified to explicitly state that algal growth is related to nutrient concentrations in water.

The discussion in Section 3.0 Numeric Targets includes a more descriptive explanation of the use of nitrogen to phosphorus ratios as an indication of which nutrient is likely to limit algal growth. Although targets for both N and P are essentially required by regulation (i.e., the Basin Plan), N:P ratios of the empirical data presented in the report are discussed for the purpose of providing an indication that both nutrients may be limiting and add further support to setting TMDL targets for both nutrients. The ratios are not presented but can be easily calculated by the reader.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: In the Draft Amendment (20 November 2001), under "Total Maximum Daily Loads for Rainbow Creek," the TMDL for biostimulatory nutrients in Rainbow Creek is set equal to 1,507 kg/yr for total nitrogen. In footnote 1, you say that this value equals the present annual load estimate from undeveloped land, leaving zero load allocation for developed land uses. However, based on the reasoning for load allocation present in Section 6.0 of the Draft Report, even if the entire watershed were undeveloped, the background load to the creek would still be 2,403 kg/yr. How is it reasonable to set the TMDL for biostimulatory nutrients equal to 1,507 kg/yr when it doesn't seem to be theoretically possible based on your loading factor assumptions?

Response: This inconsistency has been resolved. Background allocations in Section 6.0 were revised and calculated based on undeveloped land area.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: The material is scientifically sound and thorough and will provide good support for the Regional Board's proposed actions.

Response: Comment noted.

Section: **Subsection:**

Commentor: Professor David Jenkins

Comment: The report confuses NO_3-N and total N in many places. This confusion seems to stem from an inadequate initial definition of terms.

Response: Comment noted. Clarifications have been made to the document as appropriate.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: In evaluating the approach, the reservation of 10 percent of the TMDL to MOS seems reasonable. The approach for computing background versus the load allocations raises question. Why were developed land areas included in the background computation? This method implies a 0.9 (0.1) kg/ha/yr nitrogen (phosphorous) load reduction for developed lands, even though these background loads can theoretically never occur while the lands remain developed (i.e. other loading factors for developed lands apply to these lands, as reported in Tables 4-1 and 4-3). For each nutrient constituent, it seems more reasonable to base the background load on the present area of undeveloped land. If you followed this approach, the background load allocation would decrease and the load allocations would increase. The result is a more flexible load allocation for developed landowners without reducing the total TMDL goals.

Response: The recommended change has been incorporated into the draft. Background allocations in Section 6.0 were revised and calculated based on undeveloped land area, as all other land uses were assigned load allocations.

Section: **Subsection:**

Commentor: Professor David Jenkins

Comment: Numerous handwritten comments were made throughout the document.

Response: Handwritten comments were considered while revising the draft staff report.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: The data appear to be reliable and appropriate. The staff has sufficiently treated the data in a defensible manner.

Response: Comment noted.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: The staff's report on nutrient sources in the watershed appears to be adequate and correctly addressed.

Response: Comment noted.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: The hydrology of the watershed seems adequately and correctly addressed.

Response: Comment noted.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: The role of algae and its response to nutrients and other limiting factors is explained well. However, how to distinguish between "eutrophic conditions" and "excessive algal growth" was not clear. Does "excessive algal growth" have to be recurrent before "eutrophic conditions" can be declared? Or do fish kills, excess decomposition of plant matter, and/or DO depletion to below 5.0 mg/L have to be observed to warrant a declaration that the creek is "eutrophic"?

Response: The latter statement is correct, fish kills, excess decomposition of plant matter, and/or low DO would be need to be observed to warrant a declaration that a waterbody is eutrophic. These signs of eutrophication has not been observed or documented to date; however, excess algal growth has been documented. Excess algal growth is considered to not only pose an problem of nuissance but can also create a potential for eutrophic conditions to develop.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: Nutrient dynamics, including physical and chemical processes, and biological uptake and assimilation are adequately and correctly addressed.

Response: Comment noted.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: The staff report adequately and correctly addresses the effects of nutrients in the freshwater stream.

Response: Comment noted.

Section: **Subsection:**

Commentor: Professor Rhea Williamson

Comment: In general, the document provides a good review of the problem, the regulatory compliance issues, data summary, assumptions used, load calculations and areas of uncertainty. There are, however, considerable data gaps, assumptions and omissions that need correction or clarification. Many of the references cited are not provided in the reference list, or are incomplete. These are identified as noted. In general, the scientific issues identified in Attachment 2 to the "Request for Scientific Peer Review" (effects of nutrients in freshwater stream systems, nutrient dynamics, role of algae, watershed hydrology, sources of nutrients in the watershed, reliability and treatment of the data, validity of approach to nutrient loading calculations, assignment of load allocations, and data gaps) are addressed, but not always adequately: These are noted in the specific comments section that follows.

Response: Comment noted.

Section: **Subsection:**

Commentor: Professor John Dracup

Comment: The set of data gaps presented in Section 9.5.1.1 seems comprehensive and should provide sufficient information to clarify ground water and septic system issues. It is also a reasonable set of gaps to investigate during Tier I of the Nutrient Reduction and Management Plan (NRMP).

Response: Comment noted.

Section: 2.1 **Subsection:**

Commentor: Professor Rhea Williamson

Comment: The description of sources of nitrogen is incomplete. Organic nitrogen is omitted from discussion. Nitrogen fixation by actinomycetes (soil bacteria) and cyanobacteria (blue-green algae) results in the utilization of nitrogen in the form of nitrogen gas. Discussion of the required oxygen environments is not addressed.

Response: Organic nitrogen has been added to the discussion. Nitrogen fixation is already included in the list of processes that convert gaseous nitrogen into usable chemical forms. Information about the required oxygen environments has been added.

Section: 2.1 **Subsection:** Paragraph 1

Commentor: Professor David Jenkins

Comment: The sentence should reflect that the term nutrient refers to any organic or inorganic material that is necessary for life.

Response: The recommended change has been incorporated into the draft.

Section: 2.1 **Subsection:** Paragraph 2

Commentor: Professor David Jenkins

Comment: Most ammonification and nitrification does not involve, or follow from, N fixation.

Response: The referenced statement provides a list of three of the processes of the nitrogen cycle. There was no intent to imply that one cycle followed the other. The language has been rewritten to be more clear.

Section: 2.1 **Subsection:** Paragraph 3

Commentor: Professor David Jenkins

Comment: The phosphorus in rocks is already in the form of PO_4.

Response: Comment noted. The statement refers to decomposition, or "breakdown", of rock containing phosphate through weathering, leaching, etc., and not chemical breakdown. The sentence has been modified to be more clear.

Section: 2.1 **Subsection:** Paragraph 4

Commentor: Professor David Jenkins

Comment: Omit statement, "Because nitrogen has a gaseous phase, it can be transported to surface water via atmospheric deposition", because nitrogen gas is an insignificant part of the nitrogen cycle.

Response: Comment noted. The sentence was removed.

Section: 2.1 **Subsection:** Paragraph 4

Commentor: Professor David Jenkins

Comment: It is better to say "wastewater effluents", rather than "untreated wastewater".

Response: The recommended change was incorporated into the draft.

Section: 2.2 **Subsection:** Paragraph 3

Commentor: Professor Rhea Williamson

Comment: The reaches of the creek (described as upper and lower portions) are inconsistent with Figure A-3. MGT1 and RGT1 are not in either reach. The entire “middle" reach of the creek is not assessed.

Response: Language has been added to clarify the reach descriptions in Section 2.2. The middle reach is characterized by Willow Glen-4. MGT1 and RGT1 are part of the middle reach. Furthermore, there is little development in much of the middle reach and results show that RGT1 contributes low nutrient concentrations (see Table B-2).

Section: 2.3 **Subsection:** Paragraph 2

Commentor: Professor Rhea Williamson

Comment: The annual average for 1986 includes the single 1985 data point, which was one of the highest recorded values recorded (Table B-1). This will artificially elevate the 1986 annual average.

Response: Comment noted. The average for 1986 (without the 1985 data point) is 205.48 mg NO_3/L. A difference of 10.35 mg NO_3/L between the two calculated averages.

Section: 2.3 **Subsection:** Paragraph 3

Commentor: Professor Rhea Williamson

Comment: Two areas are identified as having excessive algae growth in the lower reaches. Was this assessment determined visually or was it based on water quality data such as pH and dissolved oxygen? The former can be misleading.

Response: The assessment was visually determined. The proposed monitoring in the Implementation Plan includes provisions to gather such data in the future.

Section: 2.3 **Subsection:** Paragraph 4

Commentor: Professor Rhea Williamson

Comment: The assumption of elevated historic phosphorus concentrations should be avoided unless knowledge of the fertilizer types is available. The presence of eutrophic downstream conditions does not mean that phosphorus levels are elevated. The assumption being made is that the creek is a phosphorus limited system. In addition, data (e.g., diel dissolved oxygen, pH values; evidence of fish kills) are needed to support the statement that eutrophic conditions exist.

Response: This paragraph summarizes the basis used to introduce the potential for elevated phosphorus in the absence of historic data. This was established by the Mission Resource Conservation District during the Nitrate Reduction Program in 1997, which provided data demonstrating that phosphorus was present in concentrations above the biostimulatory substances objective. The language has been modified to clarify this point and the reference to the 1997 report has been added.

Additionally, the statement that eutrophic conditions were found downstream of Rainbow Creek is based on the fact that the Santa Margarita Lagoon was listed for eutrophication on Region 9's Clean Water Section 303(d) List of Impaired Waterbodies.

Section: 2.4 **Subsection:**

Commentor: Professor David Jenkins

Comment: The appears to be confusion between NO_3-N and total N in the report. Terms should be defined clearly and used correctly through the report.

Response: Terms have been defined and clarified throughout the report.

Section: 2.4 **Subsection:** Paragraph 1

Commentor: Professor Rhea Williamson

Comment: Table B-2 does not include data for Station 1 (Jubilee Way). This station is important in that it is the most upstream site and includes land uses that are different (e.g., the prison) from the other stations.

Response: Data collected for the Jubilee Station is included in Table B-2. As noted in the footnote of Table B-2, the Jubilee monitoring location was found to be dry and was not sampled. Ground water was found surfacing approximately 200 yards upstream of the station and was monitored for the remainder of the monitoring period.

Section: 2.4 **Subsection:** Paragraph 2

Commentor: Professor Rhea Williamson

Comment: There is also no attempt to address the precipitation effect (assumed to be insignificant?) on a seasonal or annual basis, or when comparing different years. Details of this type are important when assessing the validity of the decision to use 2000 data for determination of load allocations.

Response: No conclusions were made based on the one year of rainfall data. The annual total rainfall for 2000 in Rainbow Valley and Fallbrook was 11 and 9 inches, respectively. The 2000 rainfall data was reviewed and did not correlate well with flow data. No conclusions could be drawn from one year of data. Some observations about trends in nutrient concentrations relating to the rainy season is discussed in Section 7.0 Seasonal Variations. Additional data will be collected and evaluated during the implementation phase of the TMDL.

Section: 2.4 **Subsection:** Paragraph 2

Commentor: Professor Rhea Williamson

Comment: Data for 1998-1999 are compared to 2000, however the historical data table does not include the 1998-1999 data for review. It is difficult, as a result, to know how different the values in these two data sets are. Movement of the Oak Crest station 0.2 miles more downstream may or may not place it below the unnamed tributary on Figure A-2.

Response: The 1998-1999 data, reported by the Mission Resource Conservation District, is introduced, discussed, and referenced in Section 2.3. The comparison between the two data sets has been deleted as a result of differences in analytical methods and quality control measures used between the two monitoring programs suggest a greater uncertainty associated with the MRCD data sets. MRCD used an ion specific electrode method performed in-house whereas the Regional Board used an ion chromatography method performed by a California certified analytical laboratory.

Another difference between the two data sets was that the physical location of the Oak Crest station is different. The MRCD station is at the downstream edge of the mobile home park and the Regional Board station is at the upstream edge of the mobile home park. The MRCD station was not below the unnamed tributary.

Section: 2.4 **Subsection:** Paragraph 3

Commentor: Professor Rhea Williamson

Comment: The average nitrate nitrogen concentration is based on data collected between August and October from the Oak Crest location; this means that the peak months of February to July are not assessed. Data from this site are "expected to be representative" of water quality throughout the Rainbow Valley Basin, yet this site has the lowest nitrate nitrogen concentrations and the highest ortho-phosphate concentrations of all the creek stations (Table B-2). In addition, ground water surfaces at this location, making it non-representative of stations above the site.

Response: The commentor has correctly identified that the data used to determine average concentrations does not cover peak flow months. In fact, the original monitoring plan only evaluated the critical time of year for eutrophic conditions to occur - the time of lowest flowlonger daylight hours, and warmest temperatures. Due to the limits of the data, monitoring during peak flow months is included in the implementation plan.

Section 2.4 was bulletized to improve readability and the reference to the representativeness of the concentrations found at Oak Crest to concentrations in Rainbow Valley is no longer contained in this section.

Section: 2.4 **Subsection:** Paragraph 5

Commentor: Professor Rhea Williamson

Comment: The statement that there does not appear to be the same degree of seasonal variation in nutrients may be premature. Seasonal variation (based on percent difference) of nitrate nitrogen (97%) and phosphate phosphorus (75%) is quite high at Willow Glen-4. Both nutrient parameters fluctuate considerably. Reasons may also include erosion events leading to increased turbidity.

Response: The referenced statement has been removed and the information provided has been added to the text.

Section: 2.5 **Subsection:**

Commentor: Professor John Dracup

Comment: The biostimulatory objective is more restrictive than the drinking water objective, in terms of NO_3-N concentration allowed in the creek. It is clear that the drinking water objective is mandated by the MCL set forth in California Code of Regulations, Title 22. However, it is not clear what regulation mandates the biostimulatory objective set forth in this TMDL. If there is no regulation, you should state this in the report. Also, if there is no regulation, it is not made clear what would legally compel responsible parties that are existing land users with non-point-source loads to modify their activities to meet the biostimulatory objectives.

Response: Pursuant to the Federal Clean Water Act and the California Water Code, the Water Quality Control Plan for the San Diego Region (Basin Plan) is the regulatory basis which mandates limits for biostimulatory substances. The Basin Plan contains the water quality objectives and beneficial uses that have been established for the San Diego Region. Both objectives, nitrates in drinking water and biostimulatory substances, are designated in the Basin Plan.

Section: 2.5 **Subsection:** Paragraph 2

Commentor: Professor David Jenkins

Comment: Use "less than" values when discussing nitrite data.

Response: The recommended change has been incorporated into the draft.

Section: 2.5 **Subsection:** Paragraph 3

Commentor: Professor David Jenkins

Comment: Use "less than" values when discussing ammonia data.

Response: The recommended change has been incorporated into the draft.

Section: 2.5 **Subsection:** Paragraph 3

Commentor: Professor Rhea Williamson

Comment: It is stated that ammonia has not been found in reportable quanitities. What were the reporting limits used? Levels less than 25 ug/L are considered toxic. If reporting limits are set at 0.1 mg/L, as is often the case, then ammonia will never be found at reportable levels.

Response: The commentor has correctly identified that the laboratory detection limit is not low enough to determine if concentrations are below the objective. Language has been added to clarify this point.

Additionally, lower detection limits will be required for future monitoring.

Section: 2.5 **Subsection:** Paragraph 3

Commentor: Professor Rhea Williamson

Comment: The allowable levels of un-ionized ammonia have been amended (CFR, 1999) such that allowable levels are now based on the presence and/or absence of salmonid fish. This section should be updated to reflect the amendments.

Response: This comment applies to the potential need to re-assess the Basin Plan's water quality objective for un-ionized ammonia for consistency with updated federal regulations.

Section: 2.5 **Subsection:** Paragraph 6

Commentor: Professor David Jenkins

Comment: Where are the data on emergent plant and algal numbers to support your statement that these are both "excessive"?

Response: Excessive algae and emergent plant growth was evaluted qualitatively. Photographs illustrating the amount of algae and emergent plant growth are in Attachment C, as referenced.

Section: 2.6 **Subsection:** Paragraph 2

Commentor: Professor Rhea Williamson

Comment: Unclear. Does Camp Pendleton rely entirely on ground water, or on surface waters for its drinking water supply.

Response: Camp Pendleton relies entirely on ground water, which is recharged by the surface waters of the Santa Margarita Watershed. The language has been rewritten to be more clear.

Section: 2.6 **Subsection:** Paragraph 3

Commentor: Professor Rhea Williamson

Comment: Add to this section that eutropic conditions can result in an increase in pH that can result in the dissociation of ammonium to form the toxic ammonia species.

Response: The recommended change has been incorporated into the draft.

Section: 2.6 **Subsection:** Paragraph 3

Commentor: Professor Rhea Williamson

Comment: The formation of un-ionized ammonia is not restricted to the decomposition of organic matter. In addition, such decompostion yields ammonium; the transformation to ammonia requires a pH increase.

Response: Comment noted.

Section: 2.6 **Subsection:** Paragraph 4

Commentor: Professor Rhea Williamson

Comment: It is stated that eutrophic conditions in Rainbow Creek have not been observed and that dissolved oxygen concentrations are not expected to fall below 5 mg/L. This statement is based on limited data and on assumptions. What time period is included in this assessment? Were the dissolved oxygen concentrations taken to assess oxygen sag conditions measured at several locations? in pool and riffle areas? in locations with and without flow, algae, light, substrate for attachment? Data for 1997 are not included in Table B-1, which should include all historic data for the creek. These data may answer some of the questions above. Importantly, the lack of a fish kill DOES NOT indicate that dissolved oxygen levels are above 5 mg/L. Dissolved oxygen concentrations can vary spatially; the fish will migrate from areas with low dissolved oxygen. ADDITIONAL DISSOLVED OXYGEN DATA ARE NEEDED.

Response: The commentor has correctly identified that statements about the presence of eutrophic conditions and DO concentrations are based on limited data and assumptions. In response to this comment, the reference to fish kills has been deleted. Additionally, the implementation plan will require more monitoring, including monitoring for DO.

To answer your questions, the following information has been added to the draft:

On June 4-5,1997, Regional Board staff conducted DO monitoring. The study measured temperature and DO concentrations from 1:00 p.m. in the afternoon until 6:00 a.m. the following morning at locations on the Santa Margarita River, Rainbow Creek, Sandia Creek, and De Luz Creek. The purpose was to identify the DO diel cycle and to determine if the concentrations dropped below the DO objective. The study looked at measurements in pool and riffle areas of the stream and in backwater areas with less flow. The monitoring showed concentrations above 5 mg DO/L in flowing waters and concentrations that dipped below 5 mg DO/L in backwater areas. Backwater areas that exhibited low DO were uninhabitable by fish because of dense algal mats or very shallow water.

Section: 2.6 **Subsection:** Paragraph 8

Commentor: Professor Rhea Williamson

Comment: In the discussion of the insect population, inpacts of nutrients, herbicides, and pesticides are mentioned. Have there been any analyses of other pollutants, sedimentation, scouring, and other impacts in the Creek?

Response: Data of other pollutants, sedimentation, scouring, and other impacts in the Creek are not available.

Section: 3.0 **Subsection:**

Commentor: Professor David Jenkins

Comment: Again, the report appears to show a confusion between NO_3-N and total N. Concurrent numeric targets for both nitrate and total nitrogen are inconsistent. Total N is a measure that includes NO_3-N, yet NO_3-N is set at a higher limit than total N.

Response: Section 3.0 identifies the three numeric targets that will be used to evaluate compliance during TMDL implementation. The numeric targets will be implemented consecutively rather than concurrently. The nitrate target is proposed as an interim goal and the total N target is the final goal. Language has been added to clarify this point.

Section: 3.1 **Subsection:**

Commentor: Professor David Jenkins

Comment: Stating the water quality objective and numeric target for nitrates in municipal water supply is 10 mg NO_3-N/L is redundant.

Response: Comment noted. According to requirements set out by the U.S. EPA, numeric targets must be clearly identified and an adequate basis for why they were selected provided.

Section: 3.2 **Subsection:**

Commentor: Professor John Dracup

Comment: Are Sections 3.2 and 2.5 consistent when discussing the total nitrogen objective? Section 2.5 says that the Basin Plan does not state a threshold value for nitrogen and that a weight-to-weight ratio of 10:1 between total-N:total-P was adopted during the preparation of this draft TMDL to set the total-N threshold. Section 3.2 says that the total nitrogen target is a "numeric goal set forth in the Basin Plan." Which is correct?

Response: Section 2.5 presents the objectives that apply to Rainbow Creek in accordance with the Basin Plan. In the absence of site-specific data to determine natural ratios, the objective allows for the use of a weight to weight ratio of 10:1 (N:P) for the determination of an analogous threshold value for total nitrogen. Since the objective for total phosphorus in flowing waters is 0.1 mg P/L, then total nitrogen objective is 1.0 mg N/L. Section 3.2 establishes the numeric targets for the TMDLs, which are set equivalent to the objectives designated by the Basin Plan.

Section: 3.2 **Subsection:**

Commentor: Professor David Jenkins

Comment: It is not clear what the exception to exceeding the biostimulatory targets more than 10% of the time is.

Response: Site-specific studies may be used to demonstrate that the N and P limits may be exceeded more than 10% of the time. Since this requirement is discussed in section 2.5, the referenced phrase has been deleted.

Section: 3.2 **Subsection:**

Commentor: Professor David Jenkins

Comment: The report states that a reduction in N and P concentrations is expected result in a reduction in emergent plant growth. The link between the numeric targets and emergent plant growth should be clearly established.

Response: The recommended change has been incorporated into the draft.

Section: 3.2 **Subsection:**

Commentor: Professor David Jenkins

Comment: It is unclear how the statement, "Nuisance levels of algae can develop as a result of nutrient enrichment when factors, such as sunlight, temperature and flow are not limiting", supports the selection of total N and total P targets.

Response: The discussion for biostimulatory substances targets has been revised.

Section: 3.2 **Subsection:** Paragraph 1

Commentor: Professor Rhea Williamson

Comment: Add substrate for attachment to the criteria that affect the growth of algae in creeks. The targets SHOULD include dissolved oxygen. This document does not provide the data needed to substantiate the claim that “DO concentrations exist below tolerance levels for the designated beneficial use”.

Response: The recommended change has been incorporated into the draft.

DO will not be considered as a numeric target at this time. Current data do not indicate that potential oxygen depletion would be a direct result of discharge (e.g., discharge of sewer wastewater effluent) but rather a secondary response from algal growth resulting from the availability of elevated nutrients. Monitoring data collected during TMDL implementation will be used to evaluate the need for modification of the TMDLs, including addition of numeric targets, if necessary.

Section: 4.0 **Subsection:** Paragraph 4

Commentor: Professor John Dracup

Comment: In the last paragraph of Section 4.0, you might list all potential sources “not found to be a significant source of either nitrogen or phosphorous,” just to be complete. Currently CalTrans operations is only mentioned as one of those potential sources determined to not be significant.

Response: CalTrans was the only nutrient source identified as a potential source but found to be insignificant. The language in the paragraph has been changed to reflect this.

Section: 4.1.1 **Subsection:** Table 4-1

Commentor: Professor Rhea Williamson

Comment: The reference should be for Boynton, et.al., 1993.
Nitrogen export coefficients are for coastal regions in California. Were more appropriate values available from the Natural Conservation and Resources Service (NCRS) specific to the area?

Response: The recommended change has been incorporated into the draft. Inquiries to the local office of the Natural Resources Conservation Service and UC Cooperative Extension were made. Local nutrient export coefficients were not found to be available.

Section: 4.1.2 **Subsection:**

Commentor: Professor Rhea Williamson

Comment: References. San Diego County, 1994; San Diego County, 2001; SANDAG, 2001, Dames and Moore, 1996 are all missing from the reference list.

Response: The appropriate references have been added to Section 10.0 References.

Section: 4.1.2 **Subsection:** Paragraph 2

Commentor: Professor Rhea Williamson

Comment: Are the numbers for nitrogen loss via denitrification specific to the soil types in the region? This is very important, particularly given the fact that the area is not conducive to septic systems and leach fields as a means of waste treatment and that losses may be much lower. Also note that for denitrification to occur, anaerobic conditions must exist.

Response: The denitrification estimates are not specific to soil types in the region. Reasonable estimates were used because the site-specific information was not available. The Implementation Plan includes measures to acquire such information, which will be used to re-evaluate the loading estimates in the future.

Section: 4.1.2 **Subsection:** Paragraph 4

Commentor: Professor Rhea Williamson

Comment: Use of 3,150 kg/yr may be an underestimate. Information on the prison impacts should be included. Thousands of percolation pond systems exist (as well as design equations) from which estimates of nitrogen loading can be made.

Response: The commentor correctly identifies that the estimated total nitrogen load from ground water may be underestimated. As stated in the report, the total nitrogen load to ground water should be higher than the estimated annual load of 3,150 kg N/yr, but there is currently no data available to calculate the actual value. The influence of the Rainbow Conservation Camp on the ground water in the Rainbow Valley Basin is not known at this time. However, the facility is a permitted facility with this agency and the additional information is being requested. This information will be used in future evaluations of the TMDLs and allocations.

Section: 4.1.2 **Subsection:** Paragraph 5

Commentor: Professor Rhea Williamson

Comment: Nitrogen in ground water is not removed via transpiration. It is removed through active transport and uptake by plants. Uptake rates are specific to a plant species. In addition, uptake does not result in a loss from the system, but rather a transformation of form (unless the plant is harvested and removed from the site).

Response: The referenced paragraph intended to introduce nutrient removal by plants during the process of transpiration. The language has been changed to clearly reflect "plant uptake".

Section: 4.1.2 **Subsection:** Paragraph 6

Commentor: Professor David Jenkins

Comment: The report appears to claim that N is lost by transpiration, which is incorrect.

Response: The referenced paragraph intended to introduce nutrient removal by plants during the process of transpiration. The language has been changed to clearly reflect "plant uptake".

Section: 4.1.2 **Subsection:** Paragraph 6

Commentor: Professor Rhea Williamson

Comment: Ground water reaching the creek is not limited to that that surfaces at Oak Crest 3. The estimated load to the creek from ground water is potentially an underestimate. What about irrigation return flows, inputs from upstream and other contributing sources to Oak Crest 3 during dry weather?

Response: The commentor correctly identified that the estimated load to the creek from ground water based on Oak Crest 3 data is potentially an underestimate. As stated in the report in Section 2.2 Watershed Description, the ground water basin below Rainbow Valley is semi-confined and that the more than 30 years of imported water use for irrigation and domestic water use has caused a condition of high ground water. Because of this, the assumption was made that the concentrations in ground water surfacing at the Oak Crest Location would be indicative of ground water concentrations that may exist in Rainbow Valley. Unfortunately, no monitoring well nutrient data was available. The Implementation plan includes ground water monitoring to address this issue.

Section: 4.1.2 **Subsection:** Paragraph 7

Commentor: Professor Rhea Williamson

Comment: The assumption that flows at Willow Glen are the same as at Oak Crest ignores the impacts of several tributaries, of ground water intrusion between the two sites and other sources of water. This may result in an overestimate of the load.

Response: The commentor correctly identifies that the use of flow rates recorded at Willow Glen-4 station instead of those at Oak Crest potentially overestimate the calculated load. However, as stated in the report, sufficient flow rate data at Oak Crest-3 were not collected. A Parshall flume was installed at the Oak Crest station for 10 weeks of monitoring, but was compromised when a small rainstorm undermined the installation. Several weeks of flow data were lost as a result. The Willow Glen-4 flow data has a USGS gauging station and was determined to be more reliable.

Section: 4.1.2 **Subsection:** Paragraph 9

Commentor: Professor Rhea Williamson

Comment: The use of the mean to estimate the nitrogen load from ground water to Rainbow Creek does not make sense. Dry weather conditions exist for 3-4 months. A weighted average using this information could be determined.

Response: The two approaches provide approximations of nitrogen loads from ground water. It was determined to be reasonable to select a ground water loading within the range of the approximations because of the substantial uncertainty that exists in the calculations. However, in addressing your comment, the use of the term "mean" has been changed to "simple average". Additionally, the "dry weather" data set is not complete and can not be used to effectively determine a weighted average.

Section: 4.1.3 **Subsection:** Paragraph 2

Commentor: Professor Rhea Williamson

Comment: References. Chesapeake Bay Program is missing from the reference list.

Response: The Chesapeake Bay Program reference was erroneously cited in the document. It can be found in Section 10.0 References as "USEPA 1996". The citation has been corrected.

Section: 4.2.2 **Subsection:**

Commentor: Professor Rhea Williamson

Comment: What is the concentration of phosphorus in Rainbow Creek at Oak Crest in the summer?. Summer data of this type for nitrogen were used to estimate ground water loads of nitrogen. The assumption that all phosphorus is adsorbed to soil particles is erroneous. Note that the highest levels of P were during the early part of the monitoring period.

Response: The average concentration of total phosphorus is 1.13 mg/L, and orthophosphate is 0.85 mg/L. The assumption that all phophorus is adsorbed to soil particles is specifically used in the case with ground water loading. This assumption was necessary because ground water monitoring data was not available. Surface water samples taken at Oak Crest, although assumed to be surfacing ground water, would be influenced by phosphorus in sediments that were deposited during surface flows. We could not, with any certainty, distinguish how much phosphorus is being contributed by either source. Therefore, similar treatment as with the nitrogen ground water loading calculations was not determined to be appropriate. Phosphorus loading pertaining to surface water has been calculated.

Section: 4.2.3 **Subsection:** Table 4-4

Commentor: Professor Rhea Williamson

Comment: Disagree that the load from ground water is 0.

Response: The commentor has correctly identified that the ground water load is not likely 0 mg/L. Actual ground water concentrations were not available and could not be determined therefore the assumption that phophorus easily adsorbs to soil particles and does not move as readily in subsurface flows was accepted. Ground water data will be collected during implementation and will be used to revaluate the TMDLs and load allocations.

Section: 5.0 **Subsection:**

Commentor: Professor David Jenkins

Comment: Section 5.0 Linkage Analysis is overcomplicated. Rewrite the section so that it is more clear.

Response: The recommended changes have been incorporated into the draft.

Section: 5.0 **Subsection:** Paragraph 4

Commentor: Professor Rhea Williamson

Comment: The iterative approach can be difficult to apply with parameters that vary temporally (seasonal and diel) and spatially (depth, location). This approach needs to be considered carefully in that reliable data can take years to collect.

Response: The commentor has correctly identified that ecological data vary temporally and spatially and can make an iterative approach difficult to implement. In the Implementation Plan, the TMDLs are to be re-evaluated after four years of data have been gathered and then every four years following. This schedule should be adequate to assess temporal and spatial variations.

Section: 5.1 **Subsection:**

Commentor: Professor David Jenkins

Comment: The use of NO_3-N and total N in this section is confusing to the reader.

Response: The section has been clarified.

Section: 5.1 **Subsection:** Paragraph 1

Commentor: Professor Rhea Williamson

Comment: The current estimated load of 5,740 kg/yr may be an underestimate. Using Willow Glen-4 station data, the estimated load would be 11,815 kg/yr based on the mean of 9.1 mg/L and the flow of 0.3 cfs.

Response: The calculation showing the estimated nitrogen load as 11,815 kg/yr was not provided and could not be replicated. Our calculation of the load using average concentration and flow from Willow Glen-4 indicated a nitrogen load of 2,437 kg/yr. This indicates that the estimated load of 5,740 kg/yr is more than likely an overestimate, which is a conservative approach. This calculation appears consistent with the expectation that a load estimate using site-specific data would account for assimilative capacity.

Section: 5.1 **Subsection:** Paragraph 1

Commentor: Professor Rhea Williamson

Comment: The estimate of a 28% reduction of nitrate nitrogen assumes that the load, which is based on total nitrogen, consistently results in the same proportion of nitrate nitrogen. This is not likely. Contributions to the total nitrogen load from organic decomposition, runoff and other sources will vary seasonally and spatially.

Response: In Section 5.0 Linkage Analysis, it is acknowledged that it is unlikely that a directly proportional relationship exists between mass loading and observed concentrations because of biological and chemical processes, which uptake and release nutrients at varying rates. The implementation monitoring will provide data needed to better understand the relationship between mass loading reduction and the reduction in concentrations in the creek.

Section: 5.2 **Subsection:** Paragraph 1

Commentor: Professor Rhea Williamson

Comment: The phosphorus mass load reduction should be 573 not 576 kg/yr. The statement that the reduction is near zero should be corrected. The allowable load is 22 kg/yr.

Response: As determined in Section 4.2, the phosphorus mass load is correctly stated as 576 kg/yr. The load includes 573 kg/yr from land uses and 3 kg/yr from air deposition.

The commentor correctly identifies that the allowable load for meeting the biostimulatory numeric target of 0.1 mg/L is 22 kg/yr. However, setting aside a 10% margin of safety would result in a load of only 3 kg/yr that would be allocated to existing sources. The statement that the reduction is near zero has been replaced with 3 kg/yr.

Section: 5.2 **Subsection:** Table 5-1

Commentor: Professor Rhea Williamson

Comment: The last column should be labeled the Interim Load Capacity.

Response: The recommended change has been incorporated into the draft.

Section: 6.2 **Subsection:**

Commentor: Professor David Jenkins

Comment: In regards to basis for determination of septic system load allocations, the argument given "to balance the equation" is indefensible.

Response: The referenced phrase has been deleted. As discussed in Section 6.2, reductions in septic system loads will be more significant in the long-term. For the purpose of the short-term target, emphasis is placed on the remaining land-uses because they directly contribute to surface water.

Section: 6.2 **Subsection:**

Commentor: Professor David Jenkins

Comment: There is no justification to have a lower initial % N reduction for septic systems (70%) than for agriculture and residential (75%) … especially since the septic system N estimated contribution is the largest of these. The argument given "to balance the equation" is indefensible.

Response: The septic system load reduction of 70% is less than the 75% reduction for the other four land uses because reductions in septic system loads will be less significant in the short-term, as a result of the residence time in the ground water. In the context of meeting a short-term target, the emphasis is being placed on land-uses such as agriculture and residential, which directly contribute to surface water and are therefore more easily controlled. Additionally, investigation and monitoring data will be collected and used to reassess load allocations. On the second statement, the referenced phrase has been deleted.

Section: 6.2 **Subsection:** Paragraph 4

Commentor: Professor Rhea Williamson

Comment: The number for background loads for undeveloped land needs a reference. In addition, the calculation for background sources assumes that there is a background load for the areas of the watershed that are already developed. Approximately 62% of the watershed is undeveloped (Figure A-2) resulting in a background of 1,560 kg/yr and not of 2,403 kg/yr. This change effectively increases the allocation for nonpoint sources (LAs) to 2,157 kg/yr. All of these numbers assume that the TMDL of 4,130 kg/yr is properly estimated.

Response: A reference has been provided for background loads. Additionally, background allocations in Section 6.0 have been revised and calculated based on the undeveloped land area. Park and preserve was not included because these land uses are assigned load allocations.

Section: 6.2 **Subsection:** Paragraph 7

Commentor: Professor Rhea Williamson

Comment: It is stated that nitrogen contributions from parks, urban areas, and preserves are relatively insignificant. These land uses represent an insignificant percentage of the total watershed, however loads from these areas have not been assessed.

Response: The commentor correctly identified that contributions from parks, urban areas, and preserves represent an insignificant percentage of the total watershed; however, the loads for these areas are presented in Table 4-1.

Section: 6.2 **Subsection:** Table 6-1

Commentor: Professor Rhea Williamson

Comment: If the annual load allocations are increased to 2,157 kg/yr for the reasons stated above, then the percent reduction is reduced to 52%.

Response: The annual load allocation has been changed to 2,210 kg N/yr (total nitrogen) and 206 kg P/yr (total phosphorus), as a result of basing the background load on the undeveloped land area.

Section: 6.3 **Subsection:**

Commentor: Professor David Jenkins

Comment: The last sentence of the section does not make sense.

Response: The referenced sentence states that the allocated load is the portion of the total P load that is above background. In other words, the amount that is in excess of what would be generated if all of the watershed were undeveloped land. This is consistent with the background load calculation, which was conservatively calculated by applying the export coefficient to the acreage of the watershed. The sentence has been rewritten to be more clear.

Section: 7.0 **Subsection:**

Commentor: Professor David Jenkins

Comment: It is recommended that the symbols used in Figures 7-1 and 7-2 be consistent.

Response: The recommendation has been incorporated into the draft.

Section: 7.0 **Subsection:** Figure 7-1

Commentor: Professor Rhea Williamson

Comment: Data in Figure 7-1 reveal the impact of land uses on nitrate nitrogen concentrations in the creek. Jubilee and RGT-1 are both surrounded by mostly vacant lands, and are least impacted by irrigated fields and orchards. Levels at these sites are relatively low. WGT-1 and VMT-1 receive orchard drainage; nitrate levels are quite high. Riverhouse and Stagecoach are similarly impacted heavily by orchards. Riverhouse levels are high year round, possibly a result of tributary effects and orchard input. Willow Glen has seasonally elevated winter concentrations, followed by a reduction in the late summer months. Sources, loads and seasonal variations at these sites are needed.

Response: The commentor's assessment of Figure 7-1 is in agreement with staff's and the text offered by the commentor has been incorporated. In response to the suggestion to identify sources, loads and seasonal variations at each site, the decision was made to develop two TMDLs that would be generally applied over the entire watershed instead of creating multiple TMDLs for each reach and tributary. Data collected during implementation will fill data gaps and provide additional information that will be used to determine if the TMDLs and load allocations should be revised or if localized TMDLs are needed.

Section: 7.0 **Subsection:** Paragraph 5

Commentor: Professor Rhea Williamson

Comment: Controls on nutrient loading should be implemented all year long. The sediments act as a sink for phosphorus, so controls that reduce P-loading are essential. Sediments can also act as a sink for nitrogen compounds. In addition, algae growth is year round in Rainbow Creek. Availability of plentiful nutrients during the initial growth period can result in accumulations of algae later in the year.

Response: The recommendation has been incorporated into the draft.

Section: 9.4 **Subsection:**

Commentor: Professor John Dracup

Comment: The report states that landowners/land users (such as homeowners, nurseries, businesses, etc.) are identified as responsible parties and are required to comply with all local, state, and federal laws and regulations. From the report, it is not clear which laws

would force existing land owners in unincorporated areas to change their management practices if their nutrient loads were non-point-sources. Could they be taxed or fined? Could they have land-use permits revoked? The preceding discussion in Section 9.4 was helpful, but it seemed to address control over land use changes rather than static development.

Response: To the extent that laws apply to the land users in the watershed, land users could be subject to permits and fines. As stated in Section 9.2.3 Porter-Cologne Water Quality Control Act, the Regional Board has the authority to specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted. The Regional Board may issue permits (e.g., waste discharge requirements) or waivers of waste discharge. Enforcement actions include cease and desist orders, cleanup and abatement orders, administrative civil liability orders, civil court actions, and criminal prosecutions.

Section: 9.5 **Subsection:** Paragraph 5

Commentor: Professor Rhea Williamson

Comment: Add the sentence to the end of the paragraph: If monitoring data indicate that load reductions are not adequate to result in the nutrient target concentrations, then load allocations will be reevaluated and reduced.

Response: The recommended change has been incorporated into the draft.

Section: 9.5.1 **Subsection:**

Commentor: Professor Rhea Williamson

Comment: The numbered measures or alternatives are stated as being equally effective in meeting the 28% reduction. The items help assess, plan, develop regulations and the like, but none of the items actually reduce the nitrogen or phosphorus load.

Response: The commentor has correctly identified that the implementation actions do not directly reduce the nutrient loading. The proposed implementation actions describe a range of potential actions that could be taken to correct the nutrient loading problem. These actions are regulatory mechanisms that provide a framework for reductions to be made. In essence, implementing the recommended actions will lead to reductions in nutrient loading.

Section: 9.5.1.1 **Subsection:**

Commentor: Professor David Jenkins

Comment: The statement identifying hydrologic study monitoring parameters is vague and does not specify what chemical and physical parameters are to be monitored.

Response: The monitoring parameters are discussed and presented in Section 9.7 Monitoring Strategy for TMDL Implementation and Refinement of Source Analysis. A reference to the information has been added.

Section: 9.5.1.1 **Subsection:**

Commentor: Professor David Jenkins

Comment: The bullet refering to the feasibility of establishing a "Septic System Mangement District" is vague.

Response: Creating an entity that can evaluate, manage, and resolve the sewage disposal issues that are unique to this community needs to be evaluated. Language has been added to clarify this point.

Section: 9.5.1.1 **Subsection:** Ground Water

Commentor: Professor Rhea Williamson

Comment: In the bullet discussing transpiration rates and nutrient removal, transpiration rates are not used to describe nitrogen removal.

Response: The language has been changed to clearly reflect "plant uptake".

Section: 9.5.1.4 **Subsection:** Paragraph 6

Commentor: Professor David Jenkins

Comment: It is not clear to the reader what "is considered to be inadequate" in addressing the concerns of the TMDL.

Response: As a result of recent correspondence with Hines Nursery, the referenced statement is no longer applicable and has been deleted.

Section: 9.6 **Subsection:** Table 9-1

Commentor: Professor Rhea Williamson

Comment: Tier I (A) should require interim reports 2 years after USEPA approval.

Response: The recommended change has been incorporated into the draft.

Section: 9.7.1 **Subsection:** Paragraph 1

Commentor: Professor Rhea Williamson

Comment: Targets for biostimulatory substances should be collected year round for the reasons stated above.

Response: The recommended change has been incorporated into the draft.

Section: 9.7.1 **Subsection:** Paragraph 1

Commentor: Professor David Jenkins

Comment: The sentence should specifically state which biostimulatory substances are being refered to.

Response: The recommendation has been incorporated into the draft.

Section: 9.7.1 **Subsection:** Paragraph 2

Commentor: Professor Rhea Williamson

Comment: The Margarita Glen Tributary should be retained as a site. This site has very high total nitrogen and nitrate nitrogen (Table B-2). A long reach of the creek between Oak Crest-3 and Willow Glen-4 is not assessed. Major differences in nutrient concentrations exist between these two sites (Based on the averages for 8/22/00-10/10/00, TN and nitrate are 10.8 and 8.9 mg/L at Oak Crest and are 3.8 and .3. at Willow Glen. Phosphate was always less than 0.5 mg/L at Oak Crest, but was 0.37 at Willow Glen per

Table B-2). For this reason, a station should be added on Rainbow Creek between these two stations and below the agricultural fields.

Response: The recommended changes have been incorporated into the draft.

Section: 9.7.1 **Subsection:** Paragraph 3

Commentor: Professor David Jenkins

Comment: What is "quantified algae abundance"?

Response: The language has been changed to "algal biomass".

Section: 9.7.1 **Subsection:** Paragraph 4

Commentor: Professor David Jenkins

Comment: The statement that "it is not known at this time which factor is the limiting factor" is a key statement and is hidden away here. This statement should be made in an up-front way and be loud and clear or the report will loose all credibility. Additionally, how can N and P be regulated for biostimulatory substances without knowing which limits growth?

Response: A discussion is provided in Section 3.0 Numeric Targets regarding using the ratio of nitrogen to phosphorus (N:P) to indicate which nutrient is expected to limit algal growth. The referenced statement has been modified to state that it is assumed that N and P are co-limiting.

Section: 9.7.1 **Subsection:** Paragraph 4

Commentor: Professor David Jenkins

Comment: What is a "biodynamic analysis"? Please provide a method so that it can be done by the County of San Diego.

Response: The language has been changed to "algal species composition" and a reference has been provided.

Section: 9.7.1 **Subsection:** Table 9-2

Commentor: Professor Rhea Williamson

Comment: Add turbidity to the surface water monitoring. Change the type of sample from grab to field for pH, dissolved oxygen, and conductivity for both surface and ground water monitoring. Investigate use of chlorophyll (planktonic and attached) for the algae growth quantification.

Response: The recommended changes have been incorporated into the draft. The comment regarding chlorophyll as a method for quantifying algal growth is noted.

Section: 9.7.1 **Subsection:** Table 9-2

Commentor: Professor David Jenkins

Comment: Comments in Table 9-2 include:
What is total nitrogen?
What is the difference between total nitrogen and TKN?
Change "grab" to "in situ" for pH and dissolved oxygen.
Why perform both conductivity and TDS?
What type of sample is required for "Quantification of algae growth"?

Response: Total nitrogen is a measure of all forms of nitrogen (i.e., ammonia, nitrite, nitrate, and organic nitrogen). Total Kjeldahl Nitrogen, or TKN, is a measure of ammonia nitrogen and organic nitrogen. "Grab" sample was changed to "in situ" for pH and dissolved oxygen. Since previous monitoring data has been collected, TDS only will be required. "Quantification of algae growth" has been changed to read "Algal biomass (% cover of bottom and/or collection of algal samples)" and can be sampled using in situ or grab sample methods described in USEPA (2000).

Section: Peer Review Request Letter **Subsection:** Attachment 1, page 2

Commentor: Professor Rhea Williamson

Comment: Discussions related to second tier load reductions should indicate that nutrients will be reduced to concentrations "less than" the biostimulatory substances targets.

Response: Comment noted.