COMMENT LETTER 118 - ROSENBLUM ENVIRONMENTAL ENGINEERING, JOHN ROSENBLUM, PH.D. (OCTOBER 7, 1996), RECEIVED OCTOBER 7, 1996

Response to Comment 118-1

Comment Summary: The comment indicates that existing irrigation areas that will be used for the project were not analyzed in the Draft EIR/EIS. Specifically, the same analysis that was provided for new proposed irrigation areas should be provided for the Laguna de Santa Rosa.

Existing irrigation in the Laguna de Santa Rosa has been analyzed in a previous EIR that was used in the approval process for that project. In addition, both CEQA and NEPA require only that the Draft EIR/EIS analyze the change from the existing conditions that will result from the Project. There is thus no requirement to analyze the existing irrigation practices in the Laguna de Santa Rosa (which is not part of the Project) as part of this Draft EIR/EIS.

Response to Comment 118-2

Comment Summary: The comment indicates that existing irrigation areas that will be used for the project were not included in the cumulative impacts analysis in the Draft EIR/EIS. Specifically, existing irrigation in the Laguna de Santa Rosa should have been included in the cumulative impacts analysis.

Existing irrigation areas are part of the existing conditions and not part of the Project. A detailed description of existing conditions in the Laguna de Santa Rosa is presented in Appendices I-4 (Laguna de Santa Rosa Water Quality Monitoring Results), L-4 (Aquatic Habitat Survey Results), and L-5 (Aquatic Life Survey Results). All analyses were based on this existing conditions baseline, which provides the most direct possible indication of any effects of the existing system in the area. Past and current activities are thus evaluated throughout the document. No new or additional Project impacts will occur in the Laguna de Santa Rosa as a result of irrigation proposed as part of the Project.

Response to Comment 118-3

Comment Summary: The comment states that there are several cumulative impacts that might need mitigation that were not evaluated in the Draft EIR/EIS. One example is the need for more stringent measures for the Waste Reduction Strategy to directly increase Dissolved Oxygen.

The comment that "there are several cumulative impacts that might need mitigation" is considered by the EIR/EIS authors to be vague and unsubstantiated. Mitigation measures have been identified for each significant cumulative impact except Cumulative Impact 8.4C, (loss of annual grassland and coastal scrub) and 6.1C (conductivity). No feasible mitigation could be identified for these impacts. Analysis showed that, with mitigation, cumulative effects on dissolved oxygen will not be significant (refer to page 4.6-147). The comment also suggests the "need for more stringent measures for the Waste Reduction Strategy." The Draft EIR/EIS includes Mitigation Measure 2.5.6: Total and Ammonia Nitrogen Source Control Program on page 2-131 to meet the Subregional System's portion of the Waste Reduction Strategy. This technology is proven and more stringent measures are not needed.

Response to Comment 118-4

Comment Summary: With respect to cumulative impacts, the comment states that more stringent water quality measures for the Russian River and the Laguna de Santa Rosa are required to protect endangered fish species.

The comment that "more stringent water quality measures for the Russian River and the Laguna" are needed to protect endangered fish species for cumulative impacts is considered by the EIR/EIS authors to be vague and unsubstantiated. Mitigation measures have been identified for each significant cumulative impact except Cumulative Impact 8.4C, for which no feasible mitigation could be identified.

Response to Comment 118-5

Comment Summary: The comment asks whether local elected officials, public interest groups, Chamber of Commerce, and academics were surveyed or polled to validate the conclusions reached in the Infrastructure section. The comment also asks if local opinions can be included in the Final EIR/EIS.

It appears that the comment is referring to the review of academic literature prepared on the subject of Growth Inducement. Local officials, public interest groups and Chamber of Commerce representatives were not surveyed or polled. The Growth Inducement Section provides a review of related literature, as stated in Section 5 of the Draft EIR/EIS (page 5-6). Copies of the Draft EIR/EIS were sent to affected local governments and districts for their review and comment. Comments received concerning the Draft EIR/EIS, including those from local officials, are included in the Final EIR as Volumes XVIII and XIX of the document.

Response to Comment 118-6

Comment Summary: The comment asks what the impact of current efforts to expand spheres of influence, annex properties, and extend wastewater collection systems and sewer hookups will be?

The Draft EIR/EIS, as stated in Section 1.1, is intended to provide for the General Plan buildout conditions of the Subregional System's member entities as reflected in the General Plans in effect in April 1994. The Project does not provide capacity to support expansion of spheres of influence, annexation or extension of wastewater systems beyond that necessary to support the implementation of these General Plans. Detailed information on the basis of the Wastewater Flow Projections is presented in the Draft EIR/EIS, in Appendix D-4 (Wastewater Flow Projections).

Response to Comment 118-7

Comment Summary: The comment states that the questions and comments offered in the comment letter are intended to help identify additional analyses and calculations which could improve the confidence in the results.

Specific concerns were expressed in subsequent comments and these comments are addressed specifically in the Responses to Comments below.

Responses to Comment 118-8

Comment Summary: The comment asks why the Draft EIR/EIS relies on a 70-year period of record when the Sonoma County Water Agency relies on records from only 1941. The comment states that continuous flow measurements began in 1941.

As indicated in the comment, the Draft EIR/EIS is based on Russian River flow data from the 70-year period of record (1923 through 1992). The comment also correctly points out that the flow data from the period 1923 through 1941 are different from the data from 1942 through 1992 in that the data from the recent period represent a continuous data set and data from the earlier period are estimates of total daily flow. Although the data sets are different, the early data were deemed to be too valuable to ignore. The full 70-year data set provides an indication of changes in flows over time. The difference in these two data sets was considered whenever the data were used in the Draft EIR/EIS. For example, three particular years were selected for the water quality impacts simulation from which continuous flow data were used (1964, 1976, and 1982). In the case where the daily water balance model (which was developed as part of the water quality model) was used to create a 70-year simulation for comparison with the monthly water balance model as described in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models), the hourly flow data needed to support the daily water balance model simulation from 1923 through 1941 were computed by linear interpolation between daily average flow which was assumed to be equal to the mid-day flow.

The unimpaired flows (i.e., river flows assuming no development) used in the Sonoma County Water Authority operations model were developed from available gauge data on undeveloped watersheds. For the period from 1922 through 1941, the daily inflows to Lake Pillsbury were the only available data. For the period since 1942, additional gauge data from other watersheds were used as they came on line to estimate the runoff from the 7 sub-units used in the operations model. Therefore, the only change in the method of computing runoff was the number of gauging station records used in the analysis.

Response to Comment 118-9

Comment Summary: The comment asks how the use of "the 55-year record" of River flow data would affect the water balance and water quality models.

The EIR/EIS authors assume that the 55-year period referred to in the comment is the period since 1942. However, because flow data through 1992 are used in the model, the length of the latter of the two periods identified in Comment 118-8 is 50 years, not 55 years. Regardless of which data are used, the models will be unaffected since flow data are input to the model, not part of the model. The water balance model results will be affected by changing an input variable such as flow. Shortening the period of flow data used for the water balance from 70 years to any 55-year period could affect the estimated discharge capacity and storage requirement for each design discharge rate. Changing the period of record will not affect the water quality model output directly since water quality impacts were simulated in just three particular years from which continuous flow data were available. However, any effect of a shortened period on the water balance model sizing of storage will affect the simulated daily discharge operation that is part of the water quality model output.

Response to Comment 118-10

Comment Summary: The comment asks if the incremental inflows used to evaluate the alternatives were based on the SCWA correlation with stream-gauge measurements since 1941 or on the synthesized values from SCWA simulations since 1982.

As described on page 32 of Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS, incremental local watershed flow and plant effluent flow from 1 January 1985 and 30 September 1992 were used to estimate daily reclaimed water production during the simulation periods. For model calibration, the incremental inflows were computed using the equation on page 15 of Appendix I-8, as corrected below for typographical errors. The actual 1993 - 1995 flow data were used in the computation for the calibration period.

For the alternatives evaluation, the total reclaimed wastewater "Q_{rw}" was not included, since no direct return of any flows to the River is considered in the operations model. The operations model flows at Hacienda Bridge do not include the reclaimed wastewater component, which is consistent with our model assumptions.

The following changes are made to the Draft EIR/EIS:

> Page 15, Appendix I-8. The equations following the first paragraph is~~are~~ revised as follows:
>
> $Q_i = Q_{hb} + Q_{SCWA} - Q_h - Q_{ws} - Q_{rww}$
>
> ~~$Q_i = Q_h + Q_{ws} - Q_{hb} - Q_{scwa} - Q_{rw}$~~

Response to Comment 118-11

Comment Summary: he comment states that since Mr. Miles Ferris has testified in Federal Court that the crucial gauge at Hacienda Bridge is too unreliable to evaluate compliance with environmental regulations, how could inaccuracies be quantified and verified for the 70—year (or 55-year) period used in the Draft EIR/EIS.

Mr. Ferris's testimony related to the utility of River flow data for day-to-day discharge operations. Mr. Ferris described the three-month lag time between the availability of stage (water surface elevation) data and the current stage curve to convert stage data to flow estimates. During this lag period, a stage curve from the previous winter was used, leading to potentially inaccurate flow estimates. Mr. Ferris's testimony was that this lag time was an important factor in the determination of how to employ gauge data in the daily discharge operations of the Subregional System. This lag time no longer exists, and Subregional System operations use real time data for operations.

Hacienda gauge data for the period 1923 through 1992 were used to size Project components and evaluate Project impacts, as described in Appendices D-8, D-9, I-8 and I-16 of the Draft EIR/EIS. The 70-year flow data set was used after 1993. Therefore, the lag time that contributed to transitory flow data inaccuracies of importance to daily Subregional System discharge operations had been corrected and did not affect the data that were used for the Project.

Response to Comment 118-12

Comment Summary: The comment asks how the uncertainty or error factor for Russian River flow data could be included in the water balance model.

The EIR/EIS authors consider "uncertainty" to refer to imprecision, not inaccuracy. The imprecision is considered by the authors to be small relative to the variation in flow during the period of record, and therefore not necessary to include in the model.

Response to Comment 118-13

Comment Summary: The comment asks how the uncertainty or error factor for Russian River flow data could be included in the water quality model.

Refer to Response to Comment 118-12.

Response to Comment 118-14

Comment Summary: The comment asks what the effect of an Russian River flow data error factor on the results of the water balance and water quality models would be.

Refer to Response to Comment 118-12.

Response to Comment 118-15

Comment Summary: The comment asks what the effect of an error factor on findings of significance would be.

As described in the Response to Comment 118-12, the EIR/EIS authors consider the modeling approach to have revealed the full range of impacts under the range of flow conditions that occur in the Russian River basin.

Response to Comment 118-16

Comment Summary: The comment refers to Appendix D-4 (Wastewater Flow Projections) of the Draft EIR/EIS and asks for the current volume of rainfall inflow and groundwater infiltration (I/I) to the sewer system and for the forecast over the life of the project.

The current volume of rainfall inflow and groundwater infiltration (I/I) varies depending on rainfall, and ranges from negligible to greater than 2 billion gallons per year.

I/I forecasts are based on the effect of growth and weather. The effect of growth on I/I could be negligible if one assumes that new portions of the collection systems are built to particular specifications in stable soils and then highly maintained. Under this assumption, future I/I would change each year only as a result of I/I into the existing collection system, which depends on weather and maintenance. This was the set of assumptions used in the monthly water balance model. Refer to Appendix D-8 (Water Balance Model Summary and Results) of the Draft EIR/EIS, and Response to Comment 118-46. An alternative assumption is that I/I will eventually occur in new portions of the collection system in the same proportion to average dry weather flow (ADWF) as occurs in the existing collection system. Under this assumption, future I/I would change each year as a result of growth of the collection system (of which ADWF is an index) and I/I into the existing collection system, and both would depend on weather and maintenance to the same extent. This was the set of assumptions used in the daily water balance model. Refer to page 32 in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS. The set of assumptions used in the daily water balance model would result in higher projected I/I than that used in the monthly water balance model.

The Subregional System has committed to a sewer system maintenance program. Each Subregional System partner is required in its agreement with the City of Santa Rosa to dedicate a particular fraction of annual revenues to I/I control, as described in Response to Comment 118-17. The particular revenue fraction was established in 1985 specifically to assure that I/I is maintained at the current percentage of total annual flow.

The reason for and importance of the differing assumptions between the two water balance models relates to the respective purposes of the two models. The monthly water balance model was established with Regional Board concurrence as the appropriate tool for sizing facilities to meet the 1:20 month reliability objective (which is described on page 3.1-9 of the Draft EIR/EIS). Estimates of I/I volume in the water balance do not affect the sizing of facilities and attainment of the 1:20 reliability objective because both I/I and discharge potential occur in proportion to River flow (i.e., when I/I volume is high, discharge capacity is also high). The daily water balance model was developed later because of the need for a daily simulation of the water quality impacts of discharge. A more precise estimate of I/I was needed to characterize reclaimed water production, and thus discharge. Appendix D-9 (Analysis of Results From Daily and Monthly Water Balance Models) and Response to Comment 86-8 further compare the two models.

This information was not provided in Appendix D-4 (Wastewater Flow Projections) of the Draft EIR/EIS because the purpose of Appendix D-4 was to estimate average dry weather flow (ADWF) at buildout.

Response to Comment 118-17

Comment Summary: The comment asks for the current annual expenditure by the City of Santa Rosa for I/I control.

The City spends about 15 percent of its annual sanitary sewer operations and maintenance budget on the I/I control program. In the 1996/1997 fiscal year the budget for wastewater collection system maintenance and repair is $3.8 million, with an additional $2.9 million budgeted for capital I/I reduction projects such as replacing old lines, sealing lines, and replacing leaky manholes. Refer to Response to Comments 118-16 and 188-46 for additional information about I/I.

Response to Comment 118-18

Comment Summary: The comment asks for the expected future annual expenditure by the City of Santa Rosa for I/I control.

The agreement among the Subregional System partners requires that each entity spend at least 5% of the entities' total operations and maintenance cost of sewage collection on I/I identification and control. Refer to Response to Comment 118-46 for additional information about I/I.

Response to Comment 118-19

Comment Summary: The comment asks if I/I reduction measures were evaluated in the Draft EIR/EIS.

No reduction measures were evaluated in the Draft EIR/EIS.

Response to Comment 118-20

Comment Summary: The comment asks, if no I/I reduction measures were evaluated in the Draft EIR/EIS, why not.

I/I reduction will not reduce storage volume requirements nor the maximum discharge rates. Storage volume and maximum discharge rates are controlled by the quantity of reclaimed water that is produced in dry years, and I/I does not significantly affect reclaimed water production in dry years. In years with large amounts of I/I, river flow is also high and there is typically no problem with discharge.

Response to Comment 118-21

Comment Summary: The comment asks if I/I is evaluated in the EIR/EIS, then what are projected reductions, and the basis for the projection.

The comment is conditioned on I/I reduction measures having been evaluated in the Draft EIR/EIS. Since none were evaluated, no response is necessary.

Response to Comment 118-22

Comment Summary: The comment asks for the effect of I/I projections on water balance model calculations.

I/I projections affect the quantity of reclaimed water that needs to be managed. Refer to Response to Comment 118-20.

Response to Comment 118-23

Comment Summary: The comment asks for the effect of I/I projections on the water quality model and "the results of Appendix I-8 (Russian River Water Quality Model)."

I/I projections affect the quantity of water to be managed each year. The models will not be affected by a change in I/I projections because the model is a tool used to evaluate water quality impacts associated with a particular set of input data. The water quality model included an element that simulated reclaimed water production, storage and discharge. Altering I/I projections could change the simulated quantity of reclaimed water discharged on a particular day, and thus affect the estimated water quality impact. While the annual volume of reclaimed water that will be discharged increases with increasing I/I, impacts are not expected to increase. The impacts of reclaimed water that are identified in Appendices I-16 (Water Quality Impact Analysis Report - Volume 1) and K-4 (Ecological Risk Assessment) of the Draft EIR/EIS occur during periods of low flow and dilution. I/I flows are discharged under conditions of higher River flow and dilution. As described in the Responses to Comments 118-16 through 118-20, the I/I assumptions upon which the projections are based are considered by the EIR/EIS authors to be sound and modifications are unnecessary.

Response to Comment 118-24

Comment Summary: The comment asks for the effect of I/I projections on the results of the water quality impact assessment.

Refer to Response to Comment 118-23.

Response to Comment 118-25

Comment Summary: The comment asks for the effect of I/I projections on selection of the Environmentally Superior Alternative.

Changes in I/I projections would not be expected to alter the selection of the Environmentally Superior Alternative. Refer to Response to Comment 118-23.

Response to Comment 118-26

Comment Summary: The comment asks for the effect of I/I projections on the elimination of components that is described in Appendix D-6 (Documentation in Support of the Elimination of Alternatives).

Of the components eliminated using the analysis in Appendix D-6 of the Draft EIR/EIS, none except storage were eliminated for reasons relating to the volume of reclaimed water needing to be managed. I/I projects do not factor into storage decisions for reasons explained in the Response to Comment 118-23.

Response to Comment 118-27

Comment Summary: The comment asks for the effect of I/I projections on the size of storage, irrigation areas, direct discharges, and indirect discharges.

As explained in the Response to Comment 118-23, storage size (and therefore irrigation acreage) is not affected by I/I. I/I is managed primarily through discharge, since I/I production is directly related to discharge capacity: as I/I increases so does Russian River flow. While the annual volume of reclaimed water to be discharged increases with increasing I/I, impacts are not expected to increase. The impacts of reclaimed water that are identified in Appendices I-16 (Water Quality Impact Analysis Report - Volume 1 - Text) and K-4 (Ecological Risk Assessment) of the Draft EIR/EIS occur during periods of low flow and dilution. I/I flows are discharged under conditions of higher River flow and dilution. This is illustrated in Figure 3.1-2 on page 3.1-11 of the Draft EIR/EIS. "Indirect discharge" is mentioned in the comment and is assumed to refer to the discharge of project-affected groundwater to surface water. The annual volume of this discharge will not be affected by I/I, as explained above.

Response to Comment 118-28

Comment Summary: The comment asks for the effect of I/I projections on the mitigation that is described in Chapter 2.

As explained in Response to Comment 118-27, discharge volume is affected by I/I projections, but discharge volume during dry or low River flow conditions is not affected by I/I. Since mitigation was developed to avoid or reduce impacts under such conditions, mitigation will not be affected by altered I/I projections.

Response to Comment 118-29

Comment Summary: The comment asks for the "preset percentages" of total storage that were used to calculate the target storage for each month.

The storage curve used in both the monthly and daily water balance is identified in Appendix D-12 (Revised System Storage Curve) of the Draft EIR/EIS. The storage curve used in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS was derived by optimizing to minimize storage and to achieve the desired reliability of exceeding the design discharge rate (e.g., one percent) no more than one month in 20 months. The storage curve (which identifies the target storage each month) can be described in terms of million gallons or in terms of percentage of total storage. The term "preset percentages" refers to the manner in which storage curves for each design discharge rate were represented in the daily water balance model. The model was set up such that the total storage for each design discharge component (which was developed using the monthly water balance model) is input. The storage curve for each design discharge was the same in terms of the percentage of total storage. These are the "preset percentages" cited in the report.

Response to Comment 118-30

Comment Summary: The comment asks how the target storage volume was calculated for each day of simulation using the daily water balance model.

The monthly storage objectives were developed as defined on page 28 of Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS, and daily storage objectives were interpolated assuming a straight line. This is how the existing system is managed.

Response to Comment 118-31

Comment Summary: The comment asks how the daily target storage volume was included in the water quality model.

The storage curve is one of the determinants of when discharge must occur. See Sections 4.3.2 and 4.3.3 of Appendix I-8 (Russian River Water Quality Model) for a detailed discussion. Refer also to Response to Comment 118-55.

Response to Comment 118-32

Comment Summary: The comment requests that technical tables that appear in the appendices be repeated in the "Final EIR/EIS."

The referenced tables and graphs are part of the Draft EIR/EIS and will be part of the Final EIR. For reasons of conciseness and readability it is not possible to put all of the information in appendices in the text of Volumes II and III. Also refer to Master Response 1, located in Section 6.2 of this document, which discusses document organization.

Response to Comment 118-33a

Comment Summary: The comment asks how multiple daily contingency discharges in the same month were counted in the conversion to daily occurrences.

This comment apparently relates to the contingency discharge estimate using the daily water balance model which, in contrast to the monthly water balance model, had the capability to identify more than one contingency discharge occurrence per month. The summary of "No. Months With Contingency Discharge" in Table 1 on page 6 of Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS for the daily water balance model refers to the number of months in which contingency discharge is predicted to occur, as defined in footnote 5 of the table, regardless of number of predicted occurrences in the particular month. Thus, multiple days of discharge in the same month were only counted once. Refer to Response to Comment 118-33b for an enumeration of the number of days of discharge.

Response to Comment 118-33b

Comment Summary: The comment asks how many months had multiple daily contingency discharges.

The following changes are made to the Draft EIR/EIS in response to this comment:

Page 3, Appendix D-9. The following sentence is added to the end of the second paragraph in the Contingency Discharge section:

> Additional characterization of contingency discharges as simulated using the daily water balance model is provided in Table 2.

Appendix D-9. The following Table 2 is added after Table 1.

Table 2

Characterization of Contingency Discharge Based on Daily Water Balance Model

Design Discharge	Year	Total Annual Contingency Discharge, MG	Total No. Months & Days in Year With Contingency Discharge (Mo/Day)
1%	1946	29	1 / 1
1%	1966	59	1 / 2
1%	1983	28	1 / 1
1%	1984	57	1 / 2
1%	1985	89	1 / 3
10%	1977	75	2 / 18
10%	1978	11	1 / 4
20%	1937	18	1 / 4
20%	1977	183	3 / 35
20%	1978	63	1 / 10

Response to Comment 118-34

Comment Summary: The comment requests that Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) figures be modified to identify the x-value at which the y-value exceeds the design discharge rate.

The EIR/EIS authors agree that the requested information will help compare the output of the monthly and daily water balance models, but are providing an additional table rather than modifying the figures.

The following changes are made to the Draft EIR/EIS:

Page 3, Appendix D-9. The following text is added to the end of the second paragraph in the Contingency Discharge section:

> The frequency with which the estimated discharge rate is less than or equal to the design discharge rate is summarized in Table 3. The values in Table 3 describe the x-value on Figures 1 through 8 at which the line is above the y-value corresponding to the design discharge rate.

Appendix D-9. The following Table 3 is added after Table 2:

Table 3

Percentage of Time That Estimated Discharge Rate is Less Than or Equal to Design Discharge Rate For Daily and Monthly Water Balance Model

Design Discharge Rate	Daily	Monthly
1	99.94 %	99.73
5	100 %	100
10	99.83 %	99.38 %
20	99.68 %	99.02 %

Response to Comment 118-35

Comment Summary: The comment requests that Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) figures be modified to show the 95 to 100 percentile range.

The EIR/EIS authors selected the range of 99 to 100 percent to show in Figures 2, 4, 6 and 8 in Appendix D-9 of the Draft EIR/EIS because the estimated discharge rate never exceeds the design discharge at frequency values of less than 99 percent. Thus the figures already show the "limit points". Thus, the authors consider the key information for comparison of the monthly and daily models (which is identified in Table 3 in Response to Comment 118-34) to be provided in Figures 2, 4, 6 and 8.

Response to Comment 118-36

Comment Summary: The comment asks if the 20 cfs value on Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) page 4 is an individual daily average, an individual daily maximum or some other value.

The 20 cfs value cited in the first paragraph on page 4 of Appendix D-9 of the Draft EIR/EIS is an example of a low average daily River flow value upon which daily reclaimed water discharge estimates are based. The value was presented for illustrative purposes and is not a calculated average.

Response to Comment 118-37

Comment Summary: The comment asks in how many months was the monthly average River flow greater than 1000 cfs and a daily flow value was less than 1000 cfs.

There were a total of 177 months which had a monthly average flow > 1,000 cfs with at least one day with flow < 1,000 cfs at Hacienda Bridge (per SCWA operations model). Sixty eight years (68 out of a possible 70) had at least one month where this condition existed. The two years where this condition did not exist were drought years where the monthly average did not exceed 1,000 cfs.

Response to Comment 118-38

Comment Summary: The comment asks, for each design discharge rate, in how many years did simulated reclaimed water discharge commence prior to the time that an hourly River flow estimate exceeded 1000 cfs.

The requested information is provided in the following table. Note that the 1,000 cfs discharge restriction is not part of the Basin Plan on which the Project is based.

Design Discharge	Number of Years Simulated Discharge Commenced Prior to Flow Reaching 1,000 cfs
20% alternative	70 (discharge began on 1 October each year)
20% Mitigation Operation	32
10% alternative	21
10% Mitigation Operation	12
5% alternative	4
5% Mitigation Operation	10
1% alternative	0[a]
Geysers	0[a]

[a] No discharge during the two drought years when river flow did not reach 1,000 cfs

Response to Comment 118-39

Comment Summary: The comment asks if different target storage curves were evaluated in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models).

A different distribution of monthly storage goals from that upon which the Project is based was the basis of Mitigation Measure 2.5.4: Discharge Operations, on page 2-127 of the Draft EIR/EIS. This revised storage curve emphasizes winter discharge and reduced fall and spring discharge. The revised monthly storage objectives are shown on page 2-127.

Response to Comment 118-40

Comment Summary: The comment asks what target storage curves are possible.

Two storage curves were evaluated as part of the Draft EIR/EIS: the storage curve upon which the Project description and impact analysis was based; and a revised storage curve defined in Mitigation Measure 2.5.4: Discharge Operations on page 2-127. The storage curve used in the Project description and defined in Appendix D-8 (Water Balance Model Summary and Results) of the Draft EIR/EIS was optimized to minimize storage and achieve the desired reliability of exceeding the design discharge rate (e.g., one percent) no more than one month in 20 months. Mitigation Measure 2.5.4 refined that storage curve to reduce impacts. An infinite number of other storage curves are possible to implement, and each will affect storage requirements and discharge volume. The City of Santa Rosa may choose to evaluate other storage curves during Project selection to refine storage requirements and cost, and further minimize discharge volume and receiving water impacts. However, detailed analysis of a variety of different storage curves is unnecessary to provide meaningful evaluation in the EIR/EIS.

Response to Comment 118-41

Comment Summary: The comment asks for the effect of other storage curves on need for contingency discharges.

A storage curve that results in more rapid accumulation and less discharge of reclaimed water in fall (such as that identified in Mitigation Measure 2.5.4: Discharge Operations on page 2-127 of the Draft EIR/EIS and defined here as curve type A) will result in increased frequency of contingency discharge. A storage curve that results in less rapid accumulation and more discharge of reclaimed water in fall (defined here as curve type B) will result a reduced frequency of contingency discharge.

Response to Comment 118-42

Comment Summary: The comment asks for the comparison of the effect of other storage curves on the distribution of discharge rates per Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) Figures 1 through 8.

This response is based in the storage curve types as defined in Response to Comment 118-41. Curve type A will result in a greater percentage of days with a discharge rate that is less than the design discharge rate, but will have a higher maximum discharge rate. Curve type B will result in a greater percentage of days with a discharge rate that is equal to the design discharge rate, but will have a lower maximum discharge rate. The detailed graphical analysis requested by the comment is beyond the scope of the EIR/EIS. Refer to Response to Comment 118-40.

Response to Comment 118-43

Comment Summary: The comment asks for the effect of other storage curves on water quality model results.

This response is based on the storage curve types as defined in Response to Comment 118-41. Curve type A will result in reduced frequency of impacts because discharge will tend to occur in winter when algae is less affected by reclaimed water. Curve type B will result in increased frequency of impacts because discharge will tend to occur in fall when algae is more affected by reclaimed water.

Response to Comment 118-44

Comment Summary: The comment asks for the effect of other storage curves on water quality model calibration.

The calibration of the water quality model will not change as a result of any changes to the Project description such as a revised storage curve. The calibration of the model is based on a comparison of existing conditions to simulation of conditions during 1993-1995 when existing conditions were measured for calibration purposes. Variations to the storage curve will only affect the simulation of future discharges, not the calibration period.

Response to Comment 118-45

Comment Summary: The comment asks for the effect of other storage curves on Appendix I-8 (Russian River Water Quality Model) Tables 4.2 and 4.3 on pages 34 and 37.

Tables 4.2 and 4.3 in Appendix I-8 (Russian River Water Quality Model) in the Draft EIR/EIS describe the storage curves used in Appendix D-8 (Water Balance Model Summary and Results), of the Draft EIR/EIS and Mitigation Measure 2.5.4 on page 2-127 of the Draft EIR/EIS, respectively. Thus, Table 4.2 represents the base case around which curve types A and B (as defined in Response to Comment 118-41) vary, and Table 4.3 is an example of curve type A. A different storage curve would be reflected in a change to one or more of the values in Table 4.2 of Appendix I-8.

Response to Comment 118-46

Comment Summary: The comment asks for the equation used to estimate annual reclaimed water volume from annual Russian River flow.

The requested regression equation used in the monthly water balance model is not provided in the Draft EIR/EIS, but is described in the following change to the Draft EIR/EIS. Refer also to Response to Comments 86-8 and 118-16.

The following changes are made to the Draft EIR/EIS.

Page 4, Appendix D-8. The first paragraph in the Reclaimed Water Inflow Calculations section is revised as follows:

> ...of hand-entering ADF data, Parsons ES modified the model by establishing a relationship between total annual Russian River flow and total annual Laguna Plant flow. Actual river and plant flow data were entered into a regression model for the years 1986-1992, and ~~a~~ the following regression equation was derived~~.~~:

$$ADF = River\ Volume \times 3.5\times10^{-6} + ADWF$$

where:

ADF=average daily flow in MG
River Volume = Total Annual Russian River Volume in MG
ADWF = average dry weather flow = 21 mgd.

The regression coefficient (r-squared value) for this equation is 0.85.

The regression equation was entered into the Water Balance Model so that the ADF could be calculated automatically. This modification provides a more realistic variation of ADF in response to climatic conditions. Implicit in the use of the above equation to estimate future ADF is the assumption that I/I will not increase in proportion to increased ADWF (growth). The agreement between the Subregional System partners requires that each entity spend at least 5 percent of the entities' total operations and maintenance cost of sewage collection on I/I identification and control. This fraction was derived to control I/I at current levels. The City of Santa Rosa spends up to 10 times the required amount.

Response to Comment 118-47

Comment Summary: The comment asks for the regression coefficient of the equation used to estimate annual reclaimed water volume from annual Russian River flow.

The regression coefficient is 0.85.

Response to Comment 118-48

Comment Summary: The comment asks what historical distribution of annual flows was used to convert the annual wastewater volume to monthly volumes.

The historical distribution of annual flows used to convert annual to monthly reclaimed water flows, was developed by CH2M Hill on the basis of data from 1981 to 1985 at the Laguna Treatment Plant. This is discussed on page 3 of Appendix D-8 (Water Balance Model Summary and Results) of the Draft EIR/EIS. For clarification, the data from the original CH2M Hill report should be added to the Draft EIR/EIS.

Therefore, the following changes are made to the Draft EIR/EIS:

Page 3 of Appendix D-8. The following table is added at the end of the Reclaimed Water Inflow Section:

Distribution of Total Estimated Annual Flow to Each Month For the Monthly Water Balance Model

Month	Distribution
October	0.0721
November	0.0743
December	0.0896
January	0.1141
February	0.0998
March	0.1095
April	0.0888
May	0.0772
June	0.0715
July	0.0705
August	0.0667
September	0.0659
Total	1.0000

Source: CH2M Hill's Technical Memorandum No. R-1 (February 1989)

Response to Comment 118-49

Comment Summary: The comment asks what equation was used to estimate daily wastewater volumes from daily incremental inflows to the Russian River below Healdsburg.

The regression equations used to estimate daily flows are described on page 32 of Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS (page 29 on CD-ROM) as follows:

For $Q_I > 100$ cfs
$Q_{ww} = 21 + 0.2973 (Q_I - 100)^{1/2}$

For $Q_I < 100$ cfs
$Q_{ww} = 21$

Where: Q_{ww} = Reclaimed water production in MGD
Q_I = Incremental watershed inflow in cfs

Response to Comment 118-50

Comment Summary: The comment asks what the correlation coefficient is for the linear regression.

The regression is a linear fit of waste water production with respect to the square root of the incremental local inflow (local watershed runoff). Therefore it is nonlinear with respect to the incremental local inflow. The root mean square error (which is equivalent to the standard deviation) = 2.8 MGD; R^2 = 0.775; R = $0.775^{1/2}$ = 0.88. The EIR/EIS authors consider the R^2 value of 0.775 to indicate a good fit of the data. The average of 2,196 daily waste water production values is 28.75 MGD which means the standard deviation is 10 percent.

The following change is made to the Draft EIR/EIS:

Page 32, Appendix I-8. The following sentence is added to the end of third paragraph:

> The following expression results in a root mean square error (standard deviation) of 2.8 MG, and has a correlation coefficient (r-squared value) of 0.88.

Response to Comment 118-51

Comment Summary: The comment asks what the effect of the daily water balance model would be on the contingency discharges.

Table 1 on page 6 of Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS shows the difference between monthly and daily water balance model estimates of contingency discharge frequency and volume. The portions of the lines in Figures 1 through 8 in Appendix D-9 that are above the design discharge rate illustrate the differing frequency and discharge rates of contingency discharges. Refer also to Response to Comment 118-34.

Response to Comment 118-52

Comment Summary: The comment asks how particular tables and figures in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) would be changed by the daily water balance model.

They would not be changed, as they already reflect the daily water balance model estimate of design and contingency discharges.

Response to Comment 118-53

Comment Summary: The comment asks how using the daily water balance instead of the monthly water balance model would change "contingency measures and their results." The comment, which relates to Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS, also asks how Tables 6, 7 and 8 would change.

The EIR/EIS authors assume that "results" means number of contingency discharge events, contingency discharge volume, etc. Table 1 and Figures 1 through 8 in Appendix D-9 already show how estimates of key discharge parameters are affected by the two models. Appendix D-9 does not include any tables designated 6, 7 or 8, but does contain Figures 6, 7, and 8 which reflect the daily water balance.

Response to Comment 118-54

Comment Summary: The comment asks how using the daily water balance instead of the monthly water balance model would change the calibration of the water quality model.

The water quality model uses the daily water balance, so calibration would not change. Refer to Response to Comment 118-55.

Response to Comment 118-55

Comment Summary: The comment asks how using the daily water balance model in the water quality model would affect the impacts that are identified in Draft EIR/EIS Section 4.

The daily water balance model was developed to simulate daily operations of discharge that is necessary for simulating water quality impacts. Thus, the daily water balance model is embedded in the water quality model, and the impacts identified in Section 4 using the water quality model already reflect the daily water balance model output.

Response to Comment 118-56

Comment Summary: The comment asks if the impacts of "larger" dilutions calculated from the daily water balance model "were evaluated."

As described in Response to Comment 118-55, the daily water balance is used in the water quality model, and the resultant dilutions are reflected in all of the water quality results presented in the Draft EIR/EIS.

Response to Comment 118-57

Comment Summary: The comment asks for the exact wording of any agreement with the Regional Board regarding reliability. The comment also asks if the agreement is with the Regional Board or Board staff.

The term "reliability" is defined on page 3.1-12 of the Draft EIR/EIS and refers to the frequency that the design discharge rate would be attained if the Long-Term Project were operated under River flow conditions that occurred during the 70-year period from 1923 to 1992. The 20:1 reliability design basis was introduced in writing on page 3-5 in the *Screening Evaluation of Long-Term Reclamation/Reuse Alternatives* draft report (January 1993, by CH2M Hill for the City of Santa Rosa). The 20:1 reliability design basis was established prior to issuance of the 1993 CH2M Hill report through discussion with Regional Board staff, and it was subsequently presented to the Regional Board in public meeting testimony by City staff and consultants. The 20:1 reliability design basis has been discussed by the City and Regional Board at staff meetings and by the Board at public meetings on several occasions since 1993. The 20:1 reliability design basis is explicit in the Draft EIR/EIS and the Regional Board did not comment that it should be changed (refer to Comment Letter 8). There is, however, no formal written agreement with the Regional Board.

Response to Comment 118-58

Comment Summary: The comment asks for the current reliability requirements in the existing NPDES permit.

The existing NPDES permit establishes a 5 percent maximum discharge rate and does not provide for any exceedences.

Response to Comment 118-59

Comment Summary: The comment asks for the current reliability requirements in the Basin Plan.

The existing Basin Plan specifies a 1 percent maximum discharge rate and objective criteria for evaluating exceptions.

Response to Comment 118-60

Comment Summary: The comment asks for the technical basis of the 95 percent reliability "requirement."

The 95 percent (often expressed as 20:1) reliability value is not a regulatory requirement but rather a design basis that was agreed upon by the City and Regional Board. The 95 percent value was identified through the process described in the Response to Comment 118-57. The technical basis for a reliability component in the Project design basis is described on page 3.1-12 of the Draft EIR/EIS.

Response to Comment 118-61

Comment Summary: The comment asks if reliability levels greater than 95 percent were considered and evaluated.

The effect on Project cost and storage requirements of higher levels of reliability were considered by the Regional Board at the time that the 95 percent reliability level was selected (refer to Response to Comment 118-57). The 95 percent reliability level is included on page 3.1-12 of the Draft EIR/EIS as part of the Project description. The effect of reliability levels greater than 95 percent was therefore not evaluated in the Draft EIR/EIS.

Response to Comment 118-62

Comment Summary: The comment asks how the daily water balance model characterization of contingency volume compares to that of the monthly water balance model.

Table 1 and Figures 1 through 8 in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS provide this comparison. Refer also to Responses to Comments 118-51 through 118-56 and 118-88.

Response to Comment 118-63

Comment Summary: The comment asks for the range and average contingency volume for each month according to the daily water balance model, and requests that Table 1 on page 3 of Appendix D-10 (Water Balance Contingency Plan) be expanded to include information by month instead of by year.

The EIR/EIS authors consider providing such detailed information to be unnecessary for comparing the monthly and daily water balance model characterizations of contingency discharge volume. The difference between the two characterizations is described in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS, and the daily water balance characterization (which estimates higher contingency discharge volumes) was used to evaluate environmental impacts. Refer also to Response to Comments 118-51 through 118-56 and 118-88.

Response to Comment 118-64

Comment Summary: The comment asks if the design discharge rate is attained 95 percent of the time under the daily water balance.

Figures 1 through 8 in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS show that the design discharge rate is attained more than 99 percent of the time under the daily water balance.

Response to Comment 118-65

Comment Summary: The comment asks at what frequency will the design discharge rate be attained under the daily water balance.

Refer to Responses to Comments 118-34 and 118-64.

Response to Comment 118-66

Comment Summary: The comment asks what storage volume and irrigation area would be needed to attain the 95 percent reliability objective according to the daily water balance model.

Contingency volumes were evaluated using the daily water balance model, and there is no contingency volume at the 95th percentile. Thus no change in storage or irrigation will be required.

Response to Comment 118-67

Comment Summary: The comment asks for the distribution of contingency discharge by month according to the daily water balance model.

The contingency discharges identified in Table 2 in Response to Comment 118-33b occur in the months of January, February and March. The water balance is based on the historical fact that high River flow events tend to occur in these months and discharge of fall-accumulated storage will be possible. Contingency discharge is necessary in drought years when the anticipated high River flows do not occur.

Response to Comment 118-68

Comment Summary: The comment asks for the range of consecutive daily contingency discharge volumes according to the daily water balance model.

Refer to Response to Comment 118-63.

Response to Comment 118-69

Comment Summary: The comment asks what equation was used to generate values in Table 3 on page 5 of Appendix D-10 (Water Balance Contingency Plan).

Refer to Response to Comment 118-46 for a discussion of how wastewater flows were calculated. The water balance model then apportioned flows to storage and discharge and the discharge numbers are reported in Table 3 on page 5 of Appendix D-10. Refer to Appendix D-8 (Water Balance Model Summary and Results) for a discussion of how the water balance model works.

Response to Comment 118-70

Comment Summary: The comment asks for the average daily contingency discharge volumes according to the daily water balance model.

Table 2 in Response to Comment 118-33b provides total contingency discharge for each of the years in which the model predicts a contingency discharge, and the number of contingency discharge events. The average can be calculated by dividing the total annual volume by the number of days with contingency discharge that are provided in Table 2 of Response to Comment 118-33b. For example, the average daily contingency discharge volume in 1977 for the 20 percent design discharge alternative is 183 MG divided by 35 days, or 5.2 MGD.

Response to Comment 118-71

Comment Summary: The comment asks for the discharge frequency curves according to the daily water balance model.

This information is provided in Figures 1 through 8 in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS.

Response to Comment 118-72

Comment Summary: The comment is that Figure 9 in Appendix D-10 (Water Balance Contingency Plan) is unclear and Figures 2, 4, 6 and 8 in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) are superior. The commentor also states that the additional information he provides (in Comment 118-34) will allow comparisons of different reliability requirements.

Each figure was designed to depict data consistent with the context of the document in which the figures appear. The data shown in Figure 9 of Appendix D-10 are the same data that are shown for the monthly water balance model in Figures 2 through 8 of Appendix D-9. Refer also to Response to Comment 118-34 which indicates that both daily and monthly water balance models predict contingency discharges will be needed less than 1% of the time.

Response to Comment 118-73

Comment Summary: The comments asks whether inflow and infiltration (I/I) reduction was considered as a component of the contingency program.

I/I does not affect treatment plant inflow during the very dry weather conditions that results in contingency discharges. Therefore, I/I reduction would not be an effective component of the contingency program.

Response to Comment 118-74

Comment Summary: The comment asks how I/I reduction would affect the need for contingency discharges.

As explained in Response to Comment 118-73, I/I reduction will not affect the need for contingency discharges.

Response to Comment 118-75

Comment Summary: The comment asks how I/I reduction would affect specific values in Tables 4 and 5 of Appendix D-10 (Water Balance Contingency Plan).

As explained in Response to Comment 118-73, the values in the tables would be unaffected by I/I reduction.

Response to Comment 118-76

Comment Summary: The question asks if the winter irrigation capacities shown in Table 4 of Appendix D-10 (Water Balance Contingency Plan) include the winter irrigation capacity of existing Laguna irrigation lands.

As stated on page 7 in Appendix D-10, the winter irrigation capacity in Table 4 of Appendix D-10 includes existing irrigation lands. The summer irrigation capacity also includes existing irrigation lands.

Response to Comment 118-77

Comment Summary: The comment asks why Alternatives 4 and 5 are not listed in Table 4 of Appendix D-10 (Water Balance Contingency Plan).

Alternative 4 is not listed because it does not include a contingency component. Table 4 includes a 20 percent discharge column, which is the equivalent of Alternative 5.

Response to Comment 118-78

Comment Summary: The comment asks if the length of the winter and summer irrigation seasons were adjusted in the monthly water balance model to account for the weather in each year of the 70-year simulation.

As indicated on page 3 in Appendix D-8 (Water Balance Model Summary and Results) of the Draft EIR/EIS, irrigation capacity was not adjusted in the monthly water balance model in response to weather.

Response to Comment 118-79

Comment Summary: The comment asks how the winter irrigation rates were varied by month and by type of year.

The winter irrigation rates were not varied by type of year for reasons explained in Response to Comment 118-80.

Response to Comment 118-80

Comment Summary: The comment asks how Tables 4 and 5 in Appendix D-10 (Water Balance Contingency Plan) would change if a weather-sensitive winter irrigation rate were used.

Table 4 in Appendix D-10 summarizes the incremental winter irrigation capacity associated with particular irrigation areas. Table 5 in Appendix D-10 describes how the maximum quantity of reclaimed water will be managed through each contingency program component. The contingency program will be implemented only under the dry weather conditions that make the contingency program necessary. Therefore, evaluation of other (non-dry) weather impacts on the values shown in Tables 4 and 5 is not useful or appropriate.

Response to Comment 118-81

Comment Summary: The comment includes the following quote from page 11 of Appendix D-10 (Water Balance Contingency Plan) "As the design rate for Russian River discharge increases, system requirements for irrigation acreage decreases," and asks if this means that less irrigation acreage would be utilized at high discharge rates than "is available for the project at low discharge rates." The comment also asks if additional land could be used for winter irrigation that is not made part of the project for summer irrigation.

The quoted sentence describes the amount of irrigation land in the Project and therefore the amount of land available for winter irrigation is inversely proportional to design discharge rate. Winter irrigation of lands that are not in the summer irrigation program was not considered in the Draft EIR/EIS due to the impracticality and high cost of establishing irrigation facilities on lands that would be irrigated only very infrequently. However, the Draft EIR/EIS has studied irrigation acreage in excess of the total area required for even the lowest Russian River design discharge rate.

Response to Comment 118-82

Comment Summary: This comment asks how adding lands to the project for the sole purpose of winter irrigation (per Comment 118-81) would affect the magnitude and frequency of contingency discharge to the River.

As winter irrigation acreage increases, the irrigation capacity increases and reduces the quantity of residual water to be discharged. This concept is described on page 9 in Appendix D-10 (Water Balance Contingency Plan) of the Draft EIR/EIS. Adding such lands would result in a Project that is more reliable than the 1:20 months reliability project design basis. Refer to Response to Comment 118-81 for a further explanation as to why this is not included in the Project.

Response to Comment 118-83

Comment Summary: The comment asks for contingency discharge rates and for the effect of contingency storage on contingency discharge rates calculated using the daily water balance model.

The contingency discharge rates are summarized in Figures 1 through 8 in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS, and in Table 3 in Response to Comment 118-34. The effect of contingency storage on contingency discharge rates is described in Table 1 in Appendix D-9.

Response to Comment 118-84

Comment Summary: The comment asks about the impact of I/I reduction, variable winter irrigation rates, and additional irrigation acreage on maximum discharge rate and contingency storage.

For I/I reduction, refer to Response to Comment 118-73. For variable winter irrigation rates, refer to Response to Comment 118-79. For additional irrigation acreage, refer to Response to Comment 118-82.

Response to Comment 118-85

Comment Summary: The comment asks, "for the same modifications above," about the impact of facilities designed for reliability of greater that 95 percent on maximum discharge rate and contingency storage.

The impact of facilities sized to provide a reliability of greater than 95 percent will, by definition, decrease the maximum discharge rate and increase the contingency storage volume. Detailed evaluation of other reliability levels has not been performed.

Response to Comment 118-86

Comment Summary: The comment asks if a different storage curve was used to permit 5 percent contingency storage. The comment also asks what the effect of a different storage curve would be on values in Table 8 of Appendix D-10 (Water Balance Contingency Plan).

A different storage curve was not used to add contingency storage. The model was established such that a discrete storage volume, equivalent to 5 percent of the total design storage, could be used one month annually, if required, to mitigate contingency discharges. This 5 percent contingency volume was established because rainfall runoff into storage reservoirs will be less in drought years (when contingency storage was invoked), providing additional effective storage that will not otherwise be available. A different storage curve will change the values in Table 8 of Appendix D-10 (i.e. contingency event Russian River discharge rates) causing the discharge rates to increase or decrease depending on the shape of the new storage curve.

Response to Comment 118-87

Comment Summary: This comment says that since the current reliability requirement is not 95 percent, would evaluation of a more reliable system be prudent.

Refer to Response to Comment 118-57.

Response to Comment 118-88

Comment Summary: The comment suggests that analysis of contingency discharge impacts using the daily water balance would be more prudent than using the monthly water balance model analysis.

As indicated in the Response to Comment 118-55, the daily water balance model is embedded in the water quality model and the impacts identified in Section 4 of the Draft EIR/EIS using the water quality model already reflect the daily water balance model output, including the contingency discharge impacts analysis. This is explained on page 29 in Appendix I-8 (Russian River Water Quality Model) and on page 140 in Appendix I-16 (Water Quality Impact Analysis) of the Draft EIR/EIS. The daily water balance sometimes predicts smaller and sometimes predicts larger contingency discharges than does the monthly water balance, but in either event the daily data are used for analysis.

Response to Comment 118-89

Comment Summary: The comment is that "reasonably anticipated measures to reduce contingency discharges were not evaluated" in Appendix D-10 (Water Balance Contingency Plan), and they should be added to the analysis.

The comment does not specify which anticipated measures should be evaluated. The EIR/EIS authors assume the specific measures are I/I reduction, variable winter irrigation rates, and additional irrigation acreage as mentioned in Comment 118-84. Each of these measures is addressed in Responses to Comments 118-73, 118-79, and 118-82. None provides a feasible means of reducing contingency discharge.

Response to Comment 118-90

Comment Summary: The comment is a statement of summary opinion about the adequacy of the water balance analysis that the comment indicates is addressed in preceding comments.

Each of the preceding comments is addressed in Responses to Comments 118-1 through 118-89. For the reasons cited there, the EIR/EIS authors deem the water balance model to be appropriate. All analyses of impacts used the daily water balance.

Response to Comment 118-91

Comment Summary: The comment states the commentor's purpose of making comments.

Specific concerns were expressed in subsequent comments and these comments are addressed specifically in the Responses to Comments below.

Response to Comment 118-92

Comment Summary: The comment asks for the statistical distribution of data given in Tables 6, 7 and 8 of Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results).

Tables 6, 7 and 8 on pages 12 and 13 in Appendix I-4 are intended to summarize the water quality data given in the appendix to Appendix I-4. The average values in Tables 6, 7 and 8 were not used in any analysis; rather the individual data in the appendix on which the average values are based were used. The EIR/EIS authors have not calculated the statistical distribution of the data, and do not consider a characterization of the statistical distribution of the data to be necessary for describing existing conditions (which is the purpose of Appendix I-4). All the data used in the analysis have been provided so that reviewers can evaluate it independently.

Response to Comment 118-93

Comment Summary: The comment asks how the "representativeness of the sampling data" in appendices to Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) was verified.

Each datum is the result of the collection and analysis of a water sample or the result of *in situ* determination using a field instrument. The EIR/EIS authors either collected the data, or know of the standard field methods that were used by others (e.g., the Regional Board staff) to collect the data. In both cases, quality assurance and control guidelines were part of the sampling and analysis protocol to assure representativeness.

Response to Comment 118-94

Comment Summary: The comment refers to Tables 6 through 8 in Appendix I-4 and asks how statistical inferences from the data were validated.

The data in Tables 6 through 8 of Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) of the Draft EIR/EIS consist solely of seasonal averages and no statistical inferences were made.

Response to Comment 118-95

Comment Summary: This comment asks what the wastewater discharge volume and dilution was for each of the measurements in the appendices of Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results).

The concentration of reclaimed water at various locations in the Laguna for 1993 through 1995 can be found in Appendix 3-1 of Appendices L-1 (Anadromous Fish Migration Study Program, 1991-1994) and L-2 (Anadromous Fish Migration Study Program, 1991-1995) of the Draft EIR/EIS.

Response to Comment 118-96

Comment Summary: This comment asks why no dissolved oxygen samples in the appendices to Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) were collected at night/dawn.

The diel (24 hour) dissolved oxygen measurements (which include night and dawn measurements) collected in the Laguna at Trenton-Healdsburg were used for the analyses, and reported in Appendix I-8 (Russian River Water Quality Model), but were not included in Appendix I-4. Therefore, changes to Appendix I-4 are identified below to make the two reports consistent.

The following changes are made to the Draft EIR/EIS:

Page 11, Appendix I-4. The following sentence is added after the third paragraph:

> The NCRWQCB conducted five dissolved oxygen diel studies in 1994 and 1995. These data are presented in Figures 2 through 6.

Page 12, Appendix I-4. The following paragraphs are added before Table 6:

> The results of the five diel dissolved oxygen studies are presented in Figures 2 through 6. During May 18 through 23, 1994 (Figure 2), dissolved oxygen concentrations in the Laguna at Trenton Healdsburg Road ranged from 5.3 mg/L to 7.3 mg/L. The Basin Plan dissolved oxygen instantaneous minimum for the Laguna of 7.0 mg/L was not attained during every night of the study.
>
> Dissolved oxygen in the Laguna at Trenton Healdsburg Road on September 14 through 23, 1994 ranged from 4.5 mg/L to 7.0 mg/L (Figure 3). The Basin Plan minimum concentration is 7.0 mg/L.
>
> Dissolved oxygen was measured at three locations in the Laguna during the March 3 through 8, 1995 diel: at Trenton Healdsburg Road and Occidental Road, which are below Santa Rosa's discharge to the Laguna; and at Stony Point Road, which is above Santa Rosa's discharge to the Laguna (Figure 4). Dissolved oxygen

concentrations at Occidental and Stony Point were similar, ranging from 2.4 to 6.4 mg/L at Occidental Road and 2.9 to 6.9 mg/L at Stony Point Road. During this study dissolved oxygen in the Laguna at Occidental and Stony Point Roads never exceeded the Basin Plan minimum of 7.0 mg/L. The similarity between the two locations indicates that dissolved oxygen is controlled by factors other than Santa Rosa's discharge, possibly runoff from nearby dairies. During this same time period, dissolved oxygen in the Laguna at Trenton Healdsburg Road ranged from 6.4 to 8.5 mg/L. Dissolved oxygen fell below the Basin Plan minimum during most nights of this study.

Dissolved oxygen levels measured in the Laguna at Trenton Healdsburg Road, Occidental Road, and Stony Point Road during April 26 through May 8, 1995 were variable both on a daily basis and throughout the study (Figure 5). Dissolved oxygen in the Laguna at Trenton Healdsburg was probably the least variable, but still ranged from 3.8 to 8.8 mg/L. Dissolved oxygen in the Laguna at Occidental Road was the most variable, ranging from 1.5 to 17.3 mg/L. Dissolved oxygen in the Laguna at Stony Point Road ranged from 2.5 to 7.1 mg/L. The dissolved oxygen concentrations at all three stations were frequently below the Basin Plan minimum.

Dissolved oxygen concentration in the Laguna at Occidental Road and Stony Point Road during the August 21 through 28 study were quite variable on a diel basis but fairly consistent throughout the study (Figure 6). Dissolved concentrations at these stations ranged from 2.4 to 8.5 mg/L at Occidental Road and 3.4 to 8.7 mg/L at Stony Point Road. Dissolved oxygen in the Laguna at Trenton Healdsburg Road (Figure 6) during this time period showed less diel variation and ranged from 4.1 to 7.5 mg/L. Dissolved oxygen at all three stations fell below the Basin Plan minimum during the night.

Page 12, Appendix I-4. The following figures are added after Table 6:

Figures 2 through 6.

Response to Comment 118-97

Comment Summary: This comment asks why no diel dissolved oxygen measurements were taken.

Diel dissolved oxygen measurements were made. Refer to Response to Comment 118-96.

Response to Comment 118-98

Comment Summary: This comment asks if night/dawn and diel measurements are elsewhere in the Draft EIR/EIS or available from other sources.

Refer to Response to Comment 118-96.

Response to Comment 118-99

Comment Summary: This comment asks how diel measurements would change the calculation method and the value of average dissolved oxygen concentrations.

The calculation method used and the value of dissolved oxygen concentrations for seasonal averages in Tables 6 through 8 on pages 12 and 13 of Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) of the Draft EIR/EIS would not change due to diel dissolved oxygen measurements. The seasonal averages do not include the diel data and are intended to represent average daytime measurements. The night time dissolved oxygen values would not be comparable to the values used to calculate the seasonal average dissolved oxygen. Daytime values from the diel studies are similar to the average seasonal values. Including diel measurements in seasonal averages would skew the average toward that of the few days for which diel data were available because so many more diel measurements were taken (24 to 48 per day) relative to the daytime grab sample data upon which the seasonal averages are based.

Response to Comment 118-100

Comment Summary: This comment asks why Laguna de Santa Rosa toxicity testing included tests with fish on only four of the eight days on which tests were made in 1992-1994 as presented in Table 9 in Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results).

The three tests made on Laguna de Santa Rosa and Santa Rosa Creek water during 1992 and 1993 showed no effects on fish in the larval fathead minnow 7-day survival and growth tests. Subsequent toxicity testing on Santa Rosa Creek done in 1994 included fish tests on only one of the dates, 23 January 1994 (providing wet weather data). Since neither the Laguna nor Santa Rosa Creek showed any fish effects in either wet weather or dry weather conditions, it was decided to concentrate the available resources for additional toxicity testing on animal tests which appeared to be sensitive enough to show effects. Toxicity monitoring using three species including larval fathead minnows was initiated again in 1995 in response to a Regional Board monitoring requirement. Table 7 on page 13 in Appendix H-3 (Reclaimed Water Quality Update) shows all reclaimed water toxicity data collected through 1 April 1996.

Response to Comment 118-101

Comment Summary: This comment asks whether the toxic responses to green algae found in tests made on 4 May 1994 and 10 April 1994, as shown in Table 9 of Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results), indicate potential problems for fish.

Since fish tests were not made on these dates, it is impossible to know what their outcome might have been. However, it is not unusual for toxicity tests to show effects on some test organisms but not on others.

Response to Comment 118-102

Comment Summary: This comment asks whether tests with fish were made following the toxic results to green algae mentioned in Comment 118-101.

Toxicity tests on fish were done subsequent to the 1994 toxicity tests. Table 7 on page 13 in Appendix H-3 (Reclaimed Water Quality Update) shows all of the reclaimed water toxicity data collected through 1 April 1996, including larval fathead minnow tests conducted in 1995 and 1996.

Response to Comment 118-103

Comment Summary: This comment asks whether the results of toxicity tests made on Laguna de Santa Rosa water collected on 1 July 1992 as shown in Table 9 on page 15 of Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) are representative of conditions in the Laguna.

Tests made on Laguna de Santa Rosa water collected on 1 July are not representative of dry weather conditions in the Laguna because they were collected during the runoff from an unseasonable rain (refer to Response to Comment 118-104).

Response to Comment 118-104

Comment Summary: This comment asks whether the lethal and sublethal toxicity to Ceriodaphnia *found on tests of Laguna water collected on 1 July 1992 as shown in Table 9 on page 15 of Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) can be attributed to substances in runoff.*

The Laguna water tested on 1 July 1992 was collected during the runoff from an unseasonable rain. Since tests made under dry conditions a few days before (26 June 1992) showed no effects, it is reasonable to infer that the toxic results found on tests of water collected on 1 July are due to substance(s) in runoff.

Response to Comment 118-105

Comment Summary: This comment asks why no green algae results are given in Table 9 of (Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) for Laguna samples collected on 1 July 1992, during runoff from an unseasonable rain.

No green algae (*Selenastrum*) tests were made on Laguna water collected on 1 July 1992. It is not known why algae tests were not included on this date, since *Ceriodaphnia* and *Pimephales* tests were made then (refer to Table 9 in Appendix I-4).

Response to Comment 118-106

Comment Summary: This comment asks what was the wastewater discharge volume and dilution for each of the tests shown in Table 9 on page 15 of Appendix I-4 (Laguna de Santa Rosa Water Quality Monitoring Results).

None of the tests shown in Table 9 of Appendix I-4 were made on water at a time and/or location which is exposed to reclaimed water discharge. The Laguna at Guerneville Road contains discharges in winter (November through May), but tests shown were made outside the discharge season during June and July, when no releases were made. Santa Rosa Creek water samples were collected at Willowside Road, which is located upstream from reclaimed water discharges.

Response to Comment 118-107

Comment Summary: This comment asks for the source of flow in the irrigation and storage streams in summer.

All of the irrigation and storage streams described in Appendix I-5 (Irrigation/Storage Streams Water Quality Monitoring Results) of the Draft EIR/EIS partially dry up in summer, leaving only a few isolated pools along much of their lengths. Groundwater discharge is a possible source of such water. Refer also to Response to Comment 118-109.

Response to Comment 118-108

Comment Summary: This comment asks which irrigation and storage streams described in Appendix I-5 (Irrigation/Storage Streams Water Quality Monitoring Results) are seasonal and which are naturally perennial.

All of the irrigation and storage streams described in Appendix I-5 of the Draft EIR/EIS are seasonal in that no surface flow is evident in at least one portion of each stream in the summer.

Response to Comment 118-109

Comment Summary: This comment asks if it is possible that the main sources of flow in irrigation and storage streams in summer are un-permitted/illegal discharges, irrigation runoff, or subsurface drainage.

Since no flows occur in these streams in summer (refer to Response to Comment 118-107), un-permitted/illegal discharges, irrigation runoff, or subsurface drainage are not substantial sources of water in these streams.

Response to Comment 118-110

Comment Summary: This comment asks if diel DO measurements were taken in the Russian River during the winter/discharge season and if there are diel variations in DO in the winter/discharge season.

Diel dissolved oxygen measurements were not taken in the Russian River during the winter/discharge season, but were taken during the nondischarge season (see Section 4.4 and Figures 2 through 6 on pages 15 through 19 of Appendix I-6 (Russian River Water Quality Monitoring Results) of the Draft EIR/EIS. Diel variations of dissolved oxygen are not directly related to reclaimed water discharges; rather diel variation relates to factors such as algal biomass, temperature and flow/re-aeration. Diel oxygen measurements were made in the River over a range of algal biomass conditions.

Response to Comment 118-111

Comment Summary: This comment asks if the dissolved oxygen results at the Oddfellows and Monte Rio sampling sites are affected by failing septic systems.

The EIR/EIS authors do not know the answer to this question, although it is conceivable that the dissolved oxygen at Oddfellows and Monte Rio are affected by failing septic systems. Since Project impacts on the Russian River are based on existing conditions, these conditions reflect any adverse effects of failing septic systems.

Response to Comment 118-112

Comment Summary: The comment asks if, after water quality model calibration, all the "adjusted values" of all parameters were within known and expected ranges.

The results of the calibration and the EIR/EIS authors' professional opinion about the goodness of fit between simulated and actual water quality data are given in Section 3.0 of Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS. There were no coefficients that appeared inconsistent with expected values or values reported in the literature.

Response to Comment 118-113

Comment Summary: The comment asks if the simulated water quality values were appropriate for each reach and season.

Refer to Response to Comment 118-112.

Response to Comment 118-114

Comment Summary: The comment asks what criteria were used to define an acceptable tolerance for the match between simulation results and observed data, and asks how the criteria were applied.

As indicated in the Response to Comment 118-112, the professional judgment of the EIR/EIS authors was used during the calibration process to determine the acceptable tolerance for the match between simulation results and observed data. The purpose of the model is to provide an analytical tool suitable for evaluating the cause and effect responses of the prototype. The model consists of the computer code and input data. The calibration process consists of adjusting coefficients such that the responses of the stream system seen in the monitoring data during the entire 3-year period sampling period were represented by the model. The intent was not to force the simulation results to pass through each observed data point by detailed manipulation of model coefficients. Coefficients were selected such that they were consistent with values reported in the literature and specified globally except when environmental conditions dictated spatial variations. The reported calibration results are the best fit of the data that could be achieved within the constraints of the Project (time, budget, data, etc.). The calibration process resulted in a model that in the opinion of the authors, is suitable for evaluating Project alternatives because it reproduces the magnitude and seasonal trends seen in the observed data over a wide range of environmental conditions. This opinion is based upon the approximately 40 years of combined modeling experience of the authors. Figures 2.1 through 3.29 in the appendix of Appendix I-8 (Russian River Water Quality Model) show the simulated and observed parameters for the model calibration.

The EIR/EIS authors attended meetings of the Water Quality Modeling Workgroup with the commentator on several occasions to develop such criteria. Workgroup meetings occurred on 6 June 1994, 18 July 1994, 3 August 1994, and 27 February 1995. The Workgroup did not produce such criteria at those meetings.

Response to Comment 118-115

Comment Summary: The comment asks for the results of the calibration.

The results of the calibration are provided in Figures 2.1 through 3.29 in the appendix of Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS.

Response to Comment 118-116

Comment Summary: The comment asks how uncertainty in the observed data was considered in the calibration process.

Refer to Section 3 of Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS for a description of how uncertainty associated with each calibration parameter was considered.

Response to Comment 118-117

Comment Summary: The comment asks for which parameters, locations and seasons was the uncertainty most important.

The priorities for calibration are described on the top of page 20 in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS, and the calibration approach for each constituent considered important by the EIR/EIS authors is described on pages 21 through 27 in Appendix I-8. The discussion there identifies where calibration fit was good, and where the calibration fit was less than optimal. As stated on page 26, the model showed "greater-than-desired uncertainty" for phytoplankton, but, for the reasons stated there, the model is considered suitably conservative.

Response to Comment 118-118

Comment Summary: The comment asks whether the modeling process identified which additional data would reduce large sensitivities or instabilities in the model.

Field data were collected and existing data assembled for the purposes of calibrating and validating the model, and these data are presented in Appendices I-4 through I-7 of the Draft EIR/EIS. Field data were collected at times and locations considered to have the maximum benefit to model calibration and validation. At such time that the model is to be refined, the EIR/EIS authors agree that a model analysis to answer this question would be an appropriate basis for determining what additional field data to collect; however, doing so is not within the scope of this Draft EIR/EIS. Refer also to Response to Comment 118-190b.

Response to Comment 118-119

Comment Summary: The comment asks if the calibration indicates what additional data would improve the validation and calibration of the model.

Refer to Response to comment 118-118.

Response to Comment 118-120

Comment Summary: The comment asks how the daily river volume was calculated.

The water quality simulations were done in years for which hourly flow data are available. Daily flow volume was calculated by assuming that the hourly flow estimate was the average for the hour, the resulting 24 hourly volumes were summed.

Response to Comment 118-121

Comment Summary: The comment asks if Figures 3.1 and 3.2 in Appendix I-8 (Russian River Water Quality Model) demonstrate that more field observations result in simulated data that fit observed data more closely than if fewer field data are available.

The EIR/EIS authors consider that Figures 3.1 and 3.2 in Appendix I-8 of the Draft EIR/EIS illustrate very close fit of simulated to observed flow data. Flow simulations are amenable to such close fits because only physical phenomena (e.g., water movement) are being simulated. Simulation of water quality involves not only simulation of physical phenomena, but also biological and chemical phenomena which are less amenable to simulation. The professional opinion of the EIR/EIS authors is that sufficient data were available to calibrate the model given the purpose for which the simulations are being used.

Response to Comment 118-122

Comment Summary: The comment asks why the simulated and observed flow data in Figure 3.3 in Appendix I-8 (Russian River Water Quality Model) differ on a few days.

The model computes the flow at any location as a function of input boundary flows (i.e., river flow at Healdsburg, Warm Springs Dam release, SCWA withdrawals, distributed incremental flows, etc.), physical characteristics of the stream channel and fundamental hydraulic relationships. The input flow boundary conditions are daily average flows which were assumed to be equal to the flow at mid-day. As the flow is routed through the river system, the travel time between Healdsburg and the Hacienda Bridge results in a several hour shift in the hydrograph. The plot of observed and computed flow at the Hacienda Bridge is a comparison of daily average flow data and instantaneous model results. During very dynamic hydrologic events, the daily average may not represent the flow at hour 12. That is why the largest differences between the computed and observed flow occur during short duration, high flow events.

Response to Comment 118-123

Comment Summary: The comment asks if Figure 3.4 in Appendix I-8 (Russian River Water Quality Model) shows continuous (e.g. hourly) measurements in 1995?

Figure 3.4 in Appendix I-8 of the Draft EIR/EIS shows hourly temperature measurements in 1995.

Response to Comment 118-124

Comment Summary: The comment asks how temperature and other continuous measurements were used to verify the calibration.

The temperature calibration is described on page 20 in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS.

Response to Comment 118-125

Comment Summary: The comment asks how the sparsity of temperature data were accounted for.

The EIR/EIS authors do not consider such data to be sparse. Figures 3.4 through 3.7 in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS show the individual (lone circles) and continuous (grouped circles) temperature measurements at four locations. Additional temperature data that were also used in model calibration are presented in Appendices I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) and I-6 (Russian River Water Quality Monitoring Results) of the Draft EIR/EIS.

Response to Comment 118-126

Comment Summary: The comment asks how the nitrogen load compares to other sources during the discharge season.

Nitrogen load was evaluated on page 24 in Appendix I-16 (Water Quality Impact Analysis) of the Draft EIR/EIS. Although the annual load is not parsed into discharge and nondischarge seasons, most of the load from non-reclaimed water sources occurs because of runoff during the discharge season. This is described in the report cited in Table 4-23 in Appendix I-16 as NCRWQCB (1995).

Response to Comment 118-127

Comment Summary: The comment asks what criteria were used to define an acceptable tolerance for the match between simulation results and observed data.

Refer to Response to Comment 118-114.

Response to Comment 118-128

Comment Summary: The comment asks how the sparsity of nitrogen data was accounted for.

The EIR/EIS authors do not consider the data to be sparse. The professional opinion of the EIR/EIS authors is that sufficient data were available to calibrate the model given the purpose for which the simulations are being used. Figures 3.8 through 3.15 in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS show nitrogen measurements at four locations. Additional nitrogen data that were also used in model calibration are presented in Appendices I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) and I-6 (Russian River Water Quality Monitoring Results) of the Draft EIR/EIS.

Response to Comment 118-129

Comment Summary: The comment asks how the 0.06 mg/L rms deviation between simulated and observed nitrate concentrations demonstrate equality without computing "paired t-test".

Root mean squared (rms) error is equivalent to the standard deviation. An rms error of 0.06 mg/L indicates an unusually good correlation between simulated and measured concentrations. This level of accuracy is considered atypical by the author. The paired t-test is used to discard atypical data (outliers) during a statistical analysis. The nitrate measurement in question was discarded without relying on the t-test since the departure from the model results is approximately 20 standard deviations relative to the variance for the other measurements. Twenty standard deviations is considered by the EIR/EIS authors to be an obvious indication of an outlier.

Response to Comment 118-130

Comment Summary: The comment asks for root-mean-squared (rms) deviation values for Occidental Road and Trenton-Healdsburg Road.

All rms values that have been calculated are presented in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS. A visual evaluation of the ability of the model to reproduce the observed data was primarily used and rms values were calculated at some locations to verify conclusions based on observations of graphical comparisons of simulated and observed data. A visual comparison of observed and simulated data was used for the Occidental Road and Trenton-Healdsburg Road stations so that rms values were not calculated for these sites. The model replicated the observed seasonal variations and magnitude of water quality changes.

Response to Comment 118-131

Comment Summary: The comment asks how the match between the nitrate simulation results and the measurements compare to corresponding criteria for flow and temperature.

The fit achieved for both flow and temperature is expected by the EIR/EIS authors to be much better than that achieved for any water quality parameter. Flow measurements are generally fairly accurate, plus the incremental local inflow is computed by mass balance, which includes the gauge error, and therefore diminishes the effects of gauge error. Temperature measurements are generally accurate and temperature simulation is based on reasonably well defined meteorological data and very well defined heat budget concepts. Most water quality data are more spatially and temporally variable due to the water quality interactions (e.g., algae - particulate - nutrient cycling) and the variability of sources and environmental conditions.

Response to Comment 118-132

Comment Summary: The comment asks if additional data would help confirm outliers and investigate the existence of unknown boundary conditions.

The professional opinion of the EIR/EIS authors is that sufficient data were available to calibrate the model given the purpose for which the simulations are being used. Also refer to Master Response 5, located in Section 6.2 of this document.

Response to Comment 118-133

Comment Summary: The comment asks how the ammonia load compares to other sources during the discharge season.

Refer to Response to Comment 118-126. Ammonia load occurs in a similar time frame and proportion to nitrogen load.

Response to Comment 118-134

Comment Summary: The comment asks how the dairy ammonia load was simulated.

The response to this comment is included in the changes to the Draft EIR/EIS shown below.

The following changes are made to the Draft EIR/EIS:

Table of Contents, Appendix I-8. The Table of Contents is revised as follows

Page 11, Appendix I-8. The following text is added after Section 2.3.4-4 Dissolved Phosphorus:

2.3.5 Estimate of Agricultural Inputs

The simulated agricultural load included total nitrogen, ammonia nitrogen, BOD and organic solids. Phosphates of dairy origin have not been included in the dairy analysis by MSC since phosphates are not a limiting nutrient during periods of dairy runoff. The total nitrogen load estimate was adjusted for the ammonia and the nitrogen component of organic solids.

i.e., Organic N = total N - NH_3-N - [N_s *x* Organic solids]

where N_s is the nitrogen fraction of organic solids

Each of these parameters was input to the model by allocating the dairy loads to the background concentration of the appropriate local tributaries. The incremented tributary inflows were modeled just like any other input. The timing and magnitude of the dairy load was based on the assumption that:

1. the potential load would be the greatest at the beginning of the runoff season (due to accumulation over the summer months) and

2. the rate at which the material of dairy origin would wash off the watershed would be more rapid as the runoff rate increased.

The time dependent adjustment was:

$F_t = (1 - 0.01 \times d_{40})^2$

where d_{40} was the number of days during the season when the runoff to the Laguna (excluding Santa Rosa and Mark West Creeks) exceeded 40 cfs

The flow dependent adjustment was :

$F_q = (q - 40)^{1.1}$

where q was the total the runoff to the Laguna (excluding Santa Rosa and Mark West Creeks)

These factors were normalized as the fraction of the total load for each day when q exceeded 40 cfs. The inflow concentration was adjusted on a daily basis by:

$C = C_o + M \times F_{tq} \times R/Q$

where;

C_o = inflow quality without dairy load
M = Total seasonal dairy load
F_{tq} = normalized product of F_t and F_q
R = fraction of total load allocated to a particular tributary (based on limits of the watershed)
Q = Flow rate

Response to Comment 118-135

Comment Summary: The comment asks if the characterization of ammonia loads in the water quality model could be refined.

A computer model almost never perfectly simulates real world conditions, and model refinements are almost always possible. In the particular case of ammonia loads to the Laguna, the EIR/EIS authors do not consider refinement to include the ammonia load from specific dairy farms to be warranted; instead, the ammonia load was modeled as described in the Response to Comment 118-134.

Response to Comment 118-136

Comment Summary: The comment asks what criteria were used to define an acceptable tolerance for the match between simulation results and observed ammonia data, and asks how the criteria were applied.

Refer to Response to Comment 118-114.

Response to Comment 118-137

Comment Summary: The comment asks how tolerance for the match between the simulation results and the measurements compare to corresponding criteria for flow.

The authors would not expect a fit for ammonia to be comparable to that achieved for flow. Refer to Response to Comment 118-131.

Response to Comment 118-138

Comment Summary: The comment asks how tolerance for the match between the simulation results and the measurements of ammonia concentrations compares to corresponding criteria for nitrate.

The authors would normally expect a fit for ammonia to be comparable to that achieved for nitrate. The fit for nitrate at the two lower Russian River sampling station is unusually good and it is unrealistic to expect such small differences between the model results and the observed data. The root-mean-square deviations have not been calculated. Refer to Response to Comment 118-131.

Response to Comment 118-139

Comment Summary: The comment asks how tolerance for the match between the simulation results and the measurements of ammonia concentrations compare to corresponding criteria for temperature.

The authors would not expect a fit for ammonia to be comparable to that achieved for temperature. Refer to Response to Comment 118-131.

Response to Comment 118-140

Comment Summary: The comment asks how the sparsity of nitrate data was accounted for.

Refer to Responses to Comments 118-121 and 118-128.

Response to Comment 118-141

Comment Summary: The comment refers to Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS *and asks why the dairy phosphate contribution is not treated the same as nitrogen. The comment also indicates that the report identified dairies as the principal source for phosphate.*

Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS states that dairy loads contribute to non-point sources and boundary flows during wet weather; the report does not imply that dairy sources are the principal source of phosphates. Phosphates of dairy origin have not been included in the dairy since phosphates are not a limiting nutrient during periods of dairy runoff.

Response to Comment 118-142

Comment Summary: The comment asks what criteria were used to define an acceptable tolerance for the match between simulation results and observed data for phosphate loads.

Refer to Response to Comment 118-114.

Response to Comment 118-143

Comment Summary: The comment asks how tolerance for the match between the simulation results and the measurements for phosphate loads compare to corresponding criteria for flow.

The authors would not expect a fit for phosphate to be comparable to that achieved for flow. Refer to Response to Comment 118-131.

Response to Comment 118-144

Comment Summary: The comment asks how tolerance for the match between the simulation results and the measurements for phosphate loads compare to corresponding criteria for nitrate.

The authors would normally expect a fit for phosphate to be comparable to that achieved for nitrate. The fit for nitrate at the two lower Russian River sampling station is unusually good and it is unrealistic to expect such small differences between the model results and the observed data. Refer to Response to Comment 118-131.

Response to Comment 118-145

Comment Summary: The comment asks how tolerance for the match between the simulation results and the measurements compare to corresponding criteria for temperature.

The authors would not expect a fit for phosphate to be comparable to that achieved for temperature. Refer to Response to Comment 118-131.

Response to Comment 118-146

Comment Summary: The comment asks how the sparsity of phosphate data was accounted for.

The EIR/EIS authors do not consider the data to be sparse Figures 3.16 through 3.19 in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS show phosphorus measurements at four locations. Additional phosphorus data that were also used in model calibration are presented in Appendices I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) and I-6 (Russian River Water Quality Monitoring Results). Refer also to Response to Comment 118-121.

Response to Comment 118-147

Comment Summary: The comment asks how the mean or daytime dissolved oxygen concentration can be used to evaluate impact.

The monthly average value was used for comparison with the dissolved oxygen objective for median values the Regional Board has established, as described in Section 4.6 and Appendices I-12 (Development of Evaluation Criteria for Potential Water Quality Impacts) and I-16 (Water Quality Impact Analysis Report Volume I- Text) of the Draft EIR/EIS. Monthly dissolved oxygen minima were also evaluated in Response to Comment 8-21.

Response to Comment 118-148

Comment Summary: The comment asks if diurnal and critically low night-time dissolved oxygen values were estimated.

The model simulated hourly dissolved oxygen values. The average of all hourly values in a month were used to derive an average value that was used to evaluate for significance. The monthly minimum values (lowest value in the month) were also evaluated as described in the Response to Comment 8-21.

Response to Comment 118-149

Comment Summary: The comment asks if the calibration of the model for diurnal dissolved oxygen variation is depicted on Appendix I-8 (Russian River Water Quality Model) Figures 3.20 through 3.23. The comment also asks if other data were used for the calibration.

Figures 3.20 through 3.23 in Appendix I-8 of the Draft EIR/EIS show the dissolved oxygen data that were used in the calibration. The diurnal data for the Russian River that are shown in Figures 3.22 and 3.23 are also shown in expanded scale in Figures 2 through

6 in Appendix I-6 (Russian River Water Quality Monitoring Results) of the Draft EIR/EIS. The diurnal data for the Laguna are not shown in Appendix I-4 (Laguna De Santa Rosa Water Quality, Monitoring Results) of the Draft EIR/EIS, an oversight which is addressed in the Response to Comment 118-96.

Response to Comment 118-150

Comment Summary: The comment states that the water quality model cannot simulate diurnal DO changes.

This comment is incorrect, as discussed in Response to Comment 118-148. The model simulates diurnal changes.

Response to Comment 118-151

Comment Summary: The comment asks if the following statement from Appendix I-8 (Russian River Water Quality Model) page 24 was verified: "The large variations in D.O. concentrations in the Laguna are principally a result of transient loadings that cannot be precisely described as boundary conditions . . . ."

The subject statement has not been verified and represents the opinion of the EIR/EIS authors.

For clarification, the following change is made to the Draft EIR/EIS:

Page 24, Appendix I-8. The third paragraph is revised as follows:

> The Laguna is a highly eutrophic environment which exhibits large variations in dissolved oxygen concentrations. Biological activity, particularly during warm weather, may rapidly deplete oxygen through decay and respiration or increase oxygen through photosynthesis. During periods of low wind velocity, low aeration rates allow larger departures from saturation. Eutrophic conditions persist in many of the tributaries to the modeled stream reaches so tributary loadings may also be quite variable. The variable nature of wind and loadings cannot be precisely described as boundary conditions. ~~The large variations in D.O. concentrations in the Laguna are principally a result of transient loadings that cannot be precisely described as boundary conditions for the model.~~ It is therefore unreasonable to expect the model to precisely match observed D.O. concentrations. The calibration results presented here are considered adequate because the range of simulated D.O. concentrations in the upper Laguna are comparable to the observed range, including periods of super-saturation and critically low D.O. ~~.~~ And because the simulated and observed diurnal ranges are comparable, indicating that the impact of biological activity on D.O. is reasonably represented.

Response to Comment 118-152

Comment Summary: The comment asks if inability to simulate diurnal dissolved oxygen variation is the limiting factor of the model.

The diurnal dissolved oxygen simulation is not considered to be a limiting factor. The model does simulate diurnal variations. Refer to Responses to Comments 118-148 and 8-21.

Response to Comment 118-153

Comment Summary: The comment asks if the hydraulic simulation (modeling of "travel time and periods of delayed discharge") is the limiting factor of the model.

The hydraulic simulation is not considered by the EIR/EIS authors to be a limiting factor in the model. The model simulates flows very accurately. Refer to Response to Comment 118-121.

Response to Comment 118-154

Comment Summary: The comment asks what criteria were used to define an acceptable tolerance for the match between simulation results and observed data.

Refer to Responses to Comments 118-114 and 118-151. Response to Comment 118-151 addresses the expected variability of the range in dissolved oxygen of highly eutrophic environments.

Response to Comment 118-155

Comment Summary: The comment asks how tolerance for the match between the simulation results and the measurements for dissolved oxygen compare to corresponding criteria for flow.

The EIR/EIS authors would not expect a fit for dissolved oxygen to be comparable to that achieved for flow. Refer to Response to Comment 118-131.

Response to Comment 118-156

Comment Summary: The comment asks how tolerance for the match between the simulation results and the measurements for dissolved oxygen compare to corresponding criteria for nitrate.

The EIR/EIS authors would normally expect a fit for dissolved oxygen to vary with the level of eutrophication. In unproductive waters, oxygen levels are normally near saturation. One would expect very good fits with the observed data comparable to temperature and to the nitrate fit. In more eutrophic environments such as the Laguna, the EIR/EIS authors would expect a poorer fit than that achieved for nitrate at the two lower Russian River sampling station due to the more transient behavior of dissolved oxygen (refer to Response to Comment 118-151). Refer also to Response to Comment 118-131.

Response to Comment 118-157

Comment Summary: The comment asks how tolerance for the match between the simulation results and the measurements for dissolved oxygen compare to corresponding criteria for temperature.

The authors would not expect a fit for dissolved oxygen to be comparable to that achieved for temperature except in low productivity waters. Refer to Responses to Comments 118-131, 118-151 and 118-156.

Response to Comment 118-158

Comment Summary: The comment asks how the sparsity of dissolved oxygen data was accounted for.

The EIR/EIS authors do not consider the data to be sparse. Figures 3.20 through 3.23 in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS show individual (lone circles) and continuous (grouped circles) dissolved oxygen measurements at four locations. Additional dissolved oxygen data that were also used in model calibration are presented in Appendices I-4 (Laguna de Santa Rosa Water Quality Monitoring Results) and I-6 (Russian River Water Quality Monitoring Results) of the Draft EIR/EIS. Refer to Responses to Comments 118-96 and 118-121.

Response to Comment 118-159

Comment Summary: The comment asks if additional data would improve the accuracy of the phytoplankton calibration.

The field data and the model response indicate that the Laguna is biologically active and that large variations in dissolved oxygen and phytoplankton concentrations can be expected. Additional data may help quantify the magnitude of these variations but is not required to conclude that the Laguna is highly eutrophic. It is the EIR/EIS authors' opinion that the model represents the eutrophic nature of the stream and that the model results provide an estimate of the impacts of alternative operations that is of appropriate precision for the purpose of comparing alternatives and evaluating impacts for significance.

Response to Comment 118-160

Comment Summary: The comment asks how sparsity of the data in Figures 3.24 to 3.27 in Appendix I-8 (Russian River Water Quality Model) is accounted for in the calibration.

The EIR/EIS authors do not consider the data of Figures 3.24 and 3.25 to be sparse. Refer to Response to Comment 118-121. The observed phytoplankton data in Figures 3.26 and 3.27 indicate phytoplankton levels less than 2 mg/L in the lower Russian River. The dissolved oxygen data show diurnal variations which indicate primary productivity which are inconsistent with the phytoplankton and benthic algae measurements. Therefore, model coefficients were selected such that simulated algae levels exceed the observed data to provide a model which was sensitive to changes in nutrient concentrations associated with alternative evaluation.

Response to Comment 118-161

Comment Summary: The comment refers to planktonic algae and asks, "after improving the validity of the observed data, what criteria would be used to define acceptable tolerance for the match between simulation results and the measurements."

The EIR/EIS authors consider each planktonic algae datum to be valid. Because the comment does not provide any specific reasons why the data should be considered invalid, a more specific response is not possible.

Response to Comment 118-162

Comment Summary: The comment asks if additional data would improve the accuracy of the benthic algae calibration.

Benthic algae data for the Laguna would be desirable for completeness of the calibration presentation. However, due to the uncertainty associated with benthic algae sampling (i.e., sampler's qualitative assessment of a representative area and extraction of the sample, and patchiness of suitable substrate in the Laguna), the photosynthetic production of oxygen would remain as the important factor for calibrating the planktonic and benthic algae models. The authors would continue to rely on typical benthic algae levels reported in the literature for defining model parameters.

Response to Comment 118-163

Comment Summary: The comment asks how sparsity of the benthic algae data in Figures 3.28 and 3.29 of Appendix I-8 (Russian River Water Quality Model) is accounted for in the calibration.

The authors relied on these measurements and on typical benthic algae levels reported in the literature for defining model parameters.

Response to Comment 118-164

Comment Summary: The comment refers to benthic algae and asks, "after improving the validity of the observed data, what criteria would be used to define acceptable tolerance for the match between simulation results and the measurements."

The EIR/EIS authors consider each benthic algae datum to be valid. Because the comment does not provide any specific reasons why the data should be considered invalid, a more specific response is not possible.

Response to Comment 118-165

Comment Summary: The comment asks if the monthly values for flow volume in Table 4.1 of Appendix I-8 (Russian River Water Quality Model) are calculated from daily values or are the daily values derived from the monthly values.

The monthly values in Table 4.1 are calculated from daily values.

Response to Comment 118-166

Comment Summary: The comment asks for the source of incremental watershed inflow data.

The incremental watershed inflow data were derived by the Sonoma County Water Agency based on the difference between Healdsburg and Hacienda gauge hourly data.

Response to Comment 118-167

Comment Summary: The comment asks for the correlation coefficient of the regression of reclaimed water production and incremental watershed inflow.

The correlation coefficient (R) is the square root of the "goodness of fit" indicator (R^2). As shown in to Response to Comment 118-168, R = $0.775^{1/2}$ = 0.88.

Response to Comment 118-168

Comment Summary: The comment asks that the significance of the 2.8 mgd root mean square (rms) error be described.

The root mean square (rms) error (or standard deviation) emphasizes the largest errors and weights positive and negative departures equally. It is the most common measure of the deviation of the data from the regression fit. The units of the rms error are those of the dependent variable (i.e., MGD). The rms error is an indication of the magnitude of the variation of the computed and measured production on a daily basis. The R^2 value for the regression fit is 0.775. The R^2 value is a nominal value varying between 0 and 1. When R^2 = 1, all data fall on the regression line (a perfect fit). An R^2 value of 0.775 indicates a statistically good fit of the data. The average of 2,196 daily waste water production values is 28.75 MGD, which means the standard deviation is 10 percent.

Response to Comment 118-169

Comment Summary: The comment asks for an explanation of the incremental watershed inflow approach used on the water quality model versus that used in the daily water balance model and the monthly water balance model.

As explained in Response to Comment 118-55, the daily water balance model is part of the water quality model. The derivation of reclaimed water production in the monthly water balance model is different than that used for the daily water balance model in that annual flows were used in the correlation, as explained in Appendices D-8 (Water Quality Balance Model Summary and Results) and D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS.

Response to Comment 118-170

Comment Summary: The comment asks how reclaimed water production estimated in the water quality model would change if the daily water balance model method of calculating reclaimed water production was used.

No change will occur. As explained in Response to Comment 118-55, the daily water balance model is part of the water quality model.

Response to Comment 118-171

Comment Summary: The comment applies Comments 118-33 through 118-45 to Tables 4.1 and 4.2 in Appendix I-8 (Russian River Water Quality Model) and asks how the values would change.

The comment is unclear. Table 4.1 Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS describes the average monthly River flow in the dry, normal and wet simulation years. Table 4.2 in Appendix I-8, of the Draft EIR/EIS provides the storage curve that is part of the Project description. Neither the River flow nor the storage curve information was derived using methods that are addressed in Comments 118-33 through 118-45. Tables 4.2 and 4.3 show the storage objectives for the two different storage curves discussed in Responses to Comments 118-39 through 118-45.

Response to Comment 118-172

Comment Summary: The comment questions how discharge rates were defined in the analysis of impacts.

The existing discharge was simulated using the daily water balance component of the water quality model using operating rules that reflect the current discharge permit and operating practice, and these are explained in Section 4.3.2 in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS. No attempt is made in the Draft EIR/EIS to define the existing condition in terms of the discharge rate.

Response to Comment 118-173

Comment Summary: The comment asks what criteria were used to select the dry, normal and wet years for water quality impacts simulation.

Because water quality impact is related to hydrologic conditions the water quality impacts simulations were done over a range of flow conditions to most fully disclose potential impacts. The 10th percentile year (1976) was selected as representative of dry year conditions and the 90th percentile year (1982) was selected as representative of wet year conditions. The 50th percentile (median) year (1961) was selected as representative of the normal year. These years were selected from among those with a continuous record of River flow data. In addition, impacts of contingency discharge were evaluated in the driest year on record (1977). The selection of the 10th, 50th and 90th percentile years was discussed at the water quality modeling work groups and the public roundtable in which the water quality model was presented. The rationale for selecting the 10th, 50th and 90th percentile years was that they adequately represented the middle and the extremes of the observed range of hydrologic conditions. Addition of 1977 (the driest year on record) to the analysis further broadened that range.

Response to Comment 118-174

Comment Summary: The comment asks if water quality impacts were simulated in years other than the 10th, median and 90th percentile years.

In addition to the evaluation performed on wet (1982), dry (1976) and normal (1961) years, an evaluation was performed on 1977, the driest year (0th percentile). This evaluation is in Section 4.2 in Appendix I-16 (Water Quality Impact Analysis) of the Draft EIR/EIS. No evaluation of water quality impacts was performed for combinations of years.

Response to Comment 118-175

Comment Summary: The comment asks if the monthly or daily water balance model was used as the basis for the water quality impact evaluation.

As stated in Section 4.1.4 in Appendix I-16 (Water Quality Impact Analysis) of the Draft EIR/EIS, impacts on constituents affected by biological activity were predicted using the Russian River Water quality model. Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS uses the daily water balance model. Section 4.1.4 in Appendix I-16 also states that the daily water balance model was used for prediction of impacts on conservative constituents (those unaffected by biological activity).

Response to Comment 118-176

Comment Summary: The comment asks if the dissolved oxygen evaluation accurately evaluates compliance.

The EIR/EIS authors have concluded that the dissolved oxygen analysis is appropriate for determining compliance. Refer to Response to Comment 8-21. Validity of dissolved oxygen analysis is discussed in Responses to Comments 118-147 through 118-158.

Response to Comment 118-177

Comment Summary: The comment asks how the impact of diurnal dissolved oxygen variation was evaluated.

Refer to Response to Comment 8-21.

Response to Comment 118-178

Comment Summary: The comment asks if compliance with the instantaneous dissolved oxygen objective is evaluated.

Refer to Response to Comment 8-21.

Response to Comment 118-179

Comment Summary: The comment asks if the ammonia evaluation accurately evaluates compliance.

The model results for ammonia concentrations are sufficiently accurate to evaluate compliance. Refer to Responses to Comments 118-133 through 118-140 for a discussion of model calibration for ammonia.

Response to Comment 118-180

Comment Summary: The comment asks how model estimates of ammonia concentration were validated.

The ammonia concentrations predicted by the water quality model were validated as described in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS.

Response to Comment 118-181

Comment Summary: The comment asks how can the validity of the model estimated of algae be confirmed.

Refer to Response to Comment 118-114 and 118-159 through 118-164 for a discussion of model calibration for algae.

Response to Comment 118-182

Comment Summary: The comment asks how the impact of algal blooms was evaluated.

Algal blooms were estimated using the water quality model, as described in Appendix I-8 (Russian River Water Quality Model) and as described on pages 24 through 35 in Appendix I-16 (Water Quality Impact Analysis) of the Draft EIR/EIS. The results of the simulation of impacts were evaluated for significance according to the Biostimulatory Substances evaluation criterion described in Section 4.6 and Appendices I-12 (Development of Evaluation Criteria for Potential Water Quality Impacts) and I-16 (Water Quality Impact Analysis Report) of the Draft EIR/EIS.

Response to Comment 118-183

Comment Summary: The comment asks how impacts of phytoplankton concentrations on turbidity can be confirmed.

The relationship between light transmission and phytoplankton concentration is a model input. As indicated in the Brown 1988 citation on page 3 in Appendix I-8 (Russian River Water Quality Model) of the Draft EIR/EIS, the light extinction coefficient of 0.2 is typical of values reported in the literature.

Response to Comment 118-184

Comment Summary: The comment asks for the basis of the 95th percentile concentration for evaluation of aquatic life impacts.

The 95th percentile reclaimed water concentration in a dry year (or which ever year had the highest 95th percentile reclaimed water concentration) was used to evaluate the significance of impacts according to numeric-based evaluation criteria. The 95th percentile concentration of reclaimed water is predicted to occur only 5 percent of the time in only one of about 18 years (as described in the Response to Comment 8-10). The Human Health Risk Assessment used a different approach, which is described in Appendix J-3 (Human Health Risks from Chemical and Biological Components of Reclaimed Water) of the Draft EIR/EIS.

Dilution of reclaimed water is very high when high flows occur, and impacts are related to reclaimed water concentration. Therefore, selection of a lower and more frequent reclaimed water concentration would be equivalent to a less stringent significance criterion. A concentration that is higher and occurs less frequently than the 95th percentile could have been selected. However, this would have resulted in weighting of the significance evaluation to impacts that occur only very rarely. The use of 95th percentile reclaimed water concentration in a dry year was considered be a balance between stringency and frequency, and is consistent with EPA policy. This was considered to be a conservative application of the EPA policy that recognizes excursions above permit limits.

Response to Comment 118-185

Comment Summary: The comment asks if impacts were evaluated at reclaimed water concentrations of greater than the 95th percentile.

Analysis was not done for other percentiles. Refer to Response to Comment 118-184.

Response to Comment 118-186

Comment Summary: The comment asks if the reclaimed water concentrations in Table 4-2 in Appendix I-16 (Water Quality Impact Analysis Report Volume I - Text) and Figures 4-1 through 4-12 in Appendix I-17 (Water Quality Impact Analysis Report Volume II - Figures) are based on daily water balance calculations.

The results are based on the daily water balance. Refer to Response to Comment 118-175.

Response to Comment 118-187

Comment Summary: The comment asks for reclaimed water concentration distributions at Hacienda Bridge. The comment also asks for the frequency that design discharge rates are exceeded at Hacienda Bridge.

No source of water input to the Russian River occurs between Hacienda Bridge and Oddfellows except during storm events (when the concentration of reclaimed water is low). Therefore, insufficient differences exist in the concentrations of reclaimed water at Hacienda and at Oddfellows to warrant inclusion of the concentrations at Hacienda Bridge in Table 4-2 in Appendix I-16 (Water Quality Impact Analysis Report Volume I - Text) and Figures 4-1 through 4-12 in Appendix I-17 (Water Quality Impact Analysis Report Volume II - Figures) of the Draft EIR/EIS.

The frequency that design discharge rates are exceeded is provided for the 70-year period of record in Figures 1 through 8 in Appendix D-9 (Analysis of Results from Daily and Monthly Water Balance Models) of the Draft EIR/EIS and as modified in Response to Comment 118-34. The concentration of reclaimed water did not exceed the design discharge rate in any of the three water quality simulation years more than 1 percent of days.

Response to Comment 118-188

Comment Summary: The comment asks if the 99th, 99.9th and 100th percentile concentrations can be added to Table 4-2 to help evaluate impact?

The EIR/EIS authors agree to adding the 99th and 100th percentile concentrations in Table 4-2, but think there is insufficient difference between the 99.9th percentiles and the 100th percentile reclaimed water concentrations to warrant inclusion in Table 4-2.

The following changes are made to the Draft EIR/EIS:

Page 37, Appendix I-16.Table 4-2 is revised as follows:

Table 4-2.

Estimated Daily Average Reclaimed Water Concentration

	Existing discharge	1 percent design discharge	5 percent design discharge	10 percent design discharge	20 percent design Laguna discharge	20 percent design Russian River discharge	No Project	Geysers
Santa Rosa Creek								
50th percentile[a]	19	0[d]	6	11	35	0	29	0
95th percentile[b]	62	9[~~e~~d]	49	67	81[c]	2[c]	75[c]	6
99th percentile[b]	71	13[d]	56	69	83[c]	4	79[c]	7
100th percentile[b]	79	14[d]	61	76	84[c]	36	81[c]	8
Laguna at River Rd								
50th percentile[a]	8	0[d]	3	5	17	0	13	0
95th percentile[b]	38	4[~~e~~d]	26	43	61[c]	0.6[c]	53[c]	2
99th percentile[b]	47	5[d]	32	45	64[c]	2	57[c]	3
100th percentile[b]	58	6[d]	35	52	65[c]	16	60[c]	4
Russian River at Oddfellows								
50th percentile[a]	1	0[d]	0.3	0.6	3	2	2	0
95th percentile[b]	7	0.5[~~e~~d]	5	10	15	10	10	0.4
99th percentile[b]	10	1[d]	5	10	19	11	11	0.6
100th percentile[b]	10	1[d]	6	11	20	11	11	1
Russian River at SCWA Wohler intakes								
50th percentile[a]						3		
95th percentile[b]						11		
99th percentile[b]						14		
100th percentile[b]						14		

[a] 50th percentile concentration in normal hydrologic year (1961) is given.

[b] The maximum of the three ~~95th percentile~~ concentrations (dry, normal, wet) at particular percentile is shown. The maximum occurred in the dry year (1976) unless noted otherwise.

[c] highest ~~95th percentile value~~ concentration occurred in 1961, not 1976

[d] No discharge was projected to occur in 1976 under the 1 percent design discharge. Value would occur in 1961.

Response to Comment 118-189

Comment Summary: The comment asks what reliability design basis was used in the specification of discharge scenarios.

A 95% reliability was used. Refer to Responses to Comments 118-57 and 118-60.

Response to Comment 118-190

Comment Summary: The comment asks whether calculations were done for other values. The comment also asks how "model calibration uncertainties affect estimated algae concentrations, and their significance."

Calculations were not done for other values. Refer to Responses to Comments 118-57 and 118-60.

Model output that is presented in Appendices I-16 (Water Quality Impact Analysis Report Volume I - Text) and I-17 (Water Quality Impact Analysis Report Volume II - Figures) of the Draft EIR/EIS illustrates the sensitivity of model output to changes in model input. The following table identifies figures and tables in Appendices I-16 and I-17 where output is summarized for various changes in model input. The tables and figures cited in the following table describe the effect on algae concentration and other model output constituents.

Input Variable	Output Changes Summarized
Nitrogen concentration in reclaimed water	Appendix I-16 Table 4-29
Storage curve	Appendix I-16 Table 4-30, Appendix I-17 Figure 4-23, compare Figures 4-1 through 4-12 to Figures 4-24 through 4-35, Figures 4-36 through 4-39, Figures 4-40 through 4-43, and Figures 4-44 through 4-58
Background Nitrogen loads in the Laguna	Appendix I-17 Figures 4-59 through 4-62 for Laguna locations
Other wastewater discharges	Appendix I-17 Figures 4-59 through 4-62 for River locations
Hydrologic year	Appendix I-17 Figures 4-1 through 4-12, Figures 4-36 through 4-39, and Figures 4-44 through 4-58

Response to Comment 118-191

Comment Summary: The comment asks how "larger reclaimed water concentrations (e.g. for the 99th percentile)" affect the estimate of algae impacts shown in Table 4.3 on page 40 of Appendix I-16 (Water Quality Impact Analysis Volume I - Text).

Table 4-3 in Appendix I-16 contains the results of the simulation of water quality conditions under existing reclaimed water discharge conditions. Algae impacts are simulated over the full range of reclaimed water concentrations that occur during the simulation year. The 99th percentile year was not modeled.

Response to Comment 118-192

Comment Summary: The comment asks how diurnal dissolved oxygen concentrations would affect the findings of significance.

The model accounts for diurnal variations. Refer to Responses to Comments 118-148 and 8-21.

Response to Comment 118-193

Comment Summary: The comment asks how a project designed to meet a reliability objective higher than 20:1 or 95 percent would affect the values in Tables 4-5 through 4-11 on pages 68 through 110 of Appendix I-16 (Water Quality Impact Analysis Volume I - Text). The comment also asks how the values in Tables 4-5 through 4-11 in Appendix I-16 (Water Quality Impact Analysis) would be affected if a less frequent and higher reclaimed water concentration than that represented by the 95th percentile was used to evaluate for significance. Finally, the comment asks how a project designed to meet a reliability objective higher than 20:1 or 95 percent would affect findings of conductivity, cyanide and toxicity significance.

A project designed to meet a reliability objective higher than 20:1 has not been evaluated, as discussed on Responses to Comments 118-57 and 118-60. If a higher reliability objective was achieved in a different project by additional storage and irrigation land, design discharge would be unaffected. Design discharge would be unaffected at higher reliability because the additional storage and irrigation acreage would be sized to manage flows that are managed in this Project by the contingency program. Contingency discharge would be avoided by adding storage and irrigation lands to increase reliability. The values in Tables 4-5 through 4-11 in Appendix I-16 would thus be unaffected.

The values in Tables 4-5 through 4-11 on pages 68 through 110 in Appendix I-16 associated with a concentration higher than the 95th percentile would be higher than those shown for the 95th percentile concentration. Refer to Response to Comment 118-184.

As explained in the first paragraph of this response, the conductivity, cyanide and toxicity significance findings would be unaffected.

Response to Comment 118-194

Comment Summary: The comment is that mitigation measures are not clearly described in Appendix I-16 (Water Quality Impact Analysis), and repeats Comments 118-73 and 118-82.

Mitigation measures are described in Appendix I-16 (Water Quality Impact Analysis Vol. I) on pages 124 through 141 and in Section 2 of the Draft EIR/EIS. Inflow/infiltration reduction and additional irrigation acreage are not included as mitigation measures, as described in Responses to Comments 118-73 and 118-82.

Response to Comment 118-195

Comment Summary: The comment asks for maximum reclaimed water concentrations at Hacienda under mitigation operations.

No source of water input to the Russian River occurs between Hacienda Bridge and Oddfellows except during storm events (when the concentration of reclaimed water is low). Therefore, insufficient differences exist in the concentrations of reclaimed water at Hacienda and at Oddfellows to warrant inclusion of the concentrations at Hacienda Bridge. Refer to Response to Comment 118-187.

Response to Comment 118-196

Comment Summary: The comment states that the 99th, 99.9th and 100th percentile values should be added to Table 4.21 in Appendix I-16 (Water Quality Impact Analysis) Table 4.21.

The EIR/EIS authors agree that the 99th and 100th percentile concentrations should be added to Table 4-21, but think there is insufficient difference between the 99.9th percentiles and the 100th percentile reclaimed water concentrations to warrant inclusion in Table 4-21.

The following changes are made to the Draft EIR/EIS:

Pages 128 and 129, Appendix I-16. Table 4-21 is revised as follows:

Table 4-21.

Estimated Percent Daily Average Reclaimed Water Concentrations in Receiving Waters Resulting from Project and Mitigation Operations

	Exist-ing	1 percent design discharge		5 percent design discharge		10 percent design discharge		20 percent design Laguna Discharge		20 percent design Russian River Discharge		No Project		Geysers	
		Project	Miti-ga-tion	Project	Miti-ga-tion	Project	Miti-ga-tion	Project	Miti-ga-tion	Project	Miti-ga-tion	Project	Measures for the City's Consideration	Project	Miti-ga-tion
Santa Rosa Creek															
50th percentile[a]	19	0	0	6	0	11	0	35	11	0	0	29	6	0	0
95th percentile[b]	62	9[c]	19[a]	49	54[a]	67	72[a]	81[c]	83	2[c]	61	75[c]	77	6	3.1[a]
99th percentile[b]	71	13[d]	22	56	59	69	76	83[c]	87	4	82[c]	79[c]	79	7	6[d]
100th percentile[b]	79	14[d]	26	61	64	76	79	84[c]	89	36	86	81[c]	84	8	7[d]
Laguna at River Rd															
50th percentile[a]	8	0	0	3	0	5	0	17	5	0	0	13	3	0	0
95th percentile[b]	38	4[c]	8[a]	26	31[a]	43	49[a]	61[c]	64	0.6[c]	37	53[c]	55	2	1[a]
99th percentile[b]	47	5[c]	10[d]	32	34	45	52	64[c]	71	2	64[c]	57[c]	59	3	3[d]

Table 4-21.

Estimated Percent Daily Average Reclaimed Water Concentrations in Receiving Waters Resulting from Project and Mitigation Operations

	Existing	1 percent design discharge		5 percent design discharge		10 percent design discharge		20 percent design Laguna Discharge		20 percent design Russian River Discharge		No Project		Geysers	
		Project	Mitigation	Project	Mitigation	Project	Mitigation	Project	Mitigation	Project	Mitigation	Project	Measures for the City's Consideration	Project	Mitigation
100th percentile[b]	58	6[d]	12[d]	35	39	52	58	65[c]	76	16	67	60[c]	64	4	3[d]
Russian River at Oddfellows															
50th percentile[a]	1	0	0	0.3	0	0.6	0	3	0.7	2	0.6	2	0.5	0	0
95th percentile[b]	7	0.5[c]	1	5	5	10	10	15	21	10	15	10	19	0.4	0.2[a]
99th percentile[b]	10	1[d]	1	5	5	10	11	19	21	11	18[c]	11	26	0.6	0.5[d]
100th percentile[b]	10	1[d]	1	6	6	11	11	20	22	11	19[c]	11	27	1	0.6[d]
Russian River at SCWA Wohler intakes															
50th percentile[a]	0	0	0	0	0	0	0	0	0	3	.8	0	0	0	0
95th percentile[b]	0	0	0	0	0	0	0	0	0	11	14	0	0	0	0

Table 4-21.

Estimated Percent Daily Average Reclaimed Water Concentrations in Receiving Waters Resulting from Project and Mitigation Operations

	Existing	1 percent design discharge		5 percent design discharge		10 percent design discharge		20 percent design Laguna Discharge		20 percent design Russian River Discharge		No Project		Geysers	
		Project	Mitigation	Project	Mitigation	Project	Mitigation	Project	Mitigation	Project	Mitigation	Project	Measures for the City's Consideration	Project	Mitigation
99th percentile[b]										14	14				
100th percentile[b]										14	15				

a 50th percentile concentration in normal hydrologic year (1961) is given.
b The maximum of the three ~~95th percentile~~ concentrations (dry, normal, wet) at particular percentile is shown. The maximum occurred in the dry year (1976) unless noted otherwise.
c highest ~~95th percentile value~~ concentration occurred in 1961, not 1976
d No discharge was projected to occur in 1976 under the 1 percent design discharge. Value occurred in 1961.

Response to Comment 118-197

Comment Summary: The comment states that Tables 4-26 and 4-27 on page 136 and 137 in Appendix I-16 (Water Quality Impact Analysis Report Volume I - Text) show changes in the frequency of significant impacts, and that any changes in the magnitude of impacts are not shown in the tables.

Information about any the change in magnitude of the impact can be identified in Figures 4-36 through 4-62 in Appendix I-17 (Water Quality Impact Analysis Report Volume II - Figures) of the Draft EIR/EIS

Response to Comment 118-198

Comment Summary: The comment asks if Table 4-30 on page 140 of Appendix I-16 (Water Quality Impact Analysis Volume I - Text) includes differences between adverse and beneficial impacts that do not occur at the same time and place.

The adverse and beneficial impacts shown in Table 4.30 occur at different times and places.

Response to Comment 118-199

Comment Summary: The comment asks if all beneficial impacts affect the same parameters as the adverse impacts.

Each pair of columns shows net impacts on a particular variable, benthic algae, planktonic algae, turbidity, and the waste reduction strategy. This is described in Section 3.1 of Appendix I-16 (Water Quality Impact Analysis Volume I - Text) of the Draft EIR/EIS.

Response to Comment 118-200

Comment Summary: The comment states that the contingency program is not defined clearly.

The contingency program discussed in Appendix I-16 (Water Quality Impact Analysis Volume I - Text) of the Draft EIR/EIS is cited as that developed in Appendix D-10 (Water Balance Contingency Plan) and considered in Appendix I-8 (Russian River Water Quality Model).

Response to Comment 118-201

Comment Summary: The comment asks what the reliability requirements for contingency discharge are, what the percentiles for variable concentrations are, and what distribution of target storage is used to derive Table 4-32 Appendix I-16 (Water Quality Impact Analysis Volume I - Text).

The reliability for the year in which contingency discharge impacts was simulated (1977-driest year on record) is 20:1, which is the same as for all other years. Figures 4-40 through 4-43 in Appendix I-17 (Water Quality Impact Analysis Report Volume II - Figures) of the Draft EIR/EIS show the cumulative frequency distribution for 1977 when contingency discharge would occur. The storage curve used with contingency discharge in 1977 was the same used with design discharge in all other years. The storage curve and reliability basis for contingency evaluation is stated in Appendix I-8 (Russian River Water Quality Model) and again on page 141 in Appendix I-16 (Water Quality Impact Analysis Volume I - Text) of the Draft EIR/EIS.

Response to Comment 118-202

Comment Summary: The comment asks if analysis of alternative reliability design objectives and storage curves were used.

The 20:1 reliability design objective is a fundamental characteristic of the Project description, and evaluating for different reliability changes would constitute evaluation of a project other than that described in Section 3 of the Draft EIR/EIS. The mitigation evaluated in Table 4-32 on page 144 in Appendix I-16 (Water Quality Impact Analysis Volume I - Text) of the Draft EIR/EIS is based on a different storage curve than that in the Project description, as indicated in Appendix I-8 (Russian River Water Quality Model) and on page 126 of Appendix I-16. Refer also to Response to Comment 118-201.

Response to Comment 118-203

Comment Summary: The comment asks how values in Table 4-32 of Appendix I-16 (Water Quality Impact Analysis Volume I - Text) change if project reliability is increased.

Different reliability requirements have not been evaluated. Refer to Response to Comment 118-202.

Response to Comment 118-204

Comment Summary: The comment asks if analyses were performed with "higher percentiles" and different storage curves.

Refer to Response to Comment 118-202.

Response to Comment 118-205

Comment Summary: The comment asks if the values in Tables 4-35 through 4-37 on pages 147 through 150 Appendix I-16 (Water Quality Impact Analysis Volume I - Text) are based on the values in Table 4-34.

Table 4-34 provides the basis for the results in Tables 4-35 through 4-37.

Response to Comment 118-206

Comment Summary: The comment asks what the impact on values in Tables 4-35 through 4-37 in Appendix I-16 (Water Quality Impact Analysis Volume I - Text) would be if Table 4-34 values changed in response to higher reliability requirements, different storage curve and "higher percentiles."

The effect of a different storage curve is included in Tables 4-34 through 4-37 on pages 147 through 150 in Appendix I-16 of the Draft EIR/EIS, and is identified as "mitigation operations." Higher reliability requirements have not been evaluated, but higher reliability would reduce or eliminate contingency discharge. The reference to "higher percentiles" is unclear and therefore no response can be made to this part of the comment.

Response to Comment 118-207

Comment Summary: The comment summarizes other comments and suggests collection of more field data for model validation, calibration and reliability.

The professional opinion of the EIR/EIS authors is that sufficient data were available to calibrate the model given the purpose for which the simulations are being used. This professional opinion is based upon over 40 years of collective experience on the part of the modelers. Refer also to Responses to Comments 118-112 through 118-164, and to Master Response 5, which is located in Section 6.2 of this document.

Response to Comment 118-208

Comment Summary: The comment summarizes other comments and asks for an analysis of algal blooms, diurnal and reclaimed water travel time.

These items have been evaluated, as described in the Responses to Comments 118-153, 118-159 through 164, 118-148, 118-120 through 118-122.

Response to Comment 118-209

Comment Summary: The comment asks if all water balance calculations are based on the daily model.

All impact analyses in Appendix I-16 (Water Quality Impact Analysis Volume I - Text) of the Draft EIR/EIS were based on reclaimed water concentrations from the daily water balance model.

Response to Comment 118-210

Comment Summary: The comment summarizes other comments and asks for an analysis of I/I reduction .

Refer to Response to Comments 118-16 through 118-28.

Response to Comment 118-211

Comment Summary: The comment summarizes other comments and asks for an analysis of revised target storage requirements.

Two different storage curves are evaluated in the Draft EIR/EIS. Refer to Responses to Comment 118-39 and 118-202.

Response to Comment 118-212

Comment Summary: The comment summarizes other comments and asks for an analysis of increased irrigation acreage and application rate.

Refer to Responses to Comments 118-57 through 118-89.

Response to Comment 118-213

Comment Summary: The comment summarizes other comments and asks for an analysis of higher reliability.

Refer to Responses to Comment 118-57 through 118-61.

Response to Comment 118-214

Comment Summary: The comment summarizes other comments and asks for evaluation of impacts at dilution rates that are less frequent that the 95th percentile that was used to evaluated for significant impacts of conservative constituents.

Refer to Response to Comment 118-184.

Response to Comment 118-215

Comment Summary: The comment summarizes other comments and asks for evaluation of impacts assuming that the River must reach a particular flow prior to initiating discharge in the fall of the discharge season.

The 1,000 cfs restriction that currently constrains initiation of discharge in the fall is not part of the Basin Plan and therefore the simulation of operations of the discharge alternatives need not and does not account for such restriction. The handling of the 1,000 cfs restriction is described on page 30 in Appendix I-8 (Russian River Water Quality Model) and page 38 in Appendix I-16 (Water Quality Impact Analysis Volume I - Text) of the Draft EIR/EIS.