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SUBJECT: Forwards *EPP Update of Environmental Report*

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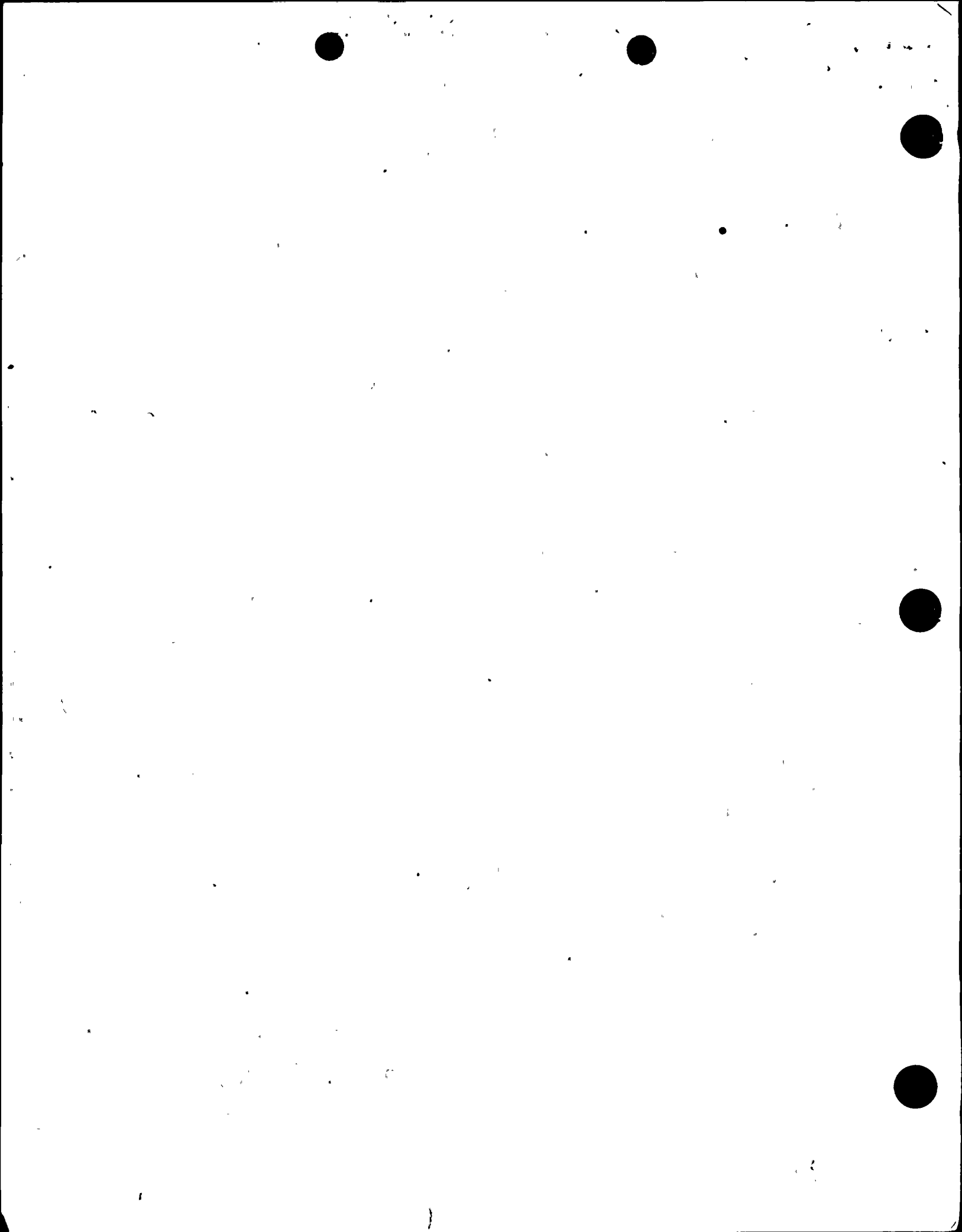
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Robert P. Powers
Vice President—Diablo Canyon
Operations and Plant Manager

December 30, 1997

PG&E Letter DCL-97-604



U.S. Nuclear Regulatory Commission
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Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Update of Environmental Report, Diablo Canyon Units 1 and 2

Clean Water Act Section 308, Thermal Effects Monitoring Program Comprehensive
Assessment Report
Chapter 1 - Changes in the Marine Environment Resulting from the Diablo Canyon
Power Plant Discharge

Dear Commissioners and Staff:

Pursuant to Section 3.2(I) of the Environmental Protection Plan (EPP), enclosed please find a copy of the final Diablo Canyon Thermal Effects Monitoring Program (TEMP) - Comprehensive Assessment Report, Chapter 1 - Changes in the Environment Resulting from the Diablo Canyon Power Plant Discharge.

This document has been reviewed by the Diablo Canyon TEMP technical subgroup (including PG&E), as well as members of a multiagency work group and the Diablo Canyon interested parties-list. Included with this submittal is a listing of the comments received during the final draft report review period and the resulting responses to those comments. Those comments by PG&E/Tenera were reviewed with Michael Thomas of the Central Coast Regional Water Quality Control Board (CCRWQCB) and his consultant, Mike Foster, on December 12, 1997, prior to inclusion in this final report.

Please note that Chapter 2 - Assessment of Thermal Effects, will be submitted on January 30, 1998 as agreed to with the multiagency work group. A draft of this document is presently being reviewed by the multiagency work group. Submittal of Chapters 1 and 2 will complete PG&E's obligation for submittal of a final thermal effects comprehensive assessment report.

Additionally, PG&E would like to note that in PG&E Letter DCL-96-166 (August 2, 1996 - entitled "Request for Update of Environmental Report for Diablo Canyon, Units 1 and 2"), PG&E stated the NRC would be provided with courtesy copies of the Semi-Annual Ecological Monitoring Program (EMP) Status Reports.

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PDR





U.S. Nuclear Regulatory Commission
December 3, 1997
Page 3

cc (with enclosures):

Steven D. Bloom
Ellis W. Merschoff
David L. Proulx

cc (without enclosures)

Kenneth E. Perkins



U.S. Nuclear Regulatory Commission
December 3, 1997
Page 2

The last PG&E submittal to the NRC that included a Semi-Annual EMP Status Report was PG&E Letter DCL-97-513, dated February 13, 1997, and entitled "Discharge Monitoring and Reporting Program Diablo Canyon Power Plant - NPDES No. CA0003715". The next semi-annual EMP status report, which would have covered the winter of 1996 and spring of 1997 time frame, has yet to be issued at the request of the CCRWQCB staff. The CCRWQCB staff plans to revise DCP's Discharge Monitoring and Reporting Program requirements in 1998 to reflect new reporting requirement(s). The NRC will be notified as required per section 3.2 of the EPP regarding these changes and/or additions when they are formalized.

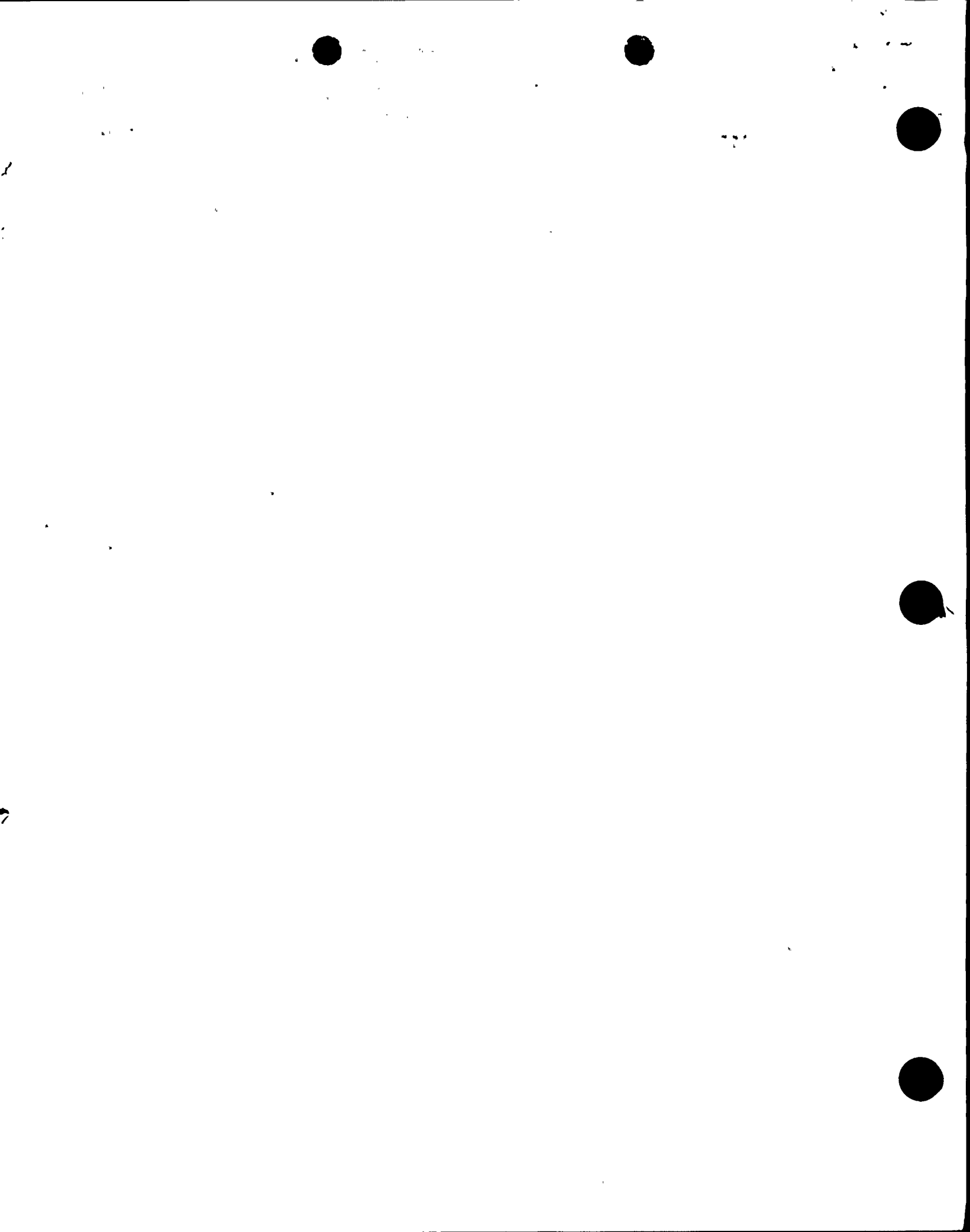
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

J. E. Molden for

Robert P. Powers

Enclosures



Response to Comments

Diablo Canyon Power Plant Thermal Effects Monitoring Program Analysis Report Chapter 1 - Changes in the Marine Environment Resulting from the Diablo Canyon Power Plant Discharge

Changes to the October 1997 final draft of the *Thermal Effects Monitoring Program Final Report Chapter 1 - Changes in the Marine Environment Resulting from the Diablo Canyon Power Plant Discharge* were made based on comments received from outside reviewers and a final internal review by PG&E and Tenera. These changes are summarized below where the comments from each reviewer are addressed separately.

The greatest number of editorial changes to the final draft resulted from changes to the figures which present the spatial extent of effects of the discharge on different biotic categories as maps. These maps appear extensively in the Summary and Sections 3.0 and 4.0. The maps showing effects on intertidal plants, invertebrates and fishes were changed to show the area of observed effects as two areas: one with greatest observed effects; and the other with reduced observed effects. This separation was done based on quantitative and qualitative observations on the responses of organisms and on results from temperature studies showing reduced plume contact and delta °T in these areas. Also the captions on all the maps were changed to represent the areas with reduced plume contact with no observed effects as areas with "unknown effects that are likely to be less than those in areas with reduced effects." The final wording and configuration of the effects maps was agreed upon by PG&E, Tenera, the Regional Board staff and their consultants. The changes to the maps resulted in changes to the text where the maps or spatial effects were discussed. These changes were too numerous to list individually and are therefore documented below by citing the sections in which they occurred.

Finally, numerous editorial changes were made during final reviews of the text that included corrections for punctuation, spelling, etc. that did not change or add to the context or meaning of the report. All of these changes as well as those discussed below are documented in drafts of the report.

Response to comments

(Each comment received is restated in *italics*, and is followed by the response.)

Reviewer: Michael Thomas, Central Coast Regional Water Quality Control Board
Date Received: November 4, 1997 / e-mail

1. The 1973 final Environmental Statement and its 1976 Addendum use OF units to describe thermal plume predictions. On maps of the discharge plume (Figure S-4, S-5, 2-5, 2-6) , include OF for comparison purposes. Figure will be revised to include Fahrenheit scale.

2. The Summary and text tables showing increases and decreases in taxa state that X number of Y taxa were "analyzed" statistically. This could be misleading, since all taxa were analyzed to some degree. X number simply met the criteria for BACI and Fisher's Exact test, and, that X number made up 99% of the taxa observed. Correct? If so, this should be stated on the table. For those taxa where test results were inconclusive, you note that "the taxon was too rare or too variable

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for the statistical test to detect changes in abundance between the pre-operation and operation phases." It seems that the same could be said for the "other" taxa that were not analyzed via BACI and Fisher's because they did not meet the criteria... yes? For example, see Table S-4: "39 of 109 taxa sampled were analyzed statistically." For 12 taxa, the results were inconclusive. It seems that this table is saying that in reality, the number of taxa where results were inconclusive is $109-39=70$. So, results were inconclusive for 70 taxa? If so, the table should so state. The tables should "stand alone." A footnote will be added to these tables to state that remaining taxa did not meet the abundance criteria for BACI analysis. The word "rare" will be struck from the text, but high variance is a legitimate explanation for inconclusive results, and this will be retained.

3. The coastal kelp surveys shown in Figure 4-19 appear to have no value with regard to analyzing impacts from the power plant. Can you change the scale to show more detail in the area we are concerned with? The text will be revised to better explain how the data from Figure 4-19 will be used. Only data from three operational surveys were completed processing at the time the report was completed. These data did not provide an adequate basis for statistical analysis for discharge effects, therefore the data were analyzed qualitatively.

4. We seem to have little understanding of the actual spatial impact to kelp. Figures S-9 and 4-18 show the observed and extrapolated areas of impact for kelp-- the extrapolated area goes out to the 60ft contour north of Diablo Cove, but does not go to the 60 ft contour at the mouth of Diablo Cove and to the south. Why? The kelp survey data from Figure 4-19 shows kelp as present consistently in these areas from Oct 1981 to June 1989. The text says that data from Figure 4-19 (referred to as "GIS mapping") was used to provide estimates of spatial impacts to kelp. Please check this apparent inconsistency. Edit Figures S-9 and 4-18 so that they can "stand alone." The figure legend states that the area of unknown or extrapolated effects based on surface plume contact only includes areas with rocky substrate that can support bull kelp. The area in front of the south entrance to Diablo Cove is all sandy bottom. Figure 4-19 also shows that bull kelp is absent in the area in front of the cove.

5. You need to clarify the scale of coastal maps used to determine the length of coastline impacted. During John's presentation on Oct 22, Tenera staff noted the scale as 1:24,000. This is unlikely because the USGS generally distributes base maps at 1:250,000 or 1:100,000. Actual 1:24,000 base maps are rare for rural areas unless they were digitized or obtained by special order. Sometimes maps are called 1:24,000 when they are extrapolated from the smaller scale, in which case the original data is not really 1:24,000. This is not critical but the correct original scale should be noted. The scale printed on the USGS maps that were used is 1:24,000, but we have no way of knowing whether or not these were extrapolated from a 1:250,000 scale. The important point is resolution, not scale. A finer resolution (from an approximately 1:9,000 scale map) was used for digitizing the shoreline in the immediate vicinity of Diablo Cove. USGS maps were used for digitizing the coastline beyond the immediate vicinity of Diablo Cove. Additional text will be added to the methods, and explanations will be added to shoreline distance references, to clarify which scales were used for the various shoreline distance calculations.

6. The scale on Figure S-2 is wrong (should be meters instead of kilometers). The figure will be revised.

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Reviewers: Dr. Michael Foster, Moss Landing Marine Laboratories
Dr. David Schiel, University of Canterbury
Date Received: November 9, 1997 / e-mail

Overall, this report does a good job of incorporating prior comments, reads well and is understandable. The following comments are mostly minor, but contain some points for consideration in revision. The major additions to this version of the report are maps showing composite surface thermal plumes, maps indicating extent of discharge effects (area or length of coast), and data on coast-wide kelp distribution including digitized maps of the kelp canopy on 4 dates. The maps of the plume and discharge effects are very helpful in determining effects caused by the discharge, but those on plume distribution need to be better justified as 'representative' (see comment 8. below). The purpose and value of the canopy information is questionable (see comments 27. and 29. below).

Specific Comments:

1. *S-1: Text indicates a Chapt. 2 Assessment Report but, as yet, this chapter has not been made available for review. A draft of The Assessment Report (Chapter 2) was presented to the Technical Work Group on December 1, 1997.*
2. *Fig. S-1: Since we now know that thermal effects extend to Fields Cove and beyond, it would be good to have nearshore bathymetry for this region as well as south to just beyond Patton Cove. Detailed nearshore bathymetry is unavailable for Field's Cove, but 30 ft and 60 ft depth contours are shown on Figure S-2 that include Field's Cove.*
3. *Fig. S-2: Check symbols. As I interpret these, they indicate subtidal algae and invertebrates were not monitored at North Control? Fields Cove? This is correct. These data were not analyzed statistically in the present report.*
4. *Appendix E: Station names and abbreviations should be listed, or reference to a list/map made at the beginning. Otherwise, what and where is NDC-4? All station names and abbreviations are listed in Appendix B.*
5. *Fig. S-6&7 (and related figs. in rest of report): Rocks and 81-100% both black. Might pick another symbol for rock and shore. Figure will be revised.*
6. *S-8 and general for shore length calculations: As noted in the last meeting, should indicate what scale of resolution is being used for coastline lengths and how lengths were actually determined (state methods in intertidal section). References to 1:24,000 or 1:9,000 scale maps will be included on figures. The methods will be revised to clearly explain the differences in resolution used in shoreline distance calculations.*
7. *S-4, or thereabouts: Mention that several survey methods were used, each targeting particular species and areas. Otherwise, readers are suddenly faced with HBT (Tab S-3), RPC & SAQ (S-4), SFQ (S-7), etc. Fig S-2 has AFAS. Probably need just a mention of the various techniques so that they have been seen before appearing in figure and table captions. Text revised in summary to introduce methods to the reader.*



8. S-8 and 2-9: Methods to produce composite plume maps (Fig. S- 6&7 and 2-7&8) from 40 temperature surveys are discussed, and it is stated that these surveys reflect a wide range of environment and plant conditions. This suggests these maps are a valid indicator of average conditions. However, a look at some of the data in Appendix C indicates many surveys were done when one unit was running at 100% and the other at 0%. So, the question is, do the composite maps truly represent average conditions or are they biased by the data set used? This presumably could be checked (even statistically tested) by comparing average and variance of conditions during the 40 surveys (at least plant operation) with average and variance of conditions over the entire time plant has been operating. Such a comparison would provide quantitative justification for saying the 40 surveys are representative. Could show this analysis in a table in Section 2. Finally (and again), very unfortunate that there are not useful data to show temperature conditions along the shore. A new table (Table 2-1) will present environmental conditions and power plant output levels during tests used to develop 2°F and 4°F composite plume maps.

9. S-8 (first paragraph): It is stated that "less than half the area of Fields Cove beyond the north channel was contacted by the 2.2 deg C isotherm during 41-60% of surveys." How can this be said? There are no data on Fig. S-6 for Fields Cove. This statement will be removed from text.

10. Fig. S-9, page S-23: Shading degrees are not decipherable on the figure. Figure will be revised.

11. S-21: First two paragraphs discuss changes in algae following power plant start-up. Then, later on same page, talk about more changes. Are the second set of changes different in some way? What does the "also" mean? Text will be revised to clarify reference to "changes".

12. S-25, 11: "One hundred microinvertebrates *sampled on* two intertidal algal spp..." Why not name the two species: prominent and abundant in intertidal zone --- some brief indication about why you did this. Text will be revised to include taxon names and expand text on methods.

13. No comment received.

14. S-25, last paragraph: Need to point out that "discharge" effects compared more impacted (Diablo) with less impacted (Fields). Therefore, if compared with no impact station, effect may have been greater. Ditto on S-30 for intertidal fish. You do later explain that p values for these comparisons adjusted to be conservative, but this does not solve the potential problem of the discharge affecting both Diablo and Fields to the same degree. Adjusting p value would not help this problem. Text will be revised.

15. S-32, Fig S-11: Dark shade of caption does not match the figure (except for DCPP itself). Figure will be revised.

16. S-33, 14: "The intertidal *areas* ...have...". Text will be revised.

17. S-33: Might consider discussing Temporal Extent of Effects a bit more, breaking effects down by habitat (intertidal, etc.) and/or group (fish, etc.). Text will be expanded to discuss temporal extent by group.



18. 1-9, paragraph 4: Indicates early sampling of subtidal stations at Fields Cove discontinued before plant operation. However, Appendix B2-9&10 shows NO SAMPLING prior to 1988 at Fields Cove. Are there any subtidal pre-op data from Fields Cove? Clarify. The text was in error. There was no pre-operational sampling in Field's Cove.

19. 3-16, Fisher's exact test: When you use contingency tables, how did you decide whether species increased, decreased or stayed the same? Was this regardless of magnitude of the difference between abundance and control mean? Was "equal to median" an exact match, or what? "Equal to median" was an exact match. Text will be revised to clarify methods.

20. 3-19, T 3-2: Something is still missing from this table. Presumably, the double listing of algae and invertebrates is for the two tidal heights. Please indicate this. Table will be revised.

21. 3-27, T 3-4: In all of these tables where you list "diversity", it would be helpful if you put "(H)" after "diversity" so that it is clear what the difference is from the "number of taxa" listed below. Tables will be revised.

22. 3-48, T 3-8: Why was there no listing or test for diversity (H') for inverts in the HBT study? It was determined that, based on published literature, diversity calculations would be of little value for invertebrate summaries because of the wide range of classification levels and invertebrate types in the samples. Diversity calculations are more meaningful when applied to narrower taxonomic groupings such as algae or fish.

23. 3-74, T 3-12: It is a wee bit confusing to state that 314 invert taxa were sampled, when table does not show this figure. Presumably, this is because of overlap between the two categories (in this case, algal substrata). Would it be helpful to add a line (or two) in each of these types of tables, listing "Overall total of taxa analyzed"; put number in the middle, between totals for each category? Also, "Overall taxa sampled". Not quite sure why you do not list 439 taxa (=discrete species) instead of 302; 251 instead of 177 for "taxa sampled" in last line of table. Isn't this meant to show simply the number of taxonomic units you found (in this case species)? The table does include the number of 314 taxa in the "Notes" column, as well as a brief explanation of how the number was derived.

24. 3-79, F 3-38: Graphs much easier to understand now. However, one insert caption is confusing. Could you change to read "Field's Cove and Pre-Operation Diablo Cove" (i.e., both are not pre-op, as they are in F 3-43)? Caption will be revised.

25. 3-115, 2nd para, l2: "lacking detailed *experimental* studies...". Text will be revised.

26. 3-118, para 4, l1: "... to feed occasionally...". Text will be revised.

27. 4-7&15 Coast-wide kelp study: There is no reason given for kelp overflight surveys! AGAIN, this report is supposed to be about effects of the thermal discharge: what is the purpose of this study???? Why was a BACI analysis not used? Why was the entire coast examined back to 1969 vs. looking at impact and similar sized control areas back to 1976 as for other analyses? If there was not enough time to complete this work, why not at least do some simple impact-control comparisons? T 4-7 does show some quantitative, graphical comparisons that could be used to at least qualitative discuss possible impacts. There is no discussion of why this particular approach was taken. Why were these particular sections picked (and where is "Crowbar?")? Even if



incomplete, this section should be re-done to focus on impacts. It is unfortunate that the two major species of surface kelps cannot not be distinguished. Text will be added to state the purpose for the studies, and describe the types of analyses that were able to be completed with the data.

28. 4-38, F 4-18: *Cannot distinguish darker shading in the figure. Figure shading will be revised.*

29. F 4-19, p 4-39: *The value of this figure is questionable.*

1) Cannot distinguish kelp species, which is one of the major points we need to know about. Can the kelp species be distinguished "pre-digitized"? 2) it is a bit difficult to compare 2 October surveys with Jun and Jul surveys; this may simply represent seasonal abundance patterns. Given that photos were taken at different tidal periods and seasonal periods, the worth of these maps is very compromised. What does "photos in digital format unavailable" mean? Were the photos not taken? Were they not processed? Or what? This implies that the information exists, but is not being used. Also, Table 4-7 seems to indicate that data for all areas are available for at least the Jul 87 and Jun 89 dates. Not sure how the figures in the table reconcile with the kelp map. Discussion of the figure will be changed to include the limitations of the current data and the problems with comparing overflights from different seasons, as well as the effects of oceanographic conditions. The caption on Figure 4-19 will be changed to indicate that data from the areas marked as "unavailable", were actually either scanned and not processed, or not scanned. Table 4-7 only shows GIS results data for the four aerial overflights which were completed at the time of the report.

30. p 4-40, l5: *"... spatial extent of effect to algae..." This sentence reads poorly and needs some grammatical work, such as: "... occurred in two zones: the sea floor, where algal assemblages are attached, and the sea surface, where floating kelp canopies occur". Text will be revised.*

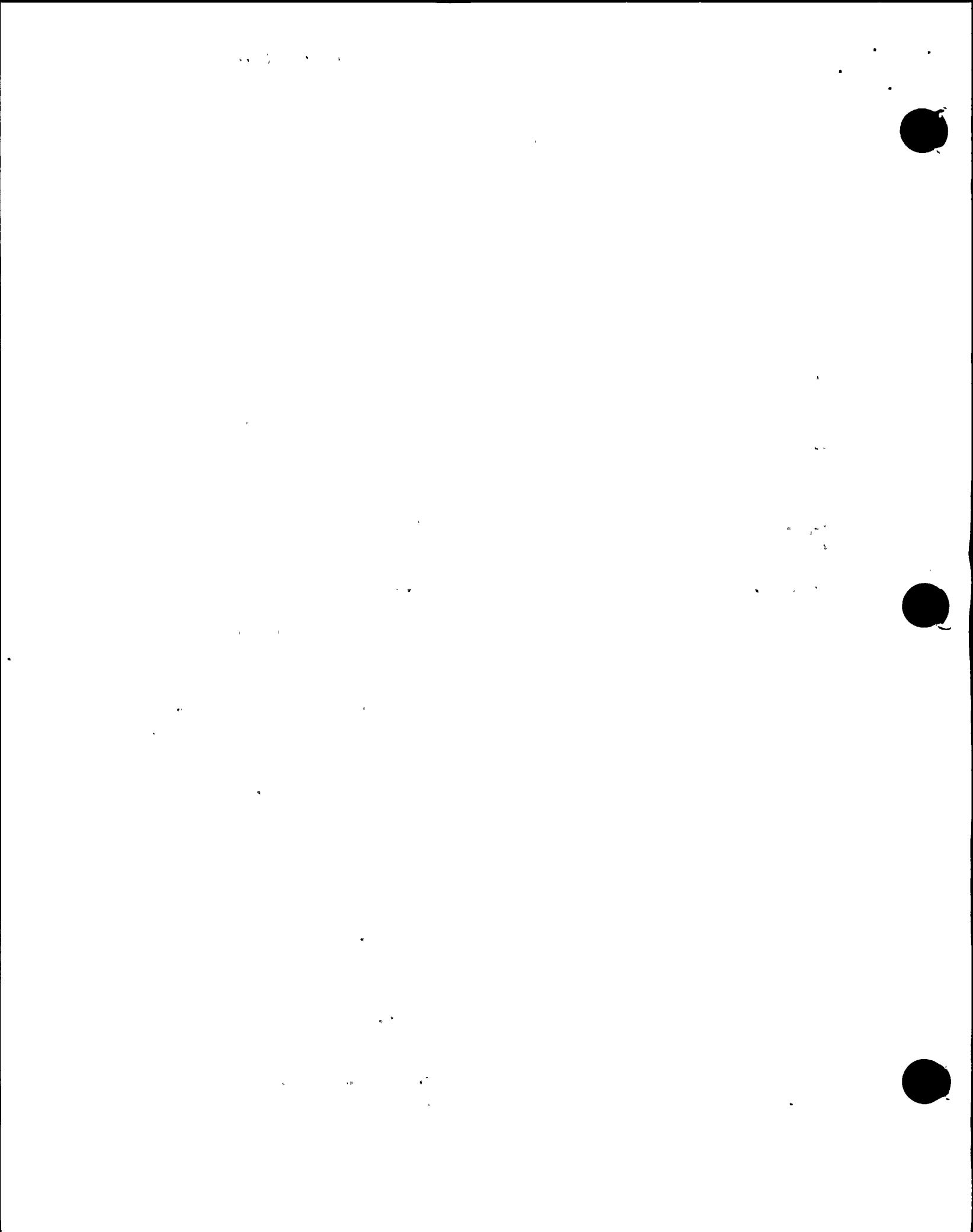
31. p 4-63, p 4-95, S purp: *This was discussed, but it is still a bit confusing. None of the sampling (e.g., tornado graphs) actually showed anywhere near the densities listed for inshore. Where did the 300 per m2 come from? Was this qualitative? Perhaps a brief sentence or phrase inserted on p 3-95 would help. This seems especially odd given that figures such as 4-50 (p 4-97) do not have S purp on them. The "sea urchin barrens" of F 4-34 (p 4- 65) were not really sampled (were they?). The huge % increase recorded in the BACI table is not seen in the complementary tornado graph. As the presence of these sea urchins is a major point, it may be worthwhile clarifying this a bit. A table will be added (Table 4-12: Densities of *Strongylocentrotus purpuratus* in three depth strata) and associated text will be added to address these points.*

32. 4-65, F 4-34: *Cannot distinguish major shadings. Figure will be revised.*

33. 4-83, F 4-45: *Bottom insert caption should read "North Diablo Cove Operation"?. Caption will be revised.*

34. 4-91, para 2, l3: *"... before power plant start-up and *the* following 10 years...". Text will be revised.*

35. *The "Literature Cited" was not checked to see if all references in the text were listed. It is a bit surprising to see that Glynn's classic paper on the fauna in Endocladia is not cited. The "Literature Cited" section has been cross-checked against all references in the text. The Glynn reference was consulted in preparing the AFAS section, but inadvertently omitted. It will be included.*



Reviewer: Ms. Deborah Johnston, California Department of Fish and Game
Date Received: December 4, 1997 / phone

1. *p S-1 para 2: There were only 11 years of data on effects of DCP, not 20.* The text will be revised to indicate that the 20 years of monitoring was on the marine environment, not only the effects of DCP.

2. *p S-1 para 3: Change location of reference to Assessment Report to previous paragraph.* Reference to the Assessment Report will be removed as the summary is specific to the Analysis Report, Chapter 1.

3. *p S-7 para 2: "intake <cooling> water".* Text will be revised.

4. *p S-7 para 3: in reference to foam add... "immediate area <and areas adjacent to> the discharge".* Text will be revised.

5. *p S-29 para 1: Need to add HBT data showing black abalone abundances.* These data appear in Appendix E1, but the data will be brought forward in the main body of the text and described in the intertidal results section on black abalone.

6. *p S-29 para 1: it was not documented that North Control and Stillwater Cove were not contacted by the thermal plume.* Because these were reference stations, there were no other stations to compare them with, but numerous lines of evidence indicate that there were no detectable temperature increases at these stations attributed to the thermal discharge.

7. *p S-33 para 1: the magnitude of the effects observed outside of Diablo Cove were less except for WS in black abalone.* Actually the incidence of WS also decreases outside of Diablo Cove and therefore this statement is consistent with the data.

8. *p S-33 para 5: the actual plume can be much larger than the 2°F isotherm.* Although this is true the only data available is on the extent of the 2°F isotherm. We have no information on the actual extent of the plume at lower temperatures.

9. *p 1-4 para 2: since DCP is the only power plant with a shoreline discharge the comments are not applicable.* The Yankee Atomic review referenced in the paragraph also includes data from east coast plant with shoreline discharges.

10. *p 1-5 para 3 and 1-8 para 3: Statement on p 1-8 appears to conflict with statement on 1-5 since a number of studies did not have control data outside the area contacted by the plume.* The text will be changed to qualify the statement on p 1-8.

11. *p 1-10 para 1: Delete last sentence.* Sentence will be changed to state that effects are less in Field's Cove than Diablo Cove.

12. *p 2-4 Figure 2-3: Change axis legend to read "Increase in degrees.."* Axis legend will be changed accordingly.

13. *p 2-5 para 3: Where's the data to support the stabilizing of the delta T.* The data was submitted to the Regional Board staff under separate cover.



14. p 2-8 para 2: *Data seem to show increases at Diablo Rock, during heat treatments.* Heat treatments were discontinued in 1989 and during heat treatments discharge volume was decreased. No increases in temperatures were observed at our monitoring stations during heat treatments.

15. p 2-17 para 1: *Figure shows plume is offshore from control stations.* Figures actually show frequency of plume contact - text will be reworded to clarify the presence of the plume in those areas.

16. p 2-22 para 4: *Remove the word rarely from last sent.* Figures show frequency of plume contact and plume was observed contacting these areas during only 1-20% of the 40 surveys.

17. p 3-33 Table 3-5: *Add delta T's observed at the stations to BACI tables.* Tables will be changed to include temperature data.

18. p 5-1 para 2: *last sentence too broad. Change to phyto- and most zoo-* Text will be changed accordingly.

19. p 5-2 para 4: *last sentence very vague - what types of secondary or combined effects.* Text will be changed.

Reviewers: PG&E/Tenera
Date Received: December 8, 1997 / meeting

Note: all references to sections and page numbers below were from an interim draft that was completed following inclusion of the comments from outside reviewers into the October 1997 draft.

1. p S-7 para 3: Text was added to further clarify the changing dynamics of the plume due to tidal height and the effects of the ridges in front of the discharge structure.

2. p S-7 para 4: Text was changed to reflect that the plume actually moves towards Diablo Rock under low tide and not out the north entrance.

3. p S-7 para 4: Text was added to describe the predominately summer conditions under which the plume photos were taken, and that winter conditions would change the configuration of the plume.

4. p S-8 para 1: Text was added to clarify how the data was processed for the composite plume figures, and describe that the plume would never actually take the configuration shown in the figure.

5. p 2-6 para 3: Text was added clarifying the plumes action under low tide when the plume is "directed towards Diablo Rock, resulting in a portion of the plume exiting the north entrance to the cove."

6. p 2-10 para 3: Add text to clarify the data collected from the aerial IR surveys. The survey data only presents information on surface temperatures that can be misleading under some



conditions as it ignores the three-dimensional characteristics of the plume. Text was also added to further describe the conditions under which the surveys were conducted - summer conditions with low waves and wind.

7. *p S-1 para 2*: Changed to "20 years of monitoring data on the DCPD nearshore..."

8. *p S-6 para 1*: Changed to clarify that Fisher's exact test does not have the same assumptions of the BACI analysis.

9. *p S-7*: Added section on how distances were calculated and the differences between the scales used in calculating shoreline distances.

10. *Summary - Biological Responses to the Discharge* - All discussion in this section on extent of spatial effects was changed to reflect the changes to the maps. This was done to recognize that changes in the areas outside Diablo Cove were generally smaller in magnitude than changes in the cove. Changes in the areas with unknown effects would be expected to be even less.

11. *p S-25 para 32*: Added text to clarify that although Field's Cove was used as a reference station for the AFAS studies temperature monitoring there showed lower temperatures than those seen in Diablo Cove, and the plume contacted that area less frequently.

12. *p S-29 Abalone*: Changed length of coastline to reflect use of USGS 1:24,000 scale map distances.

13. *p 1-10 para 1*: Added last sentence to read "Also, quantitative and qualitative observations have shown that effects in Field's Cove are less"

14. *p 2-29 Methods - Offshore surface thermal plume mapping*: Added text to better explain the conditions under which the IR surveys were conducted that may bias the data towards calmer sea conditions. Also added text explaining the composite thermal plume survey figures represent a composite and that the extent of the plume shown in the figure would never occur.

15. *p 2-15 para 2*: Changed text to clarify the frequency in which areas offshore of control stations are contacted by the plume.

16. *p 3-26 Methods*: Added section on how shoreline distances were calculated - similar to text added to Summary.

17. *Section 3.3 Results*: Numerous sections of text on spatial extent of effects were changed to reflect the changes to the maps showing extent of effects. The changes included adding an additional entry to the tables showing the summary of discharge effects at the beginning of each sub-section of results, changes to the map figures themselves, as well as changes to the text on spatial extent of effects.

18. *p 3-97 last para*: Changed the distance of shoreline observed with WS to reflect USGS 1:24,000 scale map distances.



19. *p 3-100 para 2*: Added text in the second paragraph to clarify that finding the protozoan probably responsible for WS helps explain the results of coccidian infection rates in the experiment.

20. *p 4-16 Methods - Kelp Overflight Photographic Surveys and Mapping*: Changed text to clarify use of GIS system in analysis of kelp overflight data.

21. *Section 4.3 Results*: Numerous sections of text on spatial extent of effects were changed to reflect the changes to the maps showing extent of effects. The changes included adding an additional entry to the tables showing the summary of discharge effects at the beginning of each sub-section of results, changes to the map figures themselves, as well as changes to the text on spatial extent of effects.

22. *p 4-34 last para*: Text was added to clarify the symptoms associated with early senescence in kelp.

23. *p 4-87 para 2*: Added text to clarify that the kelp survey was conducted during an El Nino year with warmer than normal ambient temperatures.

24. *p 4-90 para 3*: The text on surfgrass was changed to help explain the BACI results.

25. *p 5-3 last para*: Text was added to clarify that WS was first seen in the Channel Islands and later seen in Diablo Cove.

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