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MCAS EL TORO
SSIC # 5090.3

ORANGE COUNTY WATER DISTRICT

DUPLICATE

December 13, 1995

Mr. Andy Piszkin
Southwest Division Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, CA 92132-5190

SUBJECT: OCWD Comments on MCAS El Toro Draft OU-1 IAFS Report

Dear Mr. Piszkin:

This correspondence transmits herewith comments by the Orange County Water District (OCWD) on the MCAS El Toro Draft Interim Action Feasibility Study (IAFS) report for Operable Unit 1 (OU-1), dated October 15, 1995. We would be happy to meet with you to discuss these comments if this would be helpful.

Sincerely,

William R. Mills Jr., PE
General Manager

attachment

cc: Bonnie Arthur, US EPA Region IX
Larry Vitale, Santa Ana Regional Water Quality Control Board
Juan Jimenez, California Department of Toxic Substances Control
Bill Fallon, Congressman Robert Dornan's Office
Peter Uhlmann, Congressman Christopher Cox's Office
Bob McVicker, Irvine Ranch Water District
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General Comments

1. The IAFS report should clearly acknowledge that the costs presented are for comparison purposes only and do not reflect the potential cleanup costs required to attain remedial action objective maximum contaminant levels. The costs presented were based on a 40-year project life, which, as DON has stated, is likely to significantly understate the actual remediation period.

2. Although discussions between OCWD and DON have centered around a 40-year project life for the Irvine Desalter Project (and a baseline period on which to compare all remedial alternatives), it remains to be seen whether this period exceeds the actual useful life of the alternatives evaluated. Such dynamic factors as inflation, technological improvements, water pricing, energy costs, and regulatory standards may support a 30-year project duration, which DON has advised us is its standard for cost analysis. After 30 years (assuming the remedial action objectives are not met), all of these factors can be reevaluated and decisions can then be made as to what further actions are necessary.

3. The IAFS report should recognize that the selected remedial alternative should be allowed a reasonable level of operable flexibility during its project life, provided that the overall remedial action goals are being achieved. This flexibility could include the construction of additional injection or extraction wells, pipeline realignments, and treatment system improvements.

4. Alternatives presented in the draft IAFS, including Alternatives 2A and 6A, include the construction of two production wells in the Woodbridge area of Irvine. These wells would be capable of producing approximately 2,000 gpm. As such, the potential drawdown effects to nearby production wells, owned by Irvine Ranch Water District, the Irvine Company, and the Woodbridge Village Association, should be quantified.

5. The draft IAFS report documents reasonable methods and assumptions in estimating discharge rates and water quality (both organic and inorganic) from as-yet nonexistent extraction wells in the Shallow Groundwater Unit and Principal Aquifer. The uncertainties, however, associated with these assumptions could result in significant system modifications if these assumptions are substantially incorrect. It is incumbent upon DON to expedite the construction and sampling of any new extraction wells as soon as possible in order to verify the original flow and quality assumptions. Any extraction wells that are common between one or more preferred alternatives should be scheduled for construction as soon as practicable.

6. The draft IAFS should acknowledge that the alternative costs do not include inflation which would significantly increase operation and maintenance costs over the project life.

7. Costs for preparation of primary documents required by the Federal Facilities Agreement do not appear to be included in the draft IAFS alternative cost summary tables. These documents include Sampling and Analysis Plan, Quality Assurance Project Plan, Community Relations Plan, Remedial Design Work Plan, Preliminary Remedial Design, Final Remedial Design, Remedial Action Work Plan, Construction Quality Assurance Plan, Construction Quality Control Plan, Contingency Plan, Project Closeout Report, Federal and State Natural Resource Trustee Notifications, and Operation and Maintenance Plan. Cost estimates for preparing and obtaining regulatory approval/public comment on these documents should be provided in the draft IAFS.

8. At section 7.2.5.2, Compliance With ARARs, DON acknowledges that if it proceeds with Alternative 6A, some water treatment, in addition to VOC removal, will be required:

> "Additional requirements, such as Safe Drinking Water Act MCLs, state primary and secondary MCLs, and state action levels will apply to additional water treatment and distribution by IRWD. These additional requirements would not be ARARs, because the actions of IRWD in treatment and distribution of the water are classified as offsite, non-CERCLA actions."

However, at Section 7.2.5.7, Cost, DON has not included such costs in its cost estimate for Alternative 6A:

> "Costs [which may be] incurred by OCWD to treat the groundwater to potable quality by removing inorganic constituents are not included in this estimate. The inorganic constituents are not CERCLA hazardous substances and are not the result of activities by DON."

DON should include all costs of Alternative 6A in its evaluation of the alternative. This will present a more complete picture of this alternative. Further, DON's position that it is not liable for these costs is questionable for a number of reasons, including the following:

a. DON previously has acknowledged that activities at MCAS El Toro, including agricultural operations during the period of time when the property was owned by DON, have contributed to a release of TDS and nitrates to groundwater. Thus, there is a factual basis for DON's liability for treatment of these compounds.

b. Although the additional requirements imposed by Safe Drinking Water Act MCLs, state primary and secondary MCLs and state action levels, may not be ARARs because EPA classifies them as "off-site" actions, this treatment is an integral part of Alternative 6A and all or an appropriate percentage of the cost may be attributed to DON as a necessary element of the remedy. There is EPA precedent for requiring this type of treatment to

be included in the remedy. See, e.g., Record of Decision, Baldwin Park Operable Unit, San Gabriel Valley Superfund Sites, Los Angeles, California (March 31, 1994) at Section 10.1.1, page 43:

> "For treated water which will be put into a public water supply, all legal requirements for drinking water in existence at the time that the water is served will have to be met because EPA considers serving of the water to the public (at the tap) to be off-site. Complying with all applicable requirements for drinking water at the tap will also require attainment of the MCL for nitrate prior to serving the water to the public. Since these are not ARARs, these requirements are not "frozen" or fixed as of the date of ROD. Rather, they can change over time as new laws and regulations applicable to drinking water change. See NCP, 55 Fed. Reg. 8758 (March 8, 1990)."

c. DON's reluctance to pay an appropriate percentage of the cost of the further treatment, which will be required as a matter of law in order to implement alternative 6A, is misplaced. It appears to be based on a concern that if DON pays to treat nitrate and TDS in the water which it must treat for VOCs, then this will constitute a "windfall" to OCWD and its customers. OCWD's customers are the citizens of Orange County who have been adversely affected by the contamination which DON released to the Orange County groundwater basin. The fact that implementation of the preferred remedy for this contamination may benefit the citizens of Orange County certainly is no reason for DON to entirely avoid a significant cost of implementing the preferred remedy. Indeed, the benefit to the citizens of Orange County is a further reason for preferring Alternative 6A. DON should recognize that notwithstanding decades of future pumping and treating its VOC plume, as a practical matter its impact upon the groundwater resources of Orange County and upon Orange County citizens, will not be fully eliminated. There always will remain some low concentration of VOCs which are attributable to the DON operations. By providing an incidental benefit to the citizens of Orange County, through TDS and nitrate treatment, DON has an opportunity to overcome this permanent resource impairment and demonstrate that it can be a responsible citizen of Orange County.

Comments on Volume IV

1. P. ES-2: The third bullet item, "Prevent use of groundwater containing VOCs above cleanup levels for domestic use" should be modified to allow the use of such water for domestic and other purposes provided that adequate treatment is performed.

2. P. 1-16, 2nd para.: First and second sentences should be modified as follows: "This is the lower-most unconsolidated sediment sequence at the Station and consists of . . . silts and clays. This is the main aquifer used for water supply by IRWD and TIC to the northwest of the Station."

3. P. 2-11, last para. and p. 2-12, 2nd para.: The references to the "on-Station treatment system" should be qualified to indicate that this system is only part of some of the alternatives evaluated.

4. Page 4-6, 2nd para.: The reference to "extracted shallow groundwater pretreated on-station" should be deleted, as it is not part of Alternative 6A.

5. P. 4-12, 1st para.: We recommend that the word "approximate" be inserted before "16-inch-diameter wells. . ." in the event that 18-inch-diameter casing may be desired, as was the case with the four existing IDP wells.

6. P. 4-12, 1st para.: We recommend that the second sentence be modified as follows: ". . . using wire-wrapped or shutter stainless steel screen . . .". OCWD and IRWD have selected shutter-type or "louvre" screen for most of their recent production wells.

7. P. 4-41, 1st paragraph states, "The estimated water quality for inorganic constituents of the combined stream is presented in Appendix C and is within the design limits of the IDP treatment system as presented in the [March 1994 OCWD Irvine Desalter Project Preliminary Design Report] PDR." Our comments regarding estimated water quality of the influent stream entering the IDP treatment system are presented under "Comments on Volume VII" below.

8. P. 4-42, 2nd para.: The statement that "Groundwater treated at the IDP air strippers to remove VOCs is discharged to the remainder of the IDP treatment system." should be deleted or modified to include air stripping of VOCs following reverse osmosis as a design option in the IDP treatment system. Our analysis indicates that this option will provide a higher factor of safety in ensuring the removal of VOCs in the treatment process.

9. P. 4-42, section 4.2.11.5 ARARs (for Alternative 6A) should be modified to delete the reference to pretreatment of shallow groundwater for VOCs on station. This section should also be reworded to include the option of air stripping following reverse osmosis.

10. P. 4-43, last para.: The second sentence should be modified as follows: ". . . is reinjected after VOC treatment on station rather than . . .".

11. P. 4-47, Table 4-1, under Alternative 6A, granular activated carbon (GAC) adsorption should not be included, and GAC adsorption for air stripper offgas should be.

12. P. 4-50, Table 4-3: The draft IAFS report is inconsistent and/or unclear in its use of flow rates for individual extraction wells for Alternative 6A and presumably some of the other alternatives. We understand the rationale for using average annual extraction rates in the groundwater modeling simulations, however, when sizing well pump facilities, conveyance and treatment systems, actual operational flow rates must be used. These flow rates for individual wells under Alternative 6A (totaling 5,700 gpm) were not explicitly stated in the draft IAFS report. Further comments on this subject are presented below.

13. P. 4-77, Figure 4-7: The IDP treatment facility should be added to, and the on-station treatment system deleted from, the Alternative 6A map.

14. P. 4-79, Figure 4-8: The MCAS El Toro Project Extraction Well names in the legend should be changed to "18_EXT1D" and "18_EXT 2D."

15. P. 4-85, Figure 4-11: As recommended in Comments 8 and 9, the flow diagram should include the option of air stripping following reverse osmosis.

16. P. 5-5, 1st para.: It appears that the last portion of the first sentence should be deleted as follows: "The migrations of groundwater particles were traced from the edges of the 5-, 50-, and 500-ug/L TCE and 0.5 ug/L benzene concentration zones ~~and from the edges of the highest TCE concentration zone (above 50 ug/L)~~."

17. P. 5-10, 3rd para., 1st sentence: The statement indicating that the Shallow Groundwater Unit (SGU) extraction system will prevent downward migration of VOCs into the Principal Aquifer (PA) is unsupported by existing field data. Although we concur that extraction from the SGU will lessen the potential for downward migration, it will not necessarily prevent this from occurring. Other portions of the draft IAFS describe the lack of field data and uncertainties associated with the hydraulic relationship (i.e. inter-unit flow potential) between the SGU and PA. It was these uncertainties that led OCWD to construct wells IDP-1, -2, and -3 so that they would intercept groundwater exiting the station in both the SGU and PA in the event that downward migration does occur over time.

18. P. 5-13, 1st para.: The sentence "These results suggest that pumping of the OCWD remedial Principal Aquifer by the MCAS El Toro Project shallow extraction wells . . ." does not make any sense.

19. P. 5-19, last para.: "OCWD" should be replaced by "IDP" wells in the first sentence.

20. P. 7-10, 3rd para.: Are the costs of dual-wall piping and other possible containment facilities associated with RCRA hazardous waste incorporated into the costs for SGU remediation alternatives presented in the IAFS report?

21. P. 7-24, 4th para.: The sentence beginning with "The extraction components for the Shallow Groundwater Unit . . ." should be modified to delete the reference to on-station pretreatment for VOCs.

22. P. 7-25, 2nd para.: The second sentence states "In the event that groundwater from one or more of the on-Station extraction wells can be classified as hazardous waste, the associated extraction facilities and piping will be designed to comply with RCRA hazardous waste management criteria from the point of extraction to the point where the groundwater blends with groundwater from other extraction wells and it can no longer be classified as characteristic hazardous waste." Do the costs presented in the IAFS report include contingencies for this possibility?

23. P. 7-29, under section 7.2.5.7, 1st para.: The costs stated of $19.1 million capital and $0.9 million O&M are not consistent with costs presented in Appendix E. A calculation should be included that uses the costs from Appendix E. The present worth of $37.7 million is incorrect, not calculated correctly [$19.1M + ($0.9M x 19.7928) = $36.9M].

Volume VII (Appendices) Comments

Appendix C Comments

1. General: The flows and concentrations for most, if not all, of the alternatives are not clearly specified as based on annual averages or instantaneous (operational) flow rates. We believe the design of the conveyance and treatment facilities should be based on operational flow estimates. For example, numerous references and water quality calculations are made based on total flows of 1,260 and 2,000 gpm from the 31 proposed on-Station SGU and two proposed off-Station PA extraction wells, respectively. Assuming these are annual average flow rates, then operational flow rates would be approximately 1,400 and 2,220 gpm, given a 90% on-line percentage (used in the IDP PDR).

   Are the IAFS reported facilities costs and the water chemical concentration tables based on the operational flow rates? If not, we believe they should be and the associated text and water quality tables modified accordingly.

2. P. C-5, last para.: The first sentence should be modified to read "For inorganic compounds in the Shallow Groundwater Unit, a credible maximum concentration was calculated for TDS using only monitoring well values and applied to all inorganics . . .". The second sentence

refers to factors of 1.51 and 1.59, but it is not clear how these factors were determined or applied to the monitoring well data.

As the discharge options for Alternatives 2X and 6X depend on the inorganic and organic concentrations from the individual wells, we suggest that the credible maximum concentrations of inorganic compounds be calculated and presented in a table for the Principal Aquifer extraction wells.

3. P. C-6, 1st para.: The last sentence refers to Tables C-2e and C-2g which do not exist.

4. P. C-8 and C-10 (section C.3.1.1) and P. C-30 and C-31 (Table C-2a): The average concentrations calculated are weighted averages, but not flow-weighted averages, and the text and acronym (FWAC) should be modified to delete the reference to "flow".

5. P. C-28 and C-29, Table C-1g: The shallow groundwater concentrations listed in the flow-proportioned average and credible maximum value columns were considered. The calculation of the average values could not be checked, because the flow rates from individual sources were not included. For the inorganic concentrations (sections titled: "General Chemistry" and "Metals and Cyanide"), the flow-proportioned average was multiplied by a factor of 1.59 to calculate the credible maximum value. It did not appear that this 1.59 factor was to correct for future variations in the quality, so it probably has a different purpose than the PDR's 1.357 temporal increase factor.

   Table C-1g contains some inconsistencies: The $NO_3(N)$ concentration (credible maximum value) is listed as 30.2 mg/L and the NO_3 concentration is listed as 181; however, if $NO_3(N)$ equals 30.2, then NO_3 would be equal to 134 mg/L. The Mg concentration units are given as μg/L, but on other tables (for example, Table C-3e) the same value is given as mg/L. The mg/L unit is probably the correct one.

6. P. C-39 and C-40, Table C-3d: The chemical concentrations of the individual constituents for the listed IDP wells were compared to the concentrations listed for the same wells in PDR Table 3-1. It was determined that both sets of data were essentially the same for the parameters that were on both lists. However, the DON table did not include values for the following (listed in PDR Table 3-1 order): F, EC, pH, TOC, SiO_2, Total Hardness, Carbonate Hardness, Noncarbonate Hardness, Alkalinity, Langelier Index, Turbidity, Color, B, Br, PO_4, S, Temperature, SDI, and the radionuclides. Of these omissions, the more important parameters for the design of the IDP include F, pH, TOC, SiO_2, Turbidity, Color, SDI, and the radionuclides. Conservative assumptions with regard to possible concentrations of these and other water quality parameters from as-yet unconstructed extraction wells should be used when preparing preliminary facilities designs and costs.

In Table C-3d, the calculated flow-proportioned concentrations for the blended IDP wells for Alt 6A and 6B are listed. The flow rates for individual wells are not operational rates, so these flow-proportioned concentrations should be recalculated based on actual anticipated operational flow rates.

7. P. C-41 and C-42, Table C3-e: In the first column of data, the title should refer to Table C-1g, not C-1e. In addition, the values for "Metals and Cyanides" in column 3 are listed as "0.0" for all constituents. Values for these constituents should be taken directly from Table C-1g.

   Many of the values for "Metals and Cyanides" in column 4 are listed as "ND," and the flow-proportioned concentration which is calculated in column 6 is based on 0 μg/L for the "ND" cases. It would be more conservative to base the average concentration on the detection limit, rather that to assume all nondetected concentrations are equal to zero.

   The influent VOC concentrations from the SGU column should be based on the credible maximum VOC concentrations from Table C-1g, since no pretreatment for VOCs is included in Alternative 6A. Once revised flow-proportioned data tables are prepared, then OCWD will compare these with the IDP design criteria in the PDR for possible system design modifications.

Appendix D Comments

8. General: Treatment facilities should be sized based on operational flow rates rather than annual average flow rates. The operational flow rate of Alternative 6A is 5,700 gpm. We estimate the available reserve extraction system capacity for this alternative is 1,060 gpm, as outlined below:

Well Name	Alt. 6A Operating Rate (gpm)	Maximum Operating Rate (gpm)	Available Capacity (gpm)
ET-1	1,000	1,000	0
18_EXTD1	1,095*	1,095*	0
18_EXTD2	1,095*	1,095*	0
IDP-1	270	800	530
IDP-3	270	800	530
IDP-4	600	600	0

SGU Wells	1,370*	1,370*	0
Total:	5,700	6,760	1,060

*Assumed flow rate.

Should the total maximum operating capacity fall below 5,700 gpm, then additional unidentified water sources would be necessary to augment flows into the Alt. 6A treatment system.

9. P. D-13: The bullet items presented do not explicitly include a treatment option to nondetect for Alternative 6A (5,700 gpm).

10. P. D-27, 3rd para.: We concur with the sentence "Assuming that the shallow groundwater is not pretreated, the flow-weighted average concentration of TCE in the combined influent would be approximately 50 ug/L, with a credible maximum value of 72 ug/L - (see Table C-3e)." However, this table does not present these concentrations, probably due to problems described in Comment 7 above.

11. P. D-29, Table D-1: Table should include a column explicitly describing a combined SGU and PA 5,700 gpm VOC treatment system (Alternative 6A).

12. P. D-34, Table D-6: Applicable alternatives listed appear to be incorrect, as does the hydraulic capacity and pump capacity. Should these be Alt. 2B, 2C, and 2D and 3,000 gpm?

13. P. D-38, Table D-10: Title should be changed to " . . .Shallow Groundwater Unit. . ." rather than ". . . Principal Aquifer. . .".

14. P. D-40, Table D-12: Applicable alternatives appear to be incorrect for all three categories.

15. General: Cost tables, conceptual layout and flow diagrams should be included for a 5,700 gpm VOC treatment system (Alternative 6A). Existing tables and diagrams in this Appendix imply that there are separate SGU and PA treatment systems for all alternatives, which is not the case.

16. General: Do the Total Present Values for each alternative treatment system presented in Tables D-11, -13, -15, -17, and -18 reflect the highest, lowest, or other average TCE concentration O&M figures?

17. P. D-49, Table D-18: A column should be included for Alternative 6A (5,700 gpm).

18. P. D-59, Figure D-5: We believe that the "ET-1 Treatment Unit" should be deleted.

Appendix E Comments

19. P. E-3: Under conveyance costs (middle of page), it states "These costs are developed in Appendix F." They are not.

20. P. E-5: Under conveyance costs (middle of page), it states "The cost basis is shown in Appendix F." It is not.

21. P. E-6: Under section E.3.2 Present Worth Costs, the last sentence states "The present worth cost analyses were calculated assuming a 4 percent nominal discount rate, which incorporates inflation into the future costs." How does a 4 percent rate incorporate inflation? Please explain. Under E.4 Costs of OCWD Components, at the bottom of the page, it states "VOC treatment costs are not shown as individual components in the PDR; the cost of treatment pumps, blowers, and packing could not be determined." This is not true - blowers and packing are in Table 4 of Appendix C, T.M. No. 5, after page C-10 = $30,000 + $68,000. Pump costs for Case 1 are found in T.M. No. 5, Appendix D, first stage RO Product Transfer Pump (under 5.88 column) = $53,154, and in Case 1 EDR Conc. (under 1.48 column) = $23,658.

22. P. E1-11, Table E-2A (S) Summary Cost Estimate for Alt. 2A: see the attached tables marked-up with revised numbers. The present worth total is increased from $54.3 million to $59.3 million. The cost revisions suggested are for clarification, correction, and comparison purposes only and do not necessarily represent OCWD's estimate of actual costs for implementing this alternative.

23. P. E1-20, Table E-6A (S), Summary Cost Estimate for Alt. 6A: see the attached tables marked-up with revised numbers. The present worth totals were revised to $35.0 million and $41.3 million for DON's 0%/50% share range, respectively. The cost revisions suggested are for clarification, correction, and comparison purposes only and do not necessarily represent OCWD's estimate of actual costs for implementing this alternative.

24. P. E1-24, Table E-2A (L): Conveyance unit prices are not consistent with the PDR (need to be increased), and 28" steel casing for the crossing under Sand Canyon Avenue needs to be added. This increases the Conveyance cost. Also, telemetry costs for the PA extraction/treatment system are not included.

25. P. E1-25, Table E-2A (L): Telemetry costs for the SGU extraction/treatment system are not included.

26. P. E1-26, Table E-2A (L): PA extraction system O&M costs for conveyance and power for pumps is calculated in Table F-5 in Appendix F incorrectly and should be higher. Also, the

capital costs for the construction of new monitoring wells should be revised to include the first year reconnaissance monitoring costs for both the new and the Phase I and Phase II monitoring wells, as presented in Table G-4c.

27. P. E1-27, Table E-2A (L): O&M costs for the SGU conveyance power for pumps are calculated incorrectly in Appendix F, Table F-5, and should be lower.

28. P. E1-28, Table E-2A (L): Under Groundwater Monitoring, the annual monitoring cost for subsequent years (after the first year) should be revised to include monitoring costs for both the new and the Phase I and Phase II monitoring wells, as presented in Table G-4c. The Present Worth of these costs should be revised and updated in all dependent tables. It appears that this error occurs in all of the alternatives tables.

29. P. E1-71, Table E-6A (L): Under capital costs for PA conveyance, the unit costs are not consistent with the PDR (need to be increased), and the 20" PVC under pavement should not appear here, since it is a shared pipeline with OCWD. Well telemetry does not appear to be included. (Irvine Ranch Water District would monitor and control the system from their Michelson Operation Center.) For the Shallow Groundwater Unit, the line item "12" PVC under pavement" should be reduced to 1250 LF. See Table F-3 and Figure F-9. Well telemetry does not appear to be included.

    Under Groundwater Monitoring Wells, the capital costs for the construction of new monitoring wells should be revised to include the first year reconnaissance monitoring costs for both the new and the Phase I and Phase II monitoring wells, as presented in Table G-4e.

30. P. E1-72, Table E-6A (L): Capital costs ($130,000) for continuous flow analyzers (from PDR T.M. No. 9, Table 5) should be included here under OCWD Components. Also, Replacement costs were recalculated as follows: wellfield pump and motor cost from Table 2-2 of the PDR (column 1) for ET-1, IDP-1, 3, and 4, including 51.8% for contractor OH&P, contingencies, engineering and administration, yields $709,210. The present worth factor for 20 years at 4% interest is 0.4564, yielding a present worth of $709,210 x 0.4564 = $323,700. Replacement costs for pumps and blowers = $30,000 + $23,658 + $53,154 = $106,812, which must be replaced after 20 years. Present worth = 0.4564 x $106,812 = $48,750. Stripper packing (cost = $68,000) must be replaced after 10, 20, and 30 years, and so the present worth = $68,000 x (0.6756 + 0.4564 + 0.3083) = $97,940. Total present worth of pumps/blowers/packing replacement = $48,750 + $97,940 = $146,690.

    Under Annual O&M costs, Principal Aquifer, OCWD Components, the cost presented for the extraction system should be only for ET-1, IDP-1, 3, and 4 and is not consistent with the PDR. From Table 3 of T.M. No. 3, those four wells would have annual power costs of $37,000 + 22,000 + 25,000 + 20,000 = $104,000, but would run all of the time at 62.2%

flow (1990 ÷ 3200). ($104,000 ÷ 0.9) 0.622 = $71,900.) Maintenance of these wells plus rehabilitation will cost 4/7 ($20,000) + (4 x $5000)/3 = $18,100. Total annual extraction system O&M = $71,900 + $18,100 = $90,000. The additional O&M cost for untreated SGU groundwater of $21,000 is too low; we estimate this item to total $110,000. For existing well ET-1, the power cost is included in the above $90,000, so the $42,000 cost should be deleted.

31. P. E1-73, Table E-6A (L): The $10,000 listed at the top of the page for miscellaneous labor and parts for ET-1 is included in the previous $90,000 and should be deleted. Under "MCAS El Toro Components", conveyance to IDP facility, the correct monthly power used for each of the two deep aquifer wells is 65,800 kwH from Table F-5, and so for the year would be 2 x 12 x 65,800 = 1,579,200 kwH, considerably less than the 3,898,000 kwH listed. Similarly, under "Shallow Groundwater Unit", the power for conveyance should be 297,600 kwH, again considerably less.

32. P. E1-74, Table E-6A (L): Under Groundwater Monitoring the annual monitoring cost for subsequent years (after the first year) should be revised to include monitoring costs for both the new and the Phase I and Phase II monitoring wells, as presented in Table G-4e. The Present Worth of these costs should be revised and updated in all dependent tables.

Appendix F Comments

33. P. F-11, 1st para.: Under "Material Selection", at the end of the paragraph, our largest pipe is 20", and for reasons of corrosivity, we used PVC for that in the PDR. Under F.4.2 Well Pumps, second paragraph, second sentence, the height of the air stripper cannot not exceed 40 feet (TIC requirements). In the last sentence of the same paragraph, Figure 2 of T.M. No. 4 in the PDR shows that the ground elevation at well IDP-3 is 239 ft. (for the shallow groundwater unit treatment facility) and 131 ft. for ET-1, where the Principal Aquifer treatment facility for Alt. 2A would be located.

34. P. F-14: Under Important factors in limiting base costs, second bullet, there is no 36- to 42-inch diameter pipe.

35. P. F-15, 1st para.: Under "Materials", revise the third and fourth sentences to use PVC pipe for all pipes, and the largest pipe being 20-inch diameter.

36. P. F-16, section F.4.3.3: Flow rates vary to 1,200 gpm (not 4,500), and motor sizes vary to 150 HP (not 700 HP).

37. P. F-22 (Table F-3): Pipe segment P-13 length should be 7,100 feet, as shown on Fig. 2 of PDR T.M. No. 4. Also, 2,250 feet of pipe segment P-38 could be eliminated if 1,850 feet of pipeline from well IDP-3 were shared.

38. P. F-24 (Table F-5): Ground elevations are incorrect (except for SGU Extraction Wells) as are static lift, dynamic lift, and total lift, leading to incorrect monthly power calculations. See revised Table F-5 attached.

39. P. F-43 (Figure F-9): The location of wells IDP-1, 2, and 3 should be shown, as well as the pipeline from well IDP-3 along the railroad. The Proposed Treatment Facility should not be shown. The extraction pipeline from the location of the Treatment Facility to "Connection to IDP Pipeline" should be revised to connect to the pipeline from well IDP-3, eliminating approx. 2,250 ft. of 12" pipe (segment S-38).

Appendix G Comments

40. General: Estimated costs prepared by the DON for long-term ground water monitoring during remediation were evaluated. Because detailed ground water sampling methodology were not available for review, and because wells/constituents may be added to the program, the cost evaluation was considered preliminary. The estimated costs of ground water monitoring as presented in Tables G-4a through G-4e appear to be generally reasonable for the scope of work specified.

41. P. G-2: The second bullet item should be modified to state "Monitor the decline of groundwater elevations in the Shallow Groundwater Unit and in the Principal Aquifer."

42. P. G-4, 1st para.: Groundwater quality parameters to be monitored should include all constituents in the Santa Ana River Basin Plan, including TDS, $NO_3(N)$, Cl, Na, and SO_4.

43. P. G-9 (Table G-1): Objectives should include monitoring the decline in groundwater elevations in the Shallow Groundwater Unit and in the Principal Aquifer.

    The table makes reference to resimulating capture zones and reevaluating hydraulic containment using the CFEST model. We could not find a specific scope of work associated with these tasks, nor could we find any of the costs for performing these tasks in the cost summary tables. We concur that some type of continued groundwater modeling is necessary during the remedial actions, however this should be described in more detail and the estimated costs for each of the alternatives presented in the IAFS report. Consideration should be given to labor and hardware/software costs regarding porting the model to the selected end-user agency and allowing for adequate staff training on how the model is

structured, modified, and operated. We also suggest that the words "or approved equivalent code" be added to any statements recommending the use of the CFEST code.

44. P. G-12 (Table G-3): Station 18_BGMP08 ports do not agree with those listed on Figure G-1. Active production wells TIC-55 and TIC-111 located within or immediately adjacent to the TCE plume should be included in the groundwater monitoring plan as long as they are actively pumped. Proposed active IDP wells should also be included in the monitoring plan and shown on Figure G-1. Costs for water level and water quality monitoring should be included in the appropriate cost tables.

    Existing monitoring wells MCAS-4, -5A, -6, -8, -9, and -10 essentially delineate the current off-Station TCE plume boundary and will be necessary in evaluating future extraction well capture zones and water level elevation changes, as well as TCE plume boundary changes, in the Principal Aquifer. These wells should be included in the groundwater monitoring program and the associated costs included in the appropriate cost tables.

45. P. G-13 (Table G-3): We recommend that MP port 5 replace MP port 4 in monitoring wells 18_MCAS01 and 18_MCAS02, because historical VOC data indicated that these ports have contained higher TCE concentrations. The screened depths for these ports are 330-340 ft and 420-430 ft for wells 18_MCAS01 and 18_MCAS02, respectively.

46. P. G-14 through G-18 (Tables G-4a through G-4e): Costs for additional water quality constituents suggested in Comment 42 above should be included in these tables and other dependent tables.

47. P. G-21 (Figure G-1): Additional and substituted monitoring stations recommended in the above comments should be included on this figure. Also, well 18_IRWD78 should be labeled.

48. P. G-23 and G-24 (Figures G-2 and G-3): Well 18_TIC47 should be deleted from these maps and others as an active production well. It has been taken out of service by the Irvine Company.

49. P. I-7 (Table I-1): The numbers listed for the Source Water System are incorrect. Table 7-1 of the PDR has $5,666,600 for the Source Water System cost. Taking wells TIC-110, TIC-111, and IDP-2 out results in a deduction of 1.518 x ($267,400 + 146,900 + 203,500) = $937,800. The pipelines are estimated in Table 1 of PDR T.M. No. 9. Taking the pipelines to those wells out results in a deduction of 1.20 x 1.15 x [(9510' x $65.00) + (140' x 360.00)] = $922,600. The total deduction is $1,860,400. The remaining cost is $5,666,600 - $1,860,400 = $3,806,200. In addition, the O&M cost of $231,000 in Table 7-2 of the PDR will be reduced by the cost of those 3 wells. Table 3 of T.M. No. 3 yields $104,000

without those 3 wells, but we must add 4/7 ($20,000) + 4/3 ($5,000) = $18,100. The reduced total is then $104,000 + 18,100 = $122,100.

50. P. I-8 (Table I-2): The numbers will change according to changes in Table I-1.

51. P. I-9 (Table I-3): The numbers will change according to changes in Tables I-1 and I-2; however, the differences in unit cost do not change appreciably.

Table E-2A (S)

Summary Cost Estimate for Alternative 2A
MCAS El Toro Project Without 18_ET1
MCAS El Toro OU-1 Interim-Action FS Report

Description	Order-of-Magnitude Estimates Division Totals		VOC-Related Percent	VOC-Related Cost	
CAPITAL COSTS					
Prinicipal Aquifer					
Extraction System		$584,000	100%	$584,000	
Conveyance	2,763,700	~~$2,101,500~~	100%	~~$2,101,500~~	2,763,700
VOC Treatment System		$1,192,900	100%	$1,192,900	
Injection System		$2,931,000	100%	$2,931,000	
Subtotal - Principal Aquifer				~~$6,809,400~~	7,471,600
Shallow Groundwater Unit					
Extraction System		$2,193,200	100%	$2,193,200	
Conveyance		$1,985,500	100%	$1,985,500	
Treatment System		$2,285,600	100%	$2,285,600	
Injection System		$2,464,000	100%	$2,464,000	
Subtotal - Shallow Groundwater Unit				*$8,928,300*	
Groundwater Monitoring					
Monitoring		$1,030,100	100%	$1,030,100	
Capital Cost Subtotal				~~$16,767,800~~	17,429,900
ReplacementCosts		$730,884	100%	$730,884	
Capital Cost Total with Allowances				~~$30,481,000~~	31,615,400
ANNUAL O&M COSTS					
Principal Aquifer					
Extraction System		$4,700	100%	$4,700	
Conveyance	115,950	~~$103,260~~	100%	~~$103,260~~	115,950
Treatment System		$366,650	100%	$366,650	
Injection System		$8,400	100%	$8,400	
Subtotal - Principal Aquifer				~~$483,010~~	495,700
Shallow Groundwater Unit					
Extraction System		$37,150	100%	$37,150	
Conveyance	47,550	~~$89,250~~	100%	~~$89,250~~	47,550
Treatment System		$378,800	100%	$378,800	
Injection System		$25,500	100%	$25,500	
Subtotal - Shallow Groundwater Unit				~~$530,700~~	489,000
Groundwater Monitoring					
Monitoring	287,011	~~$78,882~~	100%	~~$78,882~~	287,011
O&M Cost Subtotal				~~$1,092,592~~	1,271,711
O&M Cost Total (10% Contingency)				~~$1,202,000~~	1,398,900
PRESENT WORTH					
Capital Costs with Allowances				~~$30,481,000~~	31,615,400
O&M Costs (PW 40 years)				~~$23,800,000~~	27,687,800
Present Worth Total				~~$54,300,000~~	59,303,000

Table E-6A (S)
Summary Cost Estimate for Alternative 6A
IDP/MCAS El Toro Project and Reduced IDP With Discharge to Use Only
MCAS El Toro OU-1 Interim-Action FS Report

Description		Division Totals	Order-of-Magnitude Estimates 0%	VOC-Related Cost	50%	Cost
CAPITAL COSTS						
MCAS El Toro Components						
Principal Aquifer						
Discharge to Remainder of IDP Treatment System		$13,000	100%	$13,000	100%	$13,000
Extraction System		$584,000	100%	$584,000	100%	$584,000
Conveyance	1,778,900	~~$2,169,500~~	100%	~~$2,169,500~~	100%	~~$2,169,500~~ 1,778,900 + Telemetry
Subtotal–Principal Aquifer			2,375,900	~~$2,766,500~~		~~$2,766,500~~ 2,375,900 + "
Shallow Groundwater Unit						
Extraction System		$2,199,600	100%	$2,199,600	100%	$2,199,600
Conveyance	1,348,375	~~$1,511,500~~	100%	~~$1,511,500~~	100%	~~$1,511,500~~ 1,348,375 + Telemetry
Subtotal–Shallow Groundwater Unit			3,547,975	~~$3,711,100~~		~~$3,711,100~~ 3,547,995 + "
Groundwater Monitoring Wells						
Monitoring Wells		$914,000	100%	$914,000	100%	$914,000
Subtotal MCAS El Toro Components			6,837,900	~~$7,391,600~~		~~$7,391,600~~ 6,837,900
MCAS El Toro Replacement Costs		$415,300		$415,300		$415,300
MCAS El Toro Components With All Allowances			12,531,500	~~$13,515,300~~		~~$13,515,300~~ 12,531,500
OCWD Components						
Land and Easements - Well Site Aquisitions		$1,149,500	0%	$0	50%	$574,750
Extraction System (Well Construction Costs)						
IDP Wells (18_IDP1, 18_IDP3, 18_IDP4)		$1,080,000	0%	$0	50%	$540,000
Existing Well 18_ET1		$872,000	* 100%	$872,000	100%	$872,000
Conveyance	3,834,400	~~$4,378,250~~	1,546,900 ~~0%~~	~~$0~~	~~50%~~	~~$2,189,125~~ 2,690,650
VOC Treatment System		$1,753,000	100%	$1,753,000	100%	$1,753,000
Modifications to Accommodate Untreated SGU Groundwater		$324,000	100%	$324,000	100%	$324,000
Treatment Equipment Building/Site Work/Telemetry		$3,383,900	0%	$0	50%	$1,691,950
Replacement Costs	470,400	~~$465,800~~	0% 146,700	~~$0~~	50%	~~$283,900~~ 308,550
Subtotal OCWD Components			4,642,600	~~$2,949,000~~		~~$8,177,725~~ 8,754,900
CAPITAL COST TOTAL			17,174,100	~~$16,460,000~~		~~$21,690,000~~ 21,286,400
ANNUAL O&M COSTS						
Principal Aquifer						
OCWD Components						
Extraction System	90,000	~~$117,200~~	0%	$0	50%	~~$58,600~~ 45,000
VOC Treatment System		$240,000	100%	$240,000	100%	$240,000
Additional VGAC for Untreated SGU Groundwater	110,000	~~$21,000~~	100%	~~$21,000~~	100%	~~$21,000~~ 110,000
~~Existing Well 18_ET1~~		~~$42,000~~	~~100%~~	~~$42,000~~	~~100%~~	~~$42,000~~
Lab Analysis of Finished Water		$127,700	0%	$0	50%	$63,850
Subtotal - OCWD Component Principal Aquifer			350,000	~~$303,000~~		~~$425,450~~ 458,850
MCAS El Toro Components						
Extraction System		$4,700	100%	$4,700	100%	$4,700
Conveyance	137,290	~~$322,790~~	100%	~~$322,790~~	100%	~~$322,790~~ 137,290
Subtotal - MCAS El Toro Component Principal Aquifer			141,990	~~$337,490~~		~~$237,490~~ 141,990
Shallow Groundwater Unit						
Extraction System		$37,150	100%	$37,150	100%	$37,150
Conveyance	47,550	~~$89,250~~	100%	~~$89,250~~	100%	~~$89,250~~ 47,550
Subtotal - Shallow Groundwater Unit			84,700	~~$126,400~~		~~$126,400~~ 84,700
Groundwater Monitoring Wells						
Monitoring Wells	273,955	~~$66,188~~	100%	~~$66,188~~	100%	~~$66,188~~ 273,955
O&M Cost Subtotal			850,645	~~$823,078~~		~~$945,520~~ 959,495
O&M Cost Total (10% Contingency on non-OCWD Components)			900,700	~~$875,000~~		~~$908,000~~ 1,009,600
PRESENT WORTH						
Capital Costs with Allowances			17,174,100	~~$16,460,000~~		~~$21,690,000~~ 21,286,400
O&M Costs (PW 40 years)			17,827,400	~~$17,300,000~~		~~$19,800,000~~ 19,982,800
Present Worth Total			35,001,500	~~$33,800,000~~		~~$41,500,000~~ 41,269,000

*Allocating shared raw water transmission facilities by percent flow basis.

TABLE E-2A (L)
Line-Item Cost Estimate for Alternative 2A
MCAS El Toro Project Without 18_ET1
MCAS El Toro OU-1 Interim-Action FS Report

Description	Quantity		Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
CAPITAL COSTS					
Principal Aquifer					
Extraction System					$584,000
Land Purchase	1	LS		$40,000	
Well Construction Costs					
Deep Production Wells (18_EXT1D, 18_EXT2D)	2	EA	272,000	544,000	2,763,700
Conveyance				low	~~2,101,500~~ + Telemetry
Wellfield Piping					
10" PVC In Open Country	2,500	LF	65 ~~35.00~~	~~87,500~~	162,500
10" PVC Under Pavement	2,700	LF	82 ~~60.00~~	~~162,000~~	221,400
14" PVC Under Pavement — 28" steel casing	16,900	LF	106 ~~80.00~~	~~1,352,000~~	1,791,400
Wellfield Pumps	285 LF ?		310.00	88,400	
Submersible Pumps--100 hp (Principal Aquifer) — Telemetry	2	EA	250,000	500,000	
VOC Treatment System (Air Stripping/VGAC System--2,000 gpm)					1,192,900
Land Purchase	1	LS		33,600	
Foundation	56	CY	600	33,600	
Equalization Tank and Pump	1	LS	103,500	103,500	
Stripper System	1	LS	153,000	153,000	
Cleaning System	1	EA	15,700	15,700	
Effluent Pump	1	EA	64,400	64,400	
Bag Filters	2	EA	5,000	10,000	
VGAC Adsorbers	2	EA	82,400	164,800	
Off-gas Blower/Heater	1	EA	7,700	7,700	
Hypochlorite Feed System	1	LS	34,400	34,400	
Acid Feed System	1	LS	48,800	48,800	
Static Mixer	2	EA	6,000	12,000	
Control Panel	1	LS	50,000	50,000	
Monitoring Equipment	1	LS	50,000	50,000	
Mechanical Allowance	1	LS	112,200	112,200	
Electrical Allowance	1	LS	112,200	112,200	
Installation Allowance	1	LS	187,000	187,000	
Injection System					2,931,000
Land Purchase	1	LS		200,000	
Land Easement	1	LS		11,000	
Well Construction Costs					
Deep Injection Wells (18_INJ1D--18_INJ10D)	10	EA	272,000	2,720,000	
Shallow Groundwater Unit					
Extraction System					2,193,200

TABLE E-2A (L)
Line-Item Cost Estimate for Alternative 2A
MCAS El Toro Project Without 18_ET1
MCAS El Toro OU-1 Interim-Action FS Report

Description	Quantity		Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
Land Purchase	1	LS		43,200	
Land Easement	1	LS		11,000	
Well Construction Costs					
Shallow Produc'n Wells (18_EXT1S--18_EXT31S)	31	EA	69,000	2,139,000	
Conveyance					1,985,500
Wellfield Piping					+ Telemetry
4" PVC Under Pavement	14,450	LF	30.00	433,500	
6" PVC Under Pavement	9,400	LF	40.00	376,000	
8" PVC Under Pavement	13,600	LF	50.00	680,000	
4" PVC Pipe Railroad Bore	300	LF	300.00	90,000	
4" PVC Pipe Taxiway Bore	120	LF	400.00	48,000	
6" PVC Pipe Taxiway Bore	120	LF	400.00	48,000	
Wellfield Pumps					
Submersible Pumps--7.5 hp (Extraction)	31	EA	10,000	310,000	
VOC Treatment System (VGAC/LGAC--1,260 gpm)					2,285,600
Foundation	56	CY	600	33,600	
Equalization Tank and Pump	1	EA	82,100	82,100	
Stripper System	1	EA	131,000	131,000	
LGAC Carbon Adsorbers	4	EA	143,000	572,000	
Bag Filters	2	EA	5,000	10,000	
Effluent Pump	1	LS	48,300	48,300	
Off-gas Blower/Heater	1	EA	5,800	5,800	
Cleaning System	1	EA	11,800	11,800	
Backwash System	1	LS	57,000	57,000	
VGAC Adsorbers	4	EA	71,000	284,000	
Hypochlorite Feed System	1	EA	37,400	37,400	
Acid Feed System	1	EA	48,800	48,800	
Pressure Vessel	1	EA	40,600	40,600	
Filter Press	1	EA	12,200	12,200	
Control Panel	1	EA	50,000	50,000	
Monitoring Equipment	1	LS	50,000	50,000	
Mechanical Allowance	1	LS	221,000	221,000	
Electrical Allowance	1	LS	221,000	221,000	
Installation Allowance	1	LS	369,000	369,000	
Injection System					2,464,000
Land Purchase	1	LS		120,000	
Land Easement	1	LS		19,000	
Well Construction Costs					
Shallow Injection Wells (18_INJ1S--18_INJ31S)	31	EA	75,000	2,325,000	

Telemetry?

TABLE E-2A (L)
Line-Item Cost Estimate for Alternative 2A
MCAS El Toro Project Without 18_ET1
MCAS El Toro OU-1 Interim-Action FS Report

Description	Quantity		Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
Groundwater Monitoring Wells	1	LS		1,030,100	1,030,100
Construction Cost Subtotal				17,429,900	~~$16,767,800~~
Mobilization and General Requirements @ 15%				2,614,500	~~2,512,000~~
Construction Cost Subtotal				20,044,400	~~$19,280,000~~
Contingencies.					
Scope Contingency @ 20%				4,008,900	~~3,860,000~~
				24,053,300	~~$23,140,000~~
Other Costs					
Administrative @ 5%				1,202,700	~~1,165,000~~
Services During Construction @ 10%				2,405,300	~~2,330,000~~
Legal @ 5%				1,202,700	~~1,165,000~~
Implementation Cost Total				28,863,900	~~$27,800,000~~
Engineering/Design @ 7%				2,020,500	~~1,950,000~~
CAPITAL COST TOTAL				30,884,400	~~$29,750,000~~
REPLACEMENT COSTS					**$731,000**
Wellfield Pumps (20 yrs)				369,684	
Treatment Pumps and Blowers (20 yrs)				304,400	
Stripper Packing (10 yrs)				56,800	
ANNUAL OPERATIONS & MAINTENANCE COSTS	(40 Years Total using an Average Annualized Cost)				
Principal Aquifer					
Extraction System					$4,700
Labor/Materials for Wells					
Administration	1	LS		$200	
Operations & Maintenance Labor	80	HR	35.00	2,800	
Supervisory Labor	20	HR	35.00	700	
Maintenance Materials	1	LS		1,000	115,950
Conveyance	1,305,600			104,450	~~103,260~~
Power for Pumps	~~1,147,000~~	KWH	0.08	~~91,760~~	
Labor/Materials for Pumps					
Administration	1	LS		250	
Operations & Maintenance Labor	100	HR	35.00	3,500	
Supervisory Labor	25	HR	35.00	875	
Maintenance Materials	1	LS		375	
Labor/Materials for Pipelines					
Administration	1	LS		250	
Operations & Maintenance Labor	100	HR	35.00	3,500	

TABLE E-2A (L)
Line-Item Cost Estimate for Alternative 2A
MCAS El Toro Project Without 18_ET1
MCAS El Toro OU-1 Interim-Action FS Report

Description	Quantity		Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
Supervisory Labor	50	HR	35.00	1,750	
Maintenance Materials	1	LS		1,000	
VOC Treatment System (Air Stripping/VGAC System--2,000gpm)					366,650
Labor for Treatment System					
Operators	3,090	HR	35.00	108,150	
Engineering	150	HR	45.00	6,750	
Management	400	HR	55.00	22,000	
Administration & Reporting	1	LS		25,000	
Utilities					
Electric Power for Treatment System	1,400,000	KWH	0.08	112,000	
Natural Gas	1,300,000	BTU	0.003	3,900	
Materials for Treatment System					
Vapor Phase Carbon	4,000	LB	1.00	4,000	
Hypochlorite Feed	18,000	LB	0.60	10,800	
Acid Feed	660,000	LB	0.06	39,600	
Meta Analysis	12	EA	225.00	2,700	
Water Sample Analysis	12	EA	225.00	2,700	
Air Sample Analysis	26	EA	225.00	5,850	
Maintenance Materials	1	LS	$23,200	23,200	
Injection System					8,400
Labor/Materials for Wells					
Administration	1	LS		400	
Operations/Maintenance/Supervisory Labor	200	HR	35.00	7,000	
Maintenance Materials	1	LS		1,000	
Shallow Groundwater Unit					
Extraction System					37,150
Labor/Materials for Wells					
Administration	1	LS		1,400	
Operations & Maintenance Labor	600	HR	35.00	21,000	
Supervisory Labor	150	HR	35.00	5,250	
Maintenance Materials	1	LS		9,500	47,550 ~~89,250~~
Conveyance	297,600			23,800 ~~65,500~~	
Power for Pumps	~~818,400~~	KWH	0.08		
Labor/Materials for Pumps					
Administration	1	LS		250	
Operations & Maintenance Labor	100	HR	35.00	3,500	
Supervisory Labor	25	HR	35.00	875	
Maintenance Materials	1	LS		375	
Labor/Materials for Pipelines					

TABLE E-2A (L)
Line-Item Cost Estimate for Alternative 2A
MCAS El Toro Project Without 18_ET1
MCAS El Toro OU-1 Interim-Action FS Report

Description	Quantity	Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
Present Worth of Capital Cost and Operations & Maintenance Cost Assuming 40 years @ 4%		$9,303,000		~~$54,300,000~~

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

TABLE E-6A (L)
Line-Item Cost Estimate for Alternative 6A
MCAS El Toro Project and Reduced IDP With Discharge to Use Only
MCAS El Toro OU-1 Interim-Action FS Record

Description	Quantity	Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
CAPITAL COSTS				
Principal Aquifer				
MCAS El Toro Components				
Discharge to Remainder of Treatment System	1 LS	$13,000	$13,000	$13,000
Extraction System				$584,000
Land Purchase	1 LS		40,000	
Well Construction Costs				
Deep Production Wells (18_EXT1D, 18_EXT2D)	2 EA	272,000	544,000	
Conveyance			1,778,900 ~~$2,169,500~~ + Telemetry	
Wellfield Piping to IDP				
10" PVC In Open Country	2,500 LF	65.00 ~~35.00~~	~~87,500~~ 162,500	
10" PVC Under Pavement	2,700 LF	82.00 ~~60.00~~	~~162,000~~ 221,400	
14" PVC Under Pavement	7,500 LF	106.00 ~~80.00~~	~~600,000~~ 795,000	
~~20" PVC Under Pavement~~ (shared pipeline)	~~6,000 LF~~	~~120.00~~	~~720,000~~	
Wellfield Pumps				
Submersible Pumps--200 hp (Principal Aquifer) + Telemetry?	2 EA	300,000	600,000	
Shallow Groundwater Unit				
Extraction System				$2,199,600
Land Purchase	1 LS		43,200	
Land Easement	1 LS		17,400	
Well Construction Costs				
Shallow Prod'n Wells (18_EXT1S--18_EXT31S)	31 EA	69,000	2,139,000	
Conveyance (To IDP through Pretreatment)			1,348,375 ~~$1,511,500~~ + Telemetry	
Wellfield Piping				
4" PVC Under Pavement	7,250 LF	35.00	253,750	
6" PVC Under Pavement	7,000 LF	40.00	280,000	
8" PVC Under Pavement	4,200 LF	50.00	210,000	
12" PVC Under Pavement (should be reduced to 1,250'; share 1,850' of 12" pipe w/ IDP)	1,250 ~~3,500~~ LF	72.50	~~253,750~~ 90,625	
4" PVC Pipe Taxiway Bore	240 LF	400.00	96,000	
6" PVC Pipe Taxiway Bore	120 LF	400.00	48,000	
12" PVC Pipe Taxiway Bore	120 LF	500.00	60,000	
Wellfield Pumps				
Submersible Pumps--7.5 hp (Extraction) + Telemetry?	31 EA	10,000	310,000	
Groundwater Monitoring Wells	1 LS		914,000	$914,000 + Telemetry?
Construction Cost Subtotal			6,837,900	~~$7,391,600~~
Mobilization and General Requirements @ 15%			1,025,700	~~$1,108,000~~
Construction Cost Subtotal			7,863,600	~~$8,500,000~~

TABLE E-6A (L)
Line-Item Cost Estimate for Alternative 6A
MCAS El Toro Project and Reduced IDP With Discharge to Use Only
MCAS El Toro OU-1 Interim-Action FS Record

Description	Quantity		Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
Contingencies					
Scope Contingency @ 20%				1,367,600	~~$1,700,000~~
				9,436,300	~~$10,200,000~~
Other Costs					
Administrative @ 5%				471,800	~~$500,000~~
Services During Construction @ 10%				943,600	~~$1,000,000~~
Legal @ 5%				471,800	~~$500,000~~
Implementation Cost Total				11,323,500	~~$12,200,000~~
Engineering/Design @ 7%				792,600	~~$900,000~~
CAPITAL COST TOTAL--MCAS El Toro Components				12,116,200	~~$13,100,000~~
REPLACEMENT COSTS--MCAS El Toro Components					$415,300
Wellfield Pumps (20 yrs)				415,300	
OCWD Components + Treatment					
Land and Easements--Well Site Aquisitions + Easements	1	LS	1,149,500	1,149,500	$1,149,500
Extraction System					
Well Construction Costs					$1,952,000
IDP Wells (18_IDP1, 18_IDP3, 18_IDP4)	1	LS	1,080,000	1,080,000	
Existing Well 18_ET1	1	LS	872,000	872,000	3,834,400
Conveyance $1,510,200 wells + 2,324,200 conveyance =	1	LS	~~4,378,250~~	~~4,378,250~~	~~$4,378,250~~
VOC Treatment System (Air Stripping at IDP Facility)	1	LS	1,753,000	1,753,000	$1,753,000
Modifications to Accommodate Untreated SGU Groundwater	1	LS	324,000	324,000	324,000
Treatment Equipment Building/Site Work/Telemetry/Electrical Trans.	1	LS	3,383,900	3,383,900	$3,383,900
Replacement Costs (+Cont. Flow Analyzers @ $130,000?)					~~$465,800~~
Wellfield Pumps				323,700 ~~247,000~~	470,400
Treatment--Pumps/Blowers/Packing				146,700 ~~218,800~~	
CAPITAL COST TOTAL--OCWD Components				12,867,200	~~$13,406,450~~
CAPITAL COST TOTAL--All Components				25,398,700	~~$26,920,000~~
ANNUAL OPERATIONS & MAINTENANCE COSTS	(40 Years Total using an Average Annualized Cost)				
Principal Aquifer					
OCWD Components				90,000	90,000
Extraction System (ET-1, IDP-1, -3, and -4)	1	LS		~~$117,200~~	~~$117,200~~
VOC Treatment System (Air Stripping at IDP Facility)	1	LS		240,000	$240,000
Additional VGAC for Untreated SGU Groundwater	1	LS		100 ~~21,000~~ 110,000	~~$21,000~~
~~Existing Well 18_ET1~~					~~$42,000~~
~~Power~~	~~1~~	~~LS~~		~~32,000~~	

TABLE E-6A (L)
Line-Item Cost Estimate for Alternative 6A
MCAS El Toro Project and Reduced IDP With Discharge to Use Only
MCAS El Toro OU-1 Interim-Action FS Record

Description	Quantity		Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
~~Miscellaneous Labor and Parts~~	~~1~~	~~LS~~		~~10,000~~	
Lab Analysis of Finished Water	1	LS		127,700	$127,700
MCAS El Toro Components					
Extraction System					~~$4,700~~
Labor/Materials for Wells					
Administration	1	LS		200	
Operations & Maintenance Labor	80	HR	35.00	2,800	
Supervisory Labor	20	HR	35.00	700	
Maintenance Materials	1	LS		1,000	
Conveyance to IDP Facility	1,579,200 from Table F-5			126,340	~~$322,790~~
Power for Pumps	~~3,898,000~~	KWH	0.08	~~311,840~~	137,290
Labor/Materials for Pumps					
Administration	1	LS		250	
Operations & Maintenance Labor	100	HR	35.00	3,500	
Supervisory Labor	25	HR	35.00	875	
Maintenance Materials	1	LS		375	
Labor/Materials for Pipelines					
Administration	1	LS		200	
Operations & Maintenance Labor	100	HR	35.00	3,500	
Supervisory Labor	50	HR	35.00	1,750	
Maintenance Materials	1	LS		500	
Shallow Groundwater Unit					
Extraction System					$37,150
Labor/Materials for Wells					
Administration	1	LS		1,400	
Operations & Maintenance Labor	600	HR	35.00	21,000	
Supervisory Labor	150	HR	35.00	5,250	
Maintenance Materials	1	LS		9,500	
Conveyance	297,600 from Table F-5			23,800	~~$89,250~~
Power for Pumps	~~818,400~~	KWH	0.08	~~65,500~~	47,550
Labor/Materials for Pumps					
Administration	1	LS		250	
Operations & Maintenance Labor	100	HR	35.00	3,500	
Supervisory Labor	25	HR	35.00	875	
Maintenance Materials	1	LS		375	
Labor/Materials for Pipelines					
Administration	1	LS		750	
Operations & Maintenance Labor	300	HR	35.00	10,500	
Supervisory Labor	150	HR	35.00	5,250	

TABLE E-6A (L)
Line-Item Cost Estimate for Alternative 6A
MCAS El Toro Project and Reduced IDP With Discharge to Use Only
MCAS El Toro OU-1 Interim-Action FS Record

Description	Quantity	Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
Maintenance Materials	1 LS		2,250	
			213,955 ~~213,955~~	213,955 ~~213,955~~
Groundwater Monitoring	1 LS		~~66,188~~	~~$66,188~~
Operations and Maintenance Annual Cost Subtotal			1,068,345	~~$1,067,978~~
Contingency @ 10% (On Non-OCWD Components)			50,055	~~$52,000~~
Operations and Maintenance Annual Cost Total			1,118,400	~~$1,120,000~~
Present Worth of Operations and Maintenance Cost for Years 1-40 Assuming $1,099,000/annum cost for years 1-40 @ 4%			~~$22,200,000~~ 22,136,300	
Estimated Capital Cost (including replacement costs)			~~26,920,000~~ 25,398,700	
Present Worth of Capital Cost and Operations & Maintenance Cost Assuming 40 years @ 4%			47,535,000	~~$49,100,~~

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

TABLE E-2A (L)
Line-Item Cost Estimate for Alternative 2A
MCAS El Toro Project Without 18_ET1
MCAS El Toro OU-1 Interim-Action FS Report

Description	Quantity		Order-of-Magnitude Estimates Unit Cost	Line Totals	Division Totals
Administration	1	LS		1,000	
Operations & Maintenance Labor	300	HR	35.00	10,500	
Supervisory Labor	150	HR	35.00	5,250	
Maintenance Materials	1	LS		2,000	
Treatment					378,800
Labor for VOC Treatment System (LGAC--1,260gpm)					
Operators	3,600	HR	35.00	126,000	
Engineering	150	HR	45.00	6,750	
Management	400	HR	55.00	22,000	
Administration and Reporting	1	LS		25,000	
Utilities					
Electric Power for Treatment System	720,000	KWH	0.08	57,600	
Natural Gas	890	MBTU	3.00	2,700	
Materials for Treatment System					
Vapor Phase Carbon	16,600	LB	$1	16,600	
Liquid Phase Carbon	34,100	LB	1.00	34,100	
Hypochlorite Feed	11,000	LB	0.60	6,600	
Acid Feed	420,000	LB	0.06	25,200	
Metal/Water Sample/Air Sample Analysis	12	EA	225.00	2,700	
Water Sample Analysis	12	EA	225.00	2,700	
Air Sample Analysis	26	EA	225.00	5,850	
Maintenance Materials	1	LS	$45,000	45,000	
Injection System					25,500
Labor/Materials for Wells					
Administration	1	LS		1,000	
Operations/Maintenance/Supervisory Labor	500	HR	35.00	17,500	
Maintenance Materials	1	LS		7,000	
Groundwater Monitoring	1	LS	287,011 ~~78,882~~	287,011 ~~78,882~~	287,011 ~~78,882~~
Operations and Maintenance Annual Cost Subtotal				1,271,711	~~$1,092,592~~
Contingency @ 10% (On non-OCWD components only)				127,171	~~109,259~~
Operations and Maintenance Annual Cost Total					~~$1,202,000~~ 1,398,900
Present Worth of Operations and Maintenance Cost for Years 1-40 Assuming $1,202,000/annum cost for years 1-40 @ 4%				~~$23,800,000~~	27,687,800
Estimated Capital Cost (including replacement costs)				~~30,481,000~~	31,615,400