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MCAS EL TORO
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BECHTEL NATIONAL INC.

CLEAN II TRANSMITTAL/DELIVERABLE RECEIPT

Contract No. N-68711-92-D-4670 **Document Control No.:** CTO-0076/0522

File Code: 0214

TO: Commanding Officer
Naval Facilities Engineering Command
Southwest Division
Mr. Richard Selby, Code 57CS.RS (O)
Building 128
1220 Pacific Highway
San Diego, CA 92132-5187

DATE: 2/12/97
CTO #: 0076
LOCATION: MCAS El Toro

FROM: _____
Program/Project Manager

DESCRIPTION: Response to DTSC Comments to Draft Final Phase II Remedial Investigation Report, Operable Unit 2C - Sites 3 and 5 (Various Date)
Comments on Draft Phase II Feasibility Reports, Operable Unit 2C - Sites 3 and 5 (Various Dates)

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RESPONSE TO COMMENTS
DRAFT PHASE II FEASIBILITY STUDY REPORTS
FOR OPERABLE UNIT 2C - STIES 3 AND 5
MCAS EL TORO, CALIFORNIA

Originator: Lawrence Vitale CRWQCB **To:** Tayseer Mahmoud DTSC **Date:** 26 November 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. Beside providing a cap for the landfill, no other corrective action measures to remediate metal and VOCs contaminated groundwater are identified in the draft feasibility study. Will there be other corrective action measures such as the installation of passive gas venting systems or an active gas collection system, pump and treat system, etc. For groundwater remediation? **Note: Groundwater beneath Site 3 and Site 5 landfills contains some metals and VOCs contamination. Since the beneficial uses of the groundwater basin (Irvine Forebay 1) beneath the sites include municipal and domestic supply, groundwater contaminated by VOCs and metals above MCLs should be remediated. Capping the landfills will minimize further groundwater degradation but may not remediate the groundwater. However, if metals/VOCs in groundwater are contained and monitored, groundwater remediation may not be necessary. Installing a passive gas venting system and capping the landfill may be sufficient.**	**RESPONSE 1:** The Draft Final FS has been revised to address technologies for remediation of groundwater. The analysis concludes that natural attenuation of VOCs (Site 3), natural precipitation of metals (Sites 3 and 5), coupled with deed restrictions and groundwater monitoring are the most appropriate for remediation of chemicals present in groundwater at concentrations exceeding the MCLs. Neither active nor passive gas venting systems are considered necessary at either site because of the very low levels of landfill gas present.
2. Cover design alternatives such as Alternatives 4a, 4b, 4c, and 4d are acceptable to us. Criteria used for acceptance: The selected cover design must offer equivalent waste containment capability to the Title 23 prescriptive cover. Alternatives 4a, 4b, 4c, and 4d meet this performance criteria. For landfill 3 the modified cover designs described in alternatives 6a and 6b would be protective of ground water and are acceptable to us. **Where appropriate we recommend a monolithic cover (4-6' of silty sand material with 10^{-5} cm/s permeability, depending on the depth of the root systems of the vegetation selected) in semi-arid/arid region.**	**RESPONSE 2:** Based on a review of soil data from borings at Sites 2 and 17 which encountered the Topanga Formation (marine siltstone) which forms the bedrock of the proposed borrow source, most of the siltstone is classified as a sandy silt to silty sand. One undisturbed sample from 02NEW1 had a hydraulic conductivity of 2×10^{-6}cm/s. Based on this value, the hydraulic conductivity of soils obtained from the borrow source was revised to 2×10^{-5} cm/s. This value was used in the HELP model to simulate the soil that is derived from the borrow source and used in the capping alternatives. Results of this simulation showed that the monolithic cover has infiltration rates which are comparable to Title 23 prescriptive caps in all cases except for the irrigated

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If El Toro MCAS is designated as semi-arid climate, then a monolithic cover (Alternative 3) is a good idea. Even though the HELP model run result shows that Alternative 3 does not offer equivalent water quality protection when compared to the prescriptive cover, we believe that the equivalency can be demonstrated by selecting the appropriate vegetation type and thickness for the cover, and selecting the appropriate unsaturated flow model to predict the amount of flow through the cover. **Because of many variables that will affect the moisture content of the cover, moisture monitoring of the monolithic cover may be necessary to effectively minimize water flow through the unsaturated zone.**	(golf course) scenario for Site 5. A discussion of the selection of the value for the hydraulic conductivity has been added to Section 4 and to the HELP appendix of Sites 3 and 5. A discussion of the equivalency of the monolithic cap with the Title 23 prescriptive (clay) cap has been added throughout the Draft Final FS.
3. **The draft FS mentioned that GCL barrier is more likely than clay to be penetrated by burrowing animals or by root systems of grasses or shrubs, and that GCL when dry is not impermeable to gas. The type of GCL that may be used is not identified in the draft FS. Is the GCL going to be a layer of clay bound by upper and lower geotextiles (e.g., Claymax, Bentomat, Bentofix) or a layer of clay bound to a geomembrane (e.g., Gundseal)? Will the use of Gundseal minimize penetration by burrowing animals or by root systems of grass, and create an impermeable surface to gas flow?**	**RESPONSE 3:** The GCL discussed in Alternative 4c and 5c is a layer of clay bound by upper and lower geotextiles. This is described on Pages 4-11 and 4-14 of the FS. There are several products such as Bentomat or Claymax that can be used to decrease the permeability of GCL. Gundseal is basically an FML with small granules of bentonite attached. The bentonite hydrates and expands to seal small cracks or holes in the GCL. Like FML, Gundseal would create an impervious surface to gas, but it would also represent a more costly alternative which we do not believe is necessary to evaluate at this time in light of the acceptable performance of the GCL and FML barriers. We have discussed the issue of permeability to gas. At landfills such as Sites 3 and 5 where gas concentrations are low enough that landfill gas controls are not needed, the permeability of the cap can be an advantage in that the cap will allow the landfill gases to pass through to the atmosphere above the landfill at concentrations that are not likely to exceed SCAQMD thresholds, rather than restricting vertical migration of the gases and causing them to migrate laterally to the sides of the landfill cap. Therefore, we do not believe that it is necessary to choose a cap that limits the migration of landfill gas for these sites.
4. **We did not review the risk assessment section of the report, therefore, we have no comment regarding human and**	**RESPONSE 4:** Comment noted.

Originator: Lawrence Vitale CRWQCB **To:** Tayseer Mahmoud DTSC **Date:** 26 November 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
environmental health risk.	

RESPONSE TO COMMENTS
DRAFT PHASE II FEASIBILITY STUDY REPORT
OPERABLE UNIT 2C - SITE 5
MCAS EL TORO, CALIFORNIA

Originator: Michael J. Wade, Senior Toxicologist DTSC **To:** Tayseer Mahmoud DTSC **Date:** 15 November 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
CONCLUSIONS AND RECOMMENDATIONS **The document is thorough and well written. We agree with the Navy's conclusions. However, we recommend minor revisions to make the report acceptable with respect to risk assessment.**	***RESPONSES TO CONCLUSIONS AND RECOMMENDATIONS*** **RESPONSE:** These revisions will be incorporated.
The Navy should include quantitative expressions of risk reduction in the detailed analysis of alternatives in Chapter 5. If the alternative renders exposure pathways incomplete, then the Navy should state that site-related risks would be removed if this alternative were implemented.	**RESPONSE:** The capping alternatives (3, 4, 5, and 6) sever the expsoure pathways to soil and therefore eliminate the soils-related risks. This discussion has been included in the FS.
Risks from residential exposure to groundwater may be as great as 1E-03, assuming that all chromium present is hexavalent. The Navy should state when chromium in groundwater will be speciated and whether any contamination in groundwater will be mitigated. Also, the Navy states that anaerobic conditions beneath the landfill which mobilized metals will be different downgradient. Any remedial alternative should contain provisions to verify this assumption.	**RESPONSE:** A series of hexavalent chromium samples were taken during the most recent round of groundwater sampling (November/December 1996). At the time of this report, the results have not been fully validated and the report has not been issued.

RESPONSE TO COMMENTS
DRAFT PHASE II FEASIBILITY STUDY REPORT
OPERABLE UNIT 2C - SITE 3
MCAS EL TORO, CALIFORNIA

Originator: John P. Christopher, Toxicologist DTSC **To:** Tayseer Mahmoud DTSC **Date:** 15 November 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
CONCLUSIONS AND RECOMMENDATIONS **The document is thorough and well written. We agree with the Navy's conclusions. However, we recommend minor revisions to make the report acceptable with respect to risk assessment.**	***RESPONSES TO CONCLUSIONS AND RECOMMENDATIONS*** **RESPONSE:** These revisions will be incorporated.
The Navy should include quantitative expressions of risk reduction in the detailed analysis of alternatives in Chapter 5. This is not done in the current draft for Alternatives 2, 5A, 5B, 6A, and 6B. If the alternative renders exposure pathways incomplete, then the Navy should state that site-related risks would be removed if this alternative were implemented.	**RESPONSE:** The capping alternatives (3, 4, 5, and 6) sever the exposure pathways to soil and therefore eliminate soils-related risks. This discussion has been included in the FS.
Risks from residential exposure to groundwater may be as great as 1E-04, assuming that all chromium present is hexavalent. The Navy should state when chromium in groundwater will be speciated and whether any contamination in groundwater will be mitigated.	**RESPONSE:** A series of hexavalent chromium samples were taken during the most recent round of groundwater sampling (November/December 1996). At the time of this report, the results have been fully validated and the report has not been issued.

RESPONSE TO COMMENTS
DRAFT PHASE II FEASIBILITY STUDY REPORT
FOR SITE 5, OU-2C
MCAS EL TORO, CALIFORNIA

Originator: Tayseer Mahmoud DTSC **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 6 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. **Utility Lines Running Along the Site: The FS should discuss whether the remedial action alternatives will interfere with access to the utility lines (Appendix D of the RI showed unidentified utilities). The future reuse of the property may necessitate expansion of the utility lines. If the lines are located under or adjacent to a cap for example, institutional controls may limit or prohibit access. In addition, the utility lines may already have an easement that allows a utility company access to the lines for repair and maintenance. These potential constraints may require a redesign of the remedial alternatives or the inclusion of the cost to move the utility lines.**	**RESPONSE 1:** There are no utility easements at Site 5. There are a series of major utilities that parallel the site and are adjacent to Perimeter Road. However, the remedial actions are not expected to interfere with these utilities. Therefore, there will be no additional costs to abandon or reroute utility lines at this site.
2. **Future Land Use: The draft Community Reuse Plan, dated August 1996, prepared by the MCAS El Toro Local Redevelopment Authority has listed the primary alternative for future redevelopment of the area where Site 5 is located as "Recreation (golf)." The FS does not include a remedial action alternative for a recreation/golf course proposal.**	**RESPONSE 2:** The FS has been modified to address the potential recreational use of Site 5.
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
1. **Section 2.2.3.2, CONTAMINANT MIGRATION, page 2-30 and 2-31: The third paragraph on page 2-30 and the first paragraph on page 2-31 mention soil analyses "in the lysimeters." For clarity, we suggest that the sentence be revised to language similar to "in a soil sample collected during installation of the lysimeter."**	**RESPONSE 1:** Both sentences have been revised as noted.
2. **Section 2.2.4.3, RISKS TO UTILITY WORKERS, page 2-37: The second sentence in the second paragraph of this section states that "It is unlikely that repair would be needed more than once a year." Please see general comment above. The FS does not clearly state whether the utility lines would be located under or adjacent to the**	**RESPONSE 2:** There are no utility easements at Site 5. However, under the golf course use, utilities that may be associated with irrigation are likely to cross the site. This types of utilities are usually buried in shallow trenches, thus reducing potential exposures to utilities workers.

Originator: Tayseer Mahmoud DTSC **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 6 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
landfill cap alternatives.	
3. **Section 3.1.4, Remedial Action Objectives, page 3-14: Please reference the decision document that supports the statement that BRAC Cleanup Team has agreed that treatment of the groundwater contamination is not necessary.**	**RESPONSE 3:** The sentence containing this reference has been deleted. The FS has been revised to evaluate technologies for groundwater remediation.
4. **Section 3.4.5, Institutional Controls, page 3-19: This section states that "Access controls (e.g., fencing and signs) are expected to be necessary to assure the integrity of the landfill cover subsequent to the completion of the closure." Please be advised that the draft Community Reuse Plan, dated August 1996, prepared by the MCAS El Toro Local Redevelopment Authority has listed the primary alternative for future redevelopment of the area where Site 5 is located as "Recreation (golf)." Please evaluate the appropriate institutional controls for recreation/golf reuse scenario and the impact on the landfill cover.**	**RESPONSE 4:** Under the golf course scenario, site security will be commensurate with this activity and unauthorized access to monitoring wells will be controlled.
5. **Section 3.5.2.2, DEED RESTRICTIONS, page 3-24: The comment provided above (comment number 4) also applies here.**	**RESPONSE 5:** The Department of Navy on deed restrictions requires that these types of restrictions to be negotiated at the time of BRAC transfer. Until that time the Base Master Plan will restrict land use and access.
6. **Section 5, Detailed Analysis of Alternatives: See attached memorandum dated November 15, 1996 form DTSC staff Toxicologist, Dr. John Christopher.**	**RESPONSE 6:** Comments to this memorandum are included in this response package.
7. **Tables 5-1 through 5-10, Cost-Estimate Summary: The 20-percent contingency has not been applied to operation and maintenance costs. This is inconsistent with Appendix D, Section D4.1, page D4-1 which states that the contingencies are 20-percent of direct and indirect capital cost and operation and maintenance costs.**	**RESPONSE 7:** The 20 percent contingency was applied to both the capital and the O&M costs. Tables 5-1 through 5-10 have been revised to clarify that this contingency is included.
8. **Section 5.2.1.2, Evaluation, State and Community Acceptance, page 5-5: Please change the text from California DTSC to Cal/EPA. Cal/EPA includes DTSC, RWQCB, CIWMB, etc. Please make the**	**RESPONSE 8:** The text has been revised as requested.

Originator: Tayseer Mahmoud DTSC **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 6 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
changes throughout the document.	
9. Appendix A, Applicable or Relevant and Appropriate Requirements (ARARs): The Tables of ARARs and the written sections are well organized making the ARARs analysis easy. We have the following general comments that could apply to all the landfill sites:	
A. The reason(s) that an ARAR was determined to be "not an ARAR" should be written in the column headed "Comments". We note that few citations determined "not an ARAR" without a reason provided in the "Comments" column.	**RESPONSE 9(A):** An explanation of why a regulation is not an ARAR has been added to the comment column throughout Appendix A.
B. The Navy did not address all the submitted potential ARARs that DTSC solicited from the agencies. The Navy should analyze all the submitted ARARs using the same format used for the appendices tables.	**RESPONSE 9(B):** Agency comments were received too late to incorporate into the draft feasibility study, but are now incorporated into the Draft Final FS.
C. In the tables, there is a superscript "b" and no explanation below the tables.	**RESPONSE 9(C):** The superscript has been replaced with an asterisk which is explained in the footnotes.
D. Section A.4.3.1.2, Criteria for Municipal Waste Landfills, 40 CFR 258, page A4-32: The section discusses 258.60, however, section 258.60 could not be found in the analysis Table A4-1 as referenced in the paragraph.	**RESPONSE 9(D):** Table A4-1 has been revised to include citations from 40CFR258.60.
E. Section A4.4.2, State, page A4-34: The paragraph states that certain State regulations may be relevant for consolidation but in Table A4-2, page A4-25, the regulations are specified as not ARARs.	**RESPONSE 9(E):** This paragraph has been deleted.
F. In the section "Resource Conservation and Recovery Act Requirements," the Navy discussed the issue whether or not California RCRA authorized program made Title 22 regulations federal regulations. DTSC sent you comments on draft FS for Sites 2 & 17 which disagrees with the assertion that DTSC's regulations	**RESPONSE 9(F):** The Navy maintains its position that federally-authorized state programs are considered potential federal ARARs.

Originator: Tayseer Mahmoud DTSC **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 6 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
are federal ARARs.	
10. <u>Appendix B, Proposed Monitoring Plan, Section B2.3, Monitoring and Reporting Frequency, page B2-2</u>: As a signatory to the Record of Decision for the landfill, we expect the Navy to submit the reporting requirements to DTSC. Please add DTSC as a recipient to all monitoring and reporting requirements due to all other agencies. DTSC is the designated one voice for Cal/EPA that will coordinate comments and approval of reports. This comment also applies to Sections B2.4, B3.3, B3.4, B4.3, B4.4, B4.5, and B5.1.	**RESPONSE 10:** DTSC has been added as a recipient to all monitoring and reporting requirements throughout the proposed monitoring plan.
11. <u>Appendix B, Proposed Monitoring Plan, Section 4.4, Corrective Action, page B4-2</u>: Include in this section further discussion detailing the elements that would lead toward corrective action. A clearly outlined contingency plan should be included in the FS. The Navy should provide information such as the following: Define what is meant by "significant change from conditions presented in the RI." What procedure would be followed if "significant change" does occur? How soon after a significant change will a validation groundwater sample be collected? What if the second groundwater sample does not validate the first sample collected? What if it does? Answers to these and other related questions need to be clearly outlined in the FS.	**RESPONSE 11:** Detailed criteria for implementing a corrective action will be provided at the detailed design stage. Once the preferred alternative has been selected and appropriate monitoring of the various media is approved, criteria can be set for corrective action.
12. <u>Appendix B, Proposed Monitoring Plan, Section B5.5, Site Security Inspection, page B5-3</u>: Inspection and maintenance of the bench mark for the landfill should be added to the list of signs to be inspected during postclosure.	**RESPONSE 12:** Inspection and maintenance of the bench mark has been added to the list of signs to be inspected during postclosure.

RESPONSE TO COMMENTS
DRAFT PHASE II FEASIBILITY STUDY REPORT
FOR SITE 3, OU-2C
MCAS EL TORO, CALIFORNIA

Originator: Tayseer Mahmoud DTSC **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 6 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. Utility Lines: **Are there any utility lines running within the site boundaries? The FS should discuss whether the remedial action alternatives will interfere with access to any utility lines. The future reuse of the property may necessitate expansion of the utility lines. If the lines are located under or adjacent to a cap for example, institutional controls may limit or prohibit access. In addition, the utility lines may already have an easement that allows a utility company access to the lines for repair and maintenance. These potential constraints may require a redesign of the remedial alternatives or the inclusion of the cost to move the utility lines.**	**RESPONSE 1:** There are utility lines running within the Site 3 boundary. These lines were installed to support the Environmental Remediation program. Costs of abandoning these lines have been added to the FS.
2. Future Land Use: **The draft Community Reuse Plan, dated August 1996, prepared by the MCAS El Toro Local Redevelopment Authority has listed the primary alternative for future redevelopment of the area where Site 3 is located as "R&D/Light Industrial/Institutional)." The FS should discuss how the remedial action alternative(s) meets the intended future use of Site 3.**	**RESPONSE 2:** A discussion of the potential reuse of Site 3 and the impact of this reuse on the proposed alternatives has been added to the FS.
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
1. Section 2.2.4.3, RISKS TO UTILITY WORKERS, page 2-37: **The second sentence in the second paragraph of this section states that "It is unlikely that repair would be needed more than once a year." Please see general comment above. The FS does not clearly state whether the utility lines would be located under or adjacent to the landfill cap alternatives.**	**RESPONSE 1:** The FS has been revised to address removal of utility lines crossing Site 3.
2. Section 3.4.5, Institutional Controls, page 3-19: **This section states that "Access controls (e.g., fencing and signs) are expected to be necessary to assure the integrity of the landfill cover subsequent to the completion of the closure." Please be advised that the draft**	**RESPONSE 2:** The discussion of access controls has been revised in light of the proposed reuse of Site 3. In particular, site access controls such as fencing will be commensurate with the reuse.

Originator: Tayseer Mahmoud DTSC **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 6 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
Community Reuse Plan, dated August 1996, prepared by the MCAS El Toro Local Redevelopment Authority has listed the primary alternative for future redevelopment of the area where Site 3 is located as R&D/Light Industrial/Institutional. Please evaluate the appropriate institutional controls for the intended use.	
3. Section 3.5.2.2, DEED RESTRICTIONS, page 3-24: The comment provided above (comment number 2) also applies here.	**RESPONSE 3:** The Department of Navy on deed restrictions requires that these types of restrictions to be negotiated at the time of BRAC transfer. Until that time the Base Master Plan will restrict land use and access.
4. Section 5, Detailed Analysis of Alternatives: See attached memorandum dated November 15, 1996 form DTSC staff Toxicologist, Dr. John Christopher.	**RESPONSE 4:** Responses to this memorandum are included in this response package.
5. Tables 5-1 through 5-10, Cost-Estimate Summary: The 20-percent contingency has not been applied to operation and maintenance costs. This is inconsistent with Appendix D, Section D4.1, page D4-1 which states that the contingencies are 20-percent of direct and indirect capital cost and operation and maintenance costs.	**RESPONSE 5:** The 20-percent contingency was applied to both the capital and O&M costs in the FS, but the tables did not make this clear. We have revised Tables 5-1 through 5-10 to clarify that this contingency has been applied to both costs.
6. Section 5.2.1.2, Evaluation, State and Community Acceptance, page 5-5: Please change the text from California DTSC to Cal/EPA. Cal/EPA includes DTSC, RWQCB, CIWMB, etc. Please make the changes throughout the document.	**RESPONSE 6:** This revision has been made throughout the document.
7. Appendix A, Applicable or Relevant and Appropriate Requirements (ARARs): The Tables of ARARs and the written sections are well organized making the ARARs analysis easy. We have the following general comments that could apply to all the landfill sites:	
A. The reason(s) that an ARAR was determined to be "not an ARAR" should be written in the column headed "Comments". We note that few citations determined "not an ARAR" without a reason provided in the "Comments" column.	**RESPONSE 7(A):** An explanation of why a regulation is not an ARAR has been added to the comment column throughout Appendix A.

Originator: Tayseer Mahmoud DTSC **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 6 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
B. The Navy did not address all the submitted potential ARARs that DTSC solicited from the agencies. The Navy should analyze all the submitted ARARs using the same format used for the appendices tables.	**RESPONSE 7(B):** Agency ARARs were received too late to be incorporated into the Draft FS. These ARARs are now incorporated into the Draft Final FS.
C. In the tables, there is a superscript "b" and no explanation below the tables.	**RESPONSE 7(C):** The superscript was a typographical error. It was supposed to be an asterisk. This has been corrected in the Draft Final FS. The meaning of the asterisk is provided in the footnotes.
D. Section A.4.3.1.2, Criteria for Municipal Waste Landfills, 40 CFR 258, page A4-32: The section discusses 258.60, however, section 258.60 could not be found in the analysis Table A4-1 as referenced in the paragraph.	**RESPONSE 7(D):** Citations to 40 CFR 258 have been added to Table 4-1.
E. Section A4.4.2, State, page A4-34: The paragraph states that certain State regulations may be relevant for consolidation but in Table A4-2, page A4-25, the regulations are specified as not ARARs.	**RESPONSE 7(E):** Section A4.4.2 has been modified and no longer states that these regulations may be relevant for consolidation.
F. In the section "Resource Conservation and Recovery Act Requirements," the Navy discussed the issue whether or not California RCRA authorized program made Title 22 regulations federal regulations. DTSC sent you comments on draft FS for Sites 2 & 17 which disagrees with the assertion that DTSC's regulations are federal ARARs.	**RESPONSE 7(F):** The Navy maintains its position that federally-authorized state programs are considered potential federal ARARs.
8. Appendix B, Proposed Monitoring Plan, Section B2.3, Monitoring and Reporting Frequency, page B2-2: As a signatory to the Record of Decision for the landfill, we expect the Navy to submit the reporting requirements to DTSC. Please add DTSC as a recipient to all monitoring and reporting requirements due to all other agencies. DTSC is the designated one voice for Cal/EPA that will coordinate comments and approval of reports. This comment also applies to Sections B2.4, B3.3, B3.4, B4.3, B4.4, B4.5, and B5.1.	**RESPONSE 8:** DTSC has been added as a recipient to all monitoring and reporting requirements throughout the proposed monitoring plan.
9. Appendix B, Proposed Monitoring Plan, Section 4.4, Corrective	**RESPONSE 9:** Detailed criteria for implementing a corrective action will be

Originator: Tayseer Mahmoud DTSC **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 6 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
Action, page B4-2: Include in this section further discussion detailing the elements that would lead toward corrective action. A clearly outlined contingency plan should be included in the FS. The Navy should provide information such as the following: Define what is meant by "significant change from conditions presented in the RI." What procedure would be followed if "significant change" does occur? How soon after a significant change will a validation groundwater sample be collected? What if the second groundwater sample does not validate the first sample collected? What if it does? Answers to these and other related questions need to be clearly outlined in the FS.	provided at the detailed design stage. Once the preferred alternative has been selected and appropriate monitoring of the various media is approved, criteria can be set for corrective action.
10. Appendix B, Proposed Monitoring Plan, Section B5.5, Site Security Inspection, page B5-3: Inspection and maintenance of the bench mark for the landfill should be added to the list of signs to be inspected during postclosure.	**RESPONSE 10:** Inspection and maintenance of the bench mark has been added to the list of signs to be inspected during postclosure.

RESPONSE TO COMMENTS
DRAFT FINAL PHASE II REMEDIAL INVESTIGATION REPORT
FOR OPERABLE UNIT 2C - SITE 3
MCAS EL TORO, CALIFORNIA

Originator: Peter M. Janicki Cal/EPA **To:** Tayseer Mahmoud DTSC **Date:** 18 October 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. Generally, the responses do not address fully Board staff comments which were included in the letter of June 3, 1996. Adequate responses should answer all issues stated in the review letter including all necessary justification, and inform, where applicable, that appropriate changes have been made in the body of the document. The latest responses appear to address certain parts of the comments and only in a surficial manner. **If necessary, Board staff are available to provide assistance in clarifying any issues related to their comments.**	**RESPONSE 1:** Comment noted. The failure to thoroughly address your comments was not intentional. We have reviewed your comments on the draft RI report and believe that the responses are correctly incorporated into the report. The responses were prepared rapidly because of the critical deadline required by the Federal Facilities Agreement and therefore may not have adequately addressed how the comments were incorporated into the document. All comments received on the draft RI reports have been reviewed again to assure the documents incorporate comments received and reflect the sites as accurately as possible.
2. The response document lacks a table of contents and continuous page numeration, both of which make review of this document difficult and cumbersome. It is recommended that the format of the response document be revised to expedite its review.	**RESPONSE 2:** We agree that a table of contents may be helpful and will recommend that this be an improvement internally on future documents. Each set of response does have pages for individual commentors.
3. Comments included in the letter of June 3, 1996, are identified as "Specific Comments." No such terminology was used in the original letter.	**RESPONSE 3:** The title of SPECIFIC COMMENTS was a typographical error. It should not have appeared in the summary.
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
4. Although the text has been revised to reflect the correct date (1944) of the blueprint, the response does not indicate that this change was made.	**RESPONSE 4:** Our response should have stated that the figure was incorrect. The blueprint was dated 1944, not 1994. The figure has been revised to show the correct date. The purpose of this feature is unknown, however, soil gas and soil sampling conducted in the area of this feature did not detect wastes or subsurface structures that indicated waste disposal activities in the feature.
5. The response to comment 4 states that the flood-retarding basin will be constructed under Orange County authority. Although the basin's construction and operation fall out of Department of Navy	**RESPONSE 5:** The flood-retarding basin is located approximately 8,000 feet upstream of Site 3. The location is not easily shown on the figures in the RI without losing detail on the features of Site 3 that we are trying to highlight.

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control, its existence and performance will directly affect the situation at Site 3. Also, after the completion of the MCAS ownership reassignment program, Site 3 likely will be operated and/or controlled by Orange County. Thus, it is requested that the basin be considered as a part of the runoff/runon control system and as such taken into consideration for the purpose of this and any future documents relevant to Site 3 closure and postclosure maintenance. As a result of this conclusion, the basin should be depicted on all relevant drawings.	To address this comment, we have shown the location of the basin on Figure 3-1.

RESPONSE TO COMMENTS
TECHNICAL MEMORANDUM ON BACKGROUND LEVELS OF INORGANICS;
RESPONSES TO COMMENTS AND DRAFT FINAL PHASE II
REMEDIAL INVESTIGATION REPORTS FOR SITES 3 AND 5
MCAS EL TORO, CALIFORNIA

Originator: John P. Christopher, Staff Toxicologist DTSC **To:** Tayseer Mahmoud DTSC **Date:** 31 October 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
1. **Technical Memorandum on Background - The technical memorandum is acceptable. The Navy was correct to remove a few high values for cadmium and nickel from the ambient sets. The approach shown in Figure 2 accurately represents the compromise worked out in San Francisco in May 1996 among the Department, U.S. EPA Region IX, and the Navy.**	**RESPONSE 1:** Comment noted.
2. **Exposure Point Concentrations - Uncertainties associated with using CMAX as exposure point concentrations are adequately addressed in the sections on uncertainties in the Draft Final RIRs for Sites 3 and 5.**	**RESPONSE 2:** Comment noted.
3. **Hexavalent Chromium in Groundwater: This following refers to the Navy's responses to our comment #14 for Site 3, "Fate and Transport in Groundwater and our comment #4 for Site 5, "Hexavalent Chromium". Nearly all the estimated risk for a potential future residents at both Sites 3 and 5 comes from groundwater, but the Navy states in conclusions for both sites that fate and transport in this medium is not significant. The Navy did not speciate valence states of chromium, so total chromium was taken to be all hexavalent. Chromium drives the risk estimate, which is >1E-04, a level customarily thought to be highly significant. Thus, transport of chromium in groundwater is very highly significant. The Navy states that conditions in groundwater at both sites are such that nearly all chromium will be in the less toxic trivalent state, but this remains to be established in a monitoring program. Thus, fate of chromium in groundwater is also crucial. The Navy must change the text of the conclusions in Section 7 of both Draft Final RIRs to reflect the importance of the fate and transport of chromium in groundwater.**	**RESPONSE 3:** Chromium is being speciated in the latest round of groundwater sampling (November/December 1996). The results of this speciation will be available the end of March.

Originator: John P. Christopher, Staff Toxicologist DTSC **To:** Tayseer Mahmoud DTSC **Date:** 31 October 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
4. **Ecological Assessment for Site 5, Section 7, Appendix S - We agree with the Navy's conclusion, expressed in Section 7.5.3, that Site 5 does not pose a significant risk to wildlife. However, this chapter requires minor revision. Copper, lead and zinc were identified as COPC in Table N-2; however, they do not appear in Table 7-2 and were apparently not evaluated as COPCs. Please include assessment of these metals in the final report. Maximum concentrations detected were within a factor of 2 of the 95th quantile of background (Table N-2); so we do not expect the corrected estimates of hazard to change dramatically for any of the species assessed.**	**RESPONSE 4:** Copper, lead, zinc will be evaluated as COPECs in the final RI and hazard indices will be presented in the final RI. This hazard indices are not expected to change the conclusion that Site 5 does not pose a significant risk to wildlife.
5. **Other Changes to Text - Except as noted in Comment 3 above, the changes in text from the earlier drafts make the Draft Final RIRs for Sites 3 and 5 acceptable with respect to risk assessment. In particular, we note and accept the changes regarding selection of inorganic COPC (Site 3, Appendix L; Site 5, Appendix N.)**	**RESPONSE 5:** Comment noted.

RESPONSE TO COMMENTS
DRAFT FINAL PHASE II REMEDIAL INVESTIGATION REPORT
FOR SITE 3, OPERABLE UNIT 2C
MCAS EL TORO, CALIFORNIA

Originator: John E. Scandura, Chief Cal/EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 4 November 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
COMMENTS	***RESPONSES TO COMMENTS***
1. **Executive Summary, Remedial Investigation Scope, Figure ES-1 - Show former Site 3 boundaries on Figure ES-1 and provide an explanation why site boundaries were reevaluated and expanded. This information will support the reasons why the scope of the investigation was increased.**	**RESPONSE 1:** We have revised Figure ES-1 to include the former site boundaries as requested. The Site 3 boundaries were expanded because a station document that was reviewed during the RI showed a large rectangular area oriented diagonally across the site and extending past the site boundary to the southwest. Investigation was performed to determine whether this feature represented a trench that could have contained landfill wastes. Geophysical surveys and trenching showed no wastes in this area. Aerial photographs were also reviewed to determine the pattern of waste disposal at Site 3. These photographs showed a long pipe extending from Tank 296 through the southwest portion of the Site 3 study area. (see Figure 3-2 in the RI). Landfill disposal activities shown on the photographs took place only to the northeast of this pipe. Therefore, the Site 3 boundaries have been redrawn to exclude areas on the other side of the pipe.
2. **Executive Summary, Nature and Extent of Contamination, Page ES-6 - The estimation for the volume of waste should be revised to reflect recent information collected during the Phase II investigation.** **Soil gas results should not be compared with California Air Resources Board (CARB) values. Values generated from the CARB study are intended for the comparison of surface air samples not subsurface soil gas samples.**	**RESPONSE 2:** Volumes estimates are included in the final RI documents. These estimates were originally prepared for the FS reports and will now be included in the RI reports. The soil gas results were compared to the results of a CARB report on the landfill gas testing program as reported in 1990. There are additional CARB studies that report air quality results at landfills that have also been referenced.
3. **Section 3.1, Surface Features, Page 3-1 - The list of DQO decisions should include the following to be added: Identify the limits of exposed and buried landfill waste.**	**RESPONSE 3:** This DQO has been added as suggested.
4. **Section 3.5.2, Regional Occurrence and Movement of Groundwater, Figure 3-6, Page 3-19 - In the legend of this figure, the explanation for groundwater divide depicted near Site 2 should be revised to read**	**RESPONSE 4:** The change in gradient and flow direction observed downgradient from Site 2 is an unique hydrogeologic feature. It is not a "divide" because the feature does not force groundwater to flow in two directions. The causes for this feature are discussed in the Site 2 RI report and

Originator: John E. Scandura, Chief Cal/EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 4 November 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
"Groundwater Divide Location and Trend Inferred."	does not affect the contaminant migration at Site 3. If this label were to be placed on the Site 3, it would require explanation in the text, possibly distracting the reader from the conditions at Site 3.
5. **Section 3.6.4.2, Groundwater Quality, Page 3-30 - Third Paragraph: Most of the reasoning discussed as to why iron and manganese results are inconclusive regarding potential degradation of groundwater from leachate of the Site 3 landfill are due to sample collection (high turbidity values) and laboratory duplicate results (not within control limits). If the laboratory duplicate results were not within control limits the sample lot should have been rerun. Since, it is assumed by the reviewer, that the samples were not rerun, it is suggested to use past data, including results from the most recent groundwater sampling event that occurred in January and February of 1996 (collected by CDM Federal Programs Corporation and reported in the draft quarterly groundwater monitoring report dated April 18, 1996) to interpret the iron and manganese analytical data.** **Fourth paragraph: The discussion about major cations and anions is unclear as to its purpose. The discussion leads the reviewer to assume that groundwater beneath Site 3 may be impacted by groundwater that has migrated beneath Sites 2, 5, and 17. Additionally, there is no support provided in the Report showing that Sites 2, 5, and 17 are upgradient, except perhaps Figure 3-6, which shows all relevant groundwater contours as inferred. Furthermore, if this section is going to state that Stiff and Piper diagrams generated from Site 3 data are similar to diagrams generated from data collected at other landfills located at MCAS El Toro, then the significance of the comparison should be addressed.**	**RESPONSE 5:** The iron and manganese concentrations discussed in this section are dissolved (filtered) concentrations. A note will be added to the table to designate this fact. Therefore, the effects of high turbidity are minimized which is discussed in Section 5.3.3.3. In addition, all samples and QA/QC samples received full validation and were found to be within control limits (Section 2.14 and Appendices N and O). The recent results from the third round (January/February 1996) and fourth round (November/December 1996) of groundwater monitoring will be incorporated as appropriate. The references to Stiff and Piper diagrams at other sites will be deleted because this comparison does not add to the understanding of Site 3 specific conditions.
6. **Section 4.1.6, Aerial Photograph Review, Page 4-8, First Paragraph - Please show the disturbed area and the several stained areas located**	**RESPONSE 6:** As explained in the RI, these areas of disturbance and staining occur after the Site 3 landfill was closed in 1955. A close review of the SAIC

Originator:	**John E. Scandura, Chief** **Cal/EPA**	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
To:	**Joseph Joyce, BRAC Environmental Coordinator** **MCAS El Toro**	
Date:	**4 November 1996**	
	east and southeast of the existing site boundaries, as shown on the 1958 aerial photograph. Also, provide explanation for the existence of such features.	1958 photograph does not reveal the configuration or texture of these areas clearly because they are covered in black ink. A review of stereographic pairs of the 1959 aerial photographs does not reveal the staining. Because the 1958 photographs were taken in February 1958, the possible stain areas may be standing water or tall grass. The areas of disturbances are small isolated locations that appear to be the result of infrequent traffic crossing this area which appears as a vacant lot in the 1959 photograph.
7.	**Section 4.4.2.1, Shallow Soil, Page 4-69 of the Draft Report, Sixth Paragraph - The following statement was deleted from the draft report to the draft final report: "...the laboratory noted that the chromatograph patterns for these analyses were not typical for these fuels." Please provide further discussion about the statement.**	**RESPONSE 7:** This statement was not deleted in the draft final RI report. Unfortunately, the paragraphs on TRPH and TPH were combined which obscured the presentation of the statement. These paragraphs will be separated in the final RI report. This discussion is related to the qualifier placed on the TPH data in the RCRA Facility Assessment. No discussion of the qualifier is found in the RFA report, however, the qualifier may be due to SVOCs interfering with the analyses.
8.	**Section 5.3.3.1, Volatile Organic Compounds in Groundwater, Page 5-32 - Reference to benzene concentration in groundwater being 5 µg/L is a typographical error. The correct reference is 21 µg/L.**	**RESPONSE 8:**. The 5 µg/L was an error. The correct value is 20 µg/L. The text has been revised accordingly.
9.	**Section 7, Conclusions and Recommendations, Table 7-1, Page 7-3 - The "Nature and Extent" entry for DQO Decision 5 should be reevaluated. Low levels of SVOCs were detected in 21 of 21 groundwater samples collected and analyzed from Sites 3 and 4, yet it is stated that water quality parameters indicate that the landfill contents have not leached to groundwater. Please provide rationale for this interpretation.** **The "Fate and Transport" entry for DQO Decision 6 should be revised to read "Landfill constituents are not predicted to leach to groundwater." In future documents, it is recommended to avoid using relative descriptors such as "significantly" without providing supporting data. It is difficult for the reviewer to interpret the**	**RESPONSE 9:** Table 7-1 has been revised to state that the presence of these contaminants is an indication that the landfill may have impacted groundwater The term "significantly" in the discussion refers to the relative concentration of contaminants in groundwater which are near detection limits for almost all contaminants. the use of the words significant or insignificant are minimized in the final RI reports unless defined.

Originator: John E. Scandura, Chief Cal/EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 4 November 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
impact a landfill may have to groundwater based on the statement "Landfill constituents have not significantly leached to groundwater."	

RESPONSE TO COMMENTS
DRAFT FINAL PHASE II REMEDIAL INVESTIGATION REPORT
OPERABLE UNIT 2C - SITES 3 AND 5
MCAS EL TORO, CALIFORNIA

Originator: Bonnie Arthur, RPM U.S. EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 8 November 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
COMMENTS	***RESPONSES TO COMMENTS***
1. Please update with the BCT the status of isotope analyses in the current groundwater sampling program. These should be included as agreed at past BCT meetings.	**1. Response:** Isotopic analyses are being performed in the current round of groundwater sampling. Results will be published at the end of March 1997.
2. Section 7, Conclusions and Recommendations; EPA does not agree that it can be conclusively stated that benzene in the groundwater underlying Site 3 is only attributable to Tank Farm #5. Additionally, EPA cannot agree that landfill contents have not leached to groundwater, given the low levels of SVOCs, as well as the benzene, detected in groundwater samples.	**2. Response:** Although there is inadequate information to definitively conclude that Site 3 is not the source of benzene in groundwater, monitoring wells placed downgradeint of Tank Farm #5 reported higher concentrations of benzene then those detected during the RI. The Navy believes that the source of benzene is not the landfill. The presence of VOCs in groundwater indicates that some leaching of landfill may have occured. The RI has been revised accordingly.

Originator: Glenn R. Kistner, RPM Cal EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 9 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
EVALUATION OF HELP MODELING ***APPENDIX C - HYDROLOGIC EVALUATION FOR PROPOSED CAP DESIGNS FOR SITE 5*** **The HELP model generates estimates of the infiltration and leachate quantities given site-specific descriptions of climate and cover designs. It was used in this Feasibility Study to compare various cover designs and their relatively effectiveness in minimizing infiltration and leachate generation from a landfill. The HELP model was designed to use a vegetated soil layer assumed to be a vertical percolation layer and was not designed to model a concrete surface layer barrier. Calculating evapotranspiration runoff and surface evaporation for a concrete surface layer is problem for the HELP model because this model uses the Soil Conservation Service (SCS) curve number method for estimating runoff. The SCS curve number method is an empirical method developed for small watersheds. The technique accounts for changes in runoff as a function of soil types, soil moisture and vegetative conditions. Therefore, serious errors can occur when using HELP to evaluate a paved surface.** **After reviewing the input parameters and result of HELP modeling, it appears that inappropriate permeability values were used for concrete and asphaltic paving. Three pathways exist for rainfall falling on paving . The three pathways are 1) runoff, 2) surface evaporation, and 3) infiltration. Most of the rainfall falling on pavement will be lost to runoff and surface evaporation and only a small percentage will infiltrate through paving. Concrete can be very impermeable generally on the order of 10^{-8} to 10^{-12} cm/sec depending on the composition and thickness of the paving. Literature values for asphaltic concrete range from 10^{-4} to 10^{-8} cm/sec. Paving, particularly concrete paving is susceptible to cracking which is for all practical purpose is the only way for rainfall to infiltrate. An appropriate maintenance and sealing program will prevent cracking from being a**	

Originator: Glenn R. Kistner, RPM Cal EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 9 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
significant source of infiltration. Generally as a rule of thumb a well maintained pavement is considered to have a hydraulic conductivity around 10^{-6} cm/sec and that no more than 5% of rainfall falling on pavement will infiltrate to groundwater. **The HELP model is very sensitive to the permeability value. The models for Alternatives 5a, 5b, 6a and 6b originally used a permeability value of 1.1 x 10^{-5} cm/sec for concrete. The permeability was increased to 1.1 x 10-4 cm/sec for the case of concrete with 10% cracks. Revised models were not submitted with revised text, so the revised input parameters could not be evaluated.**	
SPECIFIC COMMENTS **1. The text states that the annual rainfall averages 10 to 12 in/yr. Appendix C lists the mean annual precipitation value as 14 in/yr.**	***RESPONSES TO SPECIFIC COMMENTS*** **RESPONSE 1:** The HELP model was based on default precipitation data for Los Angeles, California. The default data record extends from year 1974 to 1978, with a mean annual precipitation of 13.5 inches/year. This value is approximately 1-2 inches greater than the mean precipitation at MCAS El Toro. By using the Los Angeles precipitation data, the predicted infiltration rates through the landfill cover are slightly over-estimated and, hence, provide some measure of conservatism. Furthermore, since the HELP model is primarily used as a tool for comparing the effectiveness of various alternatives in minimizing the rate of infiltration into the landfill, the slight increase in annual precipitation data is not expected to change any of the conclusions reached in this analysis.
2. The landfill acreage used was 1 acre. The Site 5 landfill covers approximately 1.7 acres.	**RESPONSE 2:** The HELP model output includes flow rates (such as average rates of evaporation or infiltration in units of inches/year) and water volumes (such as average annual infiltration or average annual evaporation in units of ft^3). Flow rates shown in the summary tables in Appendix D are in inches per year and, hence, are independent of the actual landfill area. On the other hand, the volumes of water listed in the HELP model output in Appendix D are based on unit area (one acre). The total volume of evaporation, infiltration, runoff and so on produced from the entire landfill area can be readily computed by multiplying the volumes of water presented in the HELP model

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	output by a factor of 1.7.
3. **The slope length used in the model for Site 5 was 50 ft. The slope length measured by EPA from figures provided in the report was 100 ft.**	**RESPONSE 3:** From Figure 4-1, Section 4 of the FS report, the slope length based on future grading is approximately 50 feet. Furthermore, because runoff is generally a small component of the total precipitation and because the rate of infiltration is relatively insensitive to the length of slope, small changes to the slope length (50 feet versus 100 feet) would result in minimal changes in the predicted infiltration rates.
RECOMMENDATIONS 1. **HELP model default precipitation data for Los Angeles, California from 1974 through 1978 was used for each calculation. The average annual precipitation value based on this default data was 13.52 in/yr. EPA recommends the HELP model be run using actual precipitation data collected at the Air Station over a minimum of a 15 year period.**	***RESPONSES TO RECOMMENDATIONS*** **RESPONSE 1:** Please refer to Response No. 1 above
2. **EPA recommends that model input parameters more accurately reflect site conditions. 1.7 acres should be used as the acreage and 100 ft. should be used as slope length.**	**RESPONSE 2:** Please refer to Responses No. 2 and 3 above.
3. **EPA recommends that a loam texture be used to better match the Sorrento loam noted on-site.**	**RESPONSE 3:** The RI designates the soils at Site 5 as Sorrento Loam. In the HELP model, the existing soil cover was assumed to be silty sand (which corresponds to Sorrento Loam). Porosity, field capacity, and wilting point for the soil were set to the HELP default values for silty sand (material no. 7). A hydraulic conductivity of 5.2×10^{-4} was used for the existing soils. In the revised Draft Final FS, a hydraulic conductivity of 2×10^{-5} was selected for the soils that will be obtained from the borrow source. This value was selected based on the hydraulic conductivity of one undisturbed soil sample from 02NEW1.

Originator: Glenn R. Kistner, RPM U.S. EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 9 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**

EVALUATION OF HELP MODELING

APPENDIX C - HYDROLOGIC EVALUATION FOR PROPOSED CAP DESIGNS FOR SITE 3

The HELP model generates estimates of the infiltration and leachate quantities given site-specific descriptions of climate and cover designs. It was used in this Feasibility Study to compare various cover designs and their relatively effectiveness in minimizing infiltration and leachate generation from a landfill. The HELP model was designed to use a vegetated soil layer assumed to be a vertical percolation layer and was not designed to model a concrete surface layer barrier. Calculating evapotranspiration runoff and surface evaporation for a concrete surface layer is problem for the HELP model because this model uses the Soil Conservation Service (SCS) curve number method for estimating runoff. The SCS curve number method is an empirical method developed for small watersheds. The technique accounts for changes in runoff as a function of soil types, soil moisture and vegetative conditions. Therefore, serious errors can occur when using HELP to evaluate a paved surface.

After reviewing the input parameters and result of HELP modeling, it appears that inappropriate permeability values were used for concrete and asphaltic paving. Three pathways exist for rainfall falling on paving . The three pathways are 1) runoff, 2) surface evaporation, and 3) infiltration. Most of the rainfall falling on pavement will be lost to runoff and surface evaporation and only a small percentage will infiltrate through paving. Concrete can be very impermeable generally on the order of 10^{-9} to 10^{-12} cm/sec depending on the composition and thickness of the paving. Literature values for asphaltic concrete range from 10^{-4} to 10^{-8} cm/sec. Paving, particularly concrete paving is susceptible to cracking which is for all practical purpose is the only way for rainfall to infiltrate. An appropriate

Originator: Glenn R. Kistner, RPM U.S. EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 9 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
maintenance and sealing program will prevent cracking from being a significant source of infiltration. Generally as a rule of thumb a well maintained pavement is considered to have a hydraulic conductivity around 10^{-6} cm/sec and that no more than 5% of rainfall falling on pavement will infiltrate to groundwater. **The HELP model is very sensitive to the permeability value. The models for Alternatives 5a, 5b, 6a and 6b originally used a permeability value of 1.1 x 10^{-5} cm/sec for concrete. The permeability was increased to 1.1 x 10^{-4} cm/sec for the case of concrete with 10% cracks. Revised models were not submitted with revised text, so the revised input parameters could not be evaluated.**	
SPECIFIC COMMENTS **Several inconsistencies were noted in the HELP are summarized below.** **1. The text states that the annual rainfall averages 10 to 12 in/yr. Appendix C lists the mean annual precipitation value as 14 in/yr.**	*RESPONSES TO SPECIFIC COMMENTS* **RESPONSE 1:** The HELP model was based on default precipitation data for Los Angeles, California. The default data record extends from year 1974 to 1978, with a mean annual precipitation of 13.5 inches/year. This value is approximately 1-2 inches greater than the mean precipitation at MCAS El Toro. By using the Los Angeles precipitation data, the predicted infiltration rates through the landfill cover are slightly over-estimated and, hence, provide some measure of conservatism. Furthermore, since the HELP model is primarily used as a tool for comparing the effectiveness of various alternatives in minimizing the rate of infiltration into the landfill, the slight increase in annual precipitation data is not expected to change any of the conclusions reached in this analysis.
2. The landfill acreage used was 1 acre. The Site 3 landfill covers approximately 11 acres.	**RESPONSE 2:** The HELP model output includes flow rates (such as average rates of evaporation or infiltration in units of inches/year) and water volumes (such as average annual infiltration or average annual evaporation in units of ft^3). Flow rates shown in the summary tables in Appendix D are in inches per year and, hence, are independent of the actual landfill area. On the other hand, the volumes of water listed in the HELP model output in Appendix D are

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	based on unit area (i.e., one acre). The total volume of evaporation, infiltration, runoff, and so on produced from the entire landfill area can be readily computed by multiplying the volumes of water presented in the HELP model output by a factor of 7.95.
3. The slope length used in the model for Site 3 was 800 ft. The slope length measured by EPA from figures provided in the report was 550 ft. Please explain this discrepancy.	**RESPONSE 3:** 800 feet is the maximum slope length in any direction at Site 3 per Figure 4-1, Proposed Grading Plan. This value is considered conservative. By using the maximum length, infiltration through the cap is maximized.
4. The percent slope used for Site 3 was 2%, which was stated as being conservative. Review of the site topography from figures included in the report show an average site slope of 3% to 4%.	**RESPONSE 4:** Based on Figure 3-1, the slope varies, with 2% representing the minimum slope at the site. By using the minimum slope, runoff is minimized and infiltration is maximized. This is considered conservative.
RECOMMENDATIONS	***RESPONSES TO RECOMMENDATIONS***
1. HELP model default precipitation data for Los Angeles, California from 1974 through 1978 was used for each calculation. The average annual precipitation value based on this default data was 13.52 in/yr. EPA recommends the HELP model be run using actual precipitation data collected at the Air Station over a minimum of a 15 year period.	**RESPONSE 1:** Please refer to Response No. 1 above. We acknowledge the validity of the reviewer's recommendation. As part of the final design calculations, the selected alternative will be re-evaluated using the entire record of precipitation collected at MCAS El Toro.
2. EPA recommends that actual acreage (11 acres), percent slopes (3% to 4%), and slope lengths (550 ft.) be used to more accurately reflect site conditions.	**RESPONSE 2:** Please refer to responses 2 and 3 above.
3. EPA recommends that a loam texture be used to better match the Sorrento loam noted on-site.	**RESPONSE 3:** The RI designates the soils at Site 3 as Sorrento Loam. In the HELP model, the existing soil cover was assumed to be silty sand (which corresponds to Sorrento Loam). Porosity, field capacity, and wilting point for the soil were set to the HELP default values for silty sand (material no. 7). A hydraulic conductivity of 5.2×10^{-4} was used for the existing soils. In the revised Draft Final FS, a hydraulic conductivity of 2×10^{-5} was selected for the soils that will be obtained from the borrow source. This value was selected based on the hydraulic conductivity of one undisturbed soil sample from

Originator:	**Glenn R. Kistner, RPM** **U.S. EPA**	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
To:	**Joseph Joyce, BRAC Environmental Coordinator** **MCAS El Toro**	
Date:	**9 December 1996**	
		02NEW1.

RESPONSE TO COMMENTS
DRAFT PHASE II FEASIBILITY STUDY REPORT
FOR OPERABLE UNIT 2C - SITE 3
MCAS EL TORO, CALIFORNIA

Originator: Glenn R. Kistner, RPM U.S. EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 9 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. **The need to perform any kind of remedial action is unclear since there are no stated cleanup goals. One of the first tasks in developing a Feasibility Study (FS) is to determine the cleanup goals so that the areas of concern can be established. This is not done in this document. Therefore, it is not known whether any of the units require action. This document should include a discussion of numerical cleanup goals (not just RAOs). This is fundamental to evaluating the alternatives. It is virtually impossible to evaluate the effectiveness and protectiveness of the alternatives without cleanup goals.**	**RESPONSE 1:** The need for action at Site 3 was evaluated based on the human health risk assessment performed as part of the RI report. We have now added a table to the FS showing risk-based concentrations (RBCs) for all potential risk drivers detected at the site. The RBCs act as numerical cleanup goals for areas being consolidated or clean closed.
2. **Data for Unit 1 is extremely limited. Essentially, two surface locations and one subsurface location were sampled for 11 acres. This means that the results from the risk assessment have a high degree of uncertainty and the need for a remedial action cannot be absolutely determined based on the data presented in this document.** **Further, the data and evaluations in this FS cannot be used to determine a selected remedy. Very few borings were completed and only one groundwater sample was collected from within the landfill itself. Additional data should be collected to determine a remedy; this should be stated in the FS. There are no numerical cleanup goals listed in which to evaluate the acceptability of Site 3 under present conditions. Therefore, the decision that a cap is needed for protectiveness may represent an unnecessary expenditure of funds when no unacceptable risk has been determined. If a cap is necessary to comply with state regulations, this should be stated, otherwise continued monitoring of the site may be acceptable.**	**RESPONSE 2**: A total of eight soil samples collected from 0 to 2 feet below ground surface were used to prepare the risk assessment in Unit 1. This information is presented in the RI. At the time that the RI was under preparation, all eight samples were within the Phase II Unit 1 study area boundary. Based on the findings in the RI, the Unit 1 was drawn to the boundary as represented in the FS. Even with this number of samples, the uncertainty is possibly high due to the size of the site. The data in the RI can be used for remedial action alternative selection because the selection is not specifically guided by risks at the site but rather by selection of landfill presumptive remedies. RBCs have been included in the FS and are provided as cleanup goals for areas of the site that will be subject to consolidation. A cover is necessary according to the ARARs analysis in the FS.

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3. **Data used for the risk assessment text are not consistent with data presented in Figures 2-8 and 2-9. Because of this, the validity of the risk assessment is in doubt. Please also see specific comments.**	**RESPONSE 3:** The data presented on Figures 2-8 and 2-9 reflect the results of all sampling conducted at Site 3. The risk assessment only considers chemicals in the top 2 feet of soil (for the industrial scenario) and chemicals in the top 10 feet of soil (for the residential scenario). This is why the two data sets do not correspond.
4. **Several alternatives use the existing soil for cap materials. However, the cleanup objectives (risk) for soil are not discussed in this Feasibility Study. The existing surface soil may exceed those risks and therefore be unacceptable for use as a cap because it will not meet the cleanup goals. Numerical site cleanup goals need to be determined and the alternatives reevaluated to determine if they meet those goals.**	**RESPONSE 4:** This is a valid point. To address this issue, clean soil from the borrow source between Sites 2 and 17 will be imported to Site 3 to be used as the upper 4 feet of soil for the native soil cap and the upper 2 feet of soil (vegetative cover) for the capping designs in Alternative 4. We will continue to use on-site soil for the foundation layers for Alternatives 4, 5, and 6. RBCs have been established for Site 3. These will be used as goals against which confirmation samples taken from areas being consolidated can be compared.
5. **Although stability of the cover system does not appear to be an issue due to the relatively gentle grades and minimal side slopes, a drainage layer above the barrier layer (clay, geomembrane, or GCL) should be evaluated depending on the future use of the capped area where a vegetative cover is used. If the capped area will be subject to vehicle access or other activity when the vegetative layer is saturated, damage to the cap may occur. The vertical location of a drainage layer will depend on the depth of saturation based on the HELP runs and the future use of the site. This will likely only be an issue during the heavy precipitation months of January and February, but this issue should be considered in the FS.**	**RESPONSE 5:** Because the FS was meant to be a conceptual document, drainage layers were not shown above the clay, GCL, and FML barrier layers. The need for a drainage layer will be evaluated at the detailed design stage once the preferred alternative is chosen. We have added a note to this effect in the Draft Final FS.
6. **Actual site climatological data (mean temperatures, monthly rainfall) should be obtained from El Toro (climatological data is normally**	**RESPONSE 6:** Actual climatological data from MCAS El Toro will be used in a detailed design of the cap. However, the difference in data from Los

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collected at military airfields) and presented as a comparison to the default data used for Los Angeles, California.	Angeles and MCAS El Toro is not significantly different (approximately 12.5 to 14 inches/year at MCAS El Toro versus 13.5 inches/year of rainfall at Los Angeles).
7. **Chlorinated solvents and metals have been detected at Unit 3. The presence of CERCLA contaminants means that this Unit cannot be considered for no further action under the petroleum exclusion.**	**RESPONSE 7:** Chemicals detected in Unit 3 do not exceed the RBCs and did not result in unacceptable risks at this unit. Therefore, this unit will be recommended for no further action or should be eligible for a petroleum exclusion due to the very limited but relatively high concentrations of TRPH and TPH.
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
1. **Section 2.2.1.4, p. 2-9. The features discussed in the first few paragraphs of this section could be shown on Figure 2-3 (i.e., channel, box culverts, upstream culverts, drop structure, etc.).**	**RESPONSE 1:** These features have been added to Figure 2-3.
2. **Figure 2-3. This figure shows nothing more than Figure 2-1. Please revise or delete this figure.**	**RESPONSE 2:** Figure 2-3 has been revised to show the site drainage features mentioned in Comment 1 and also a major water pipeline from a water tank near the site is illustrated on this figure.
3. **Section 2.2.2, p. 2-15, paragraph 2. Please reference Figure 2-6 instead of Figure 2-5.**	**RESPONSE 3:** The text has been revised as noted.
4. **Section 2.2.2.3. Please use consistent units in the text and figures for this section (i.e., choose either mg/L or ppm_v). It is confusing for the reader when different units are used in the same paragraph, and when units change in a section.**	**RESPONSE 4:** The differences in units has to do with the fact that the results are reported in a different format from the Air SWAT and the Phase II RI. Also the are differences in how the different samples are reported (i.e., instantaneous are ppm because they are readings from a PID, integrated and ambient are µg/L because they are reported from an analytical laboratory, and the flux chamber measurements are presented in $\mu g/m^2/min$ because they are a measure of concentration over time).
5. **Page 2-16, last paragraph. Figure 2-7 should be cited rather than Figure 2-6. The methane sample concentration in sample 3-PG4 should be 42 ppm not 19 ppm_v as the text indicates. Please revise the text and**	**RESPONSE 5:** The reference has been revised, however, the conversion for methane from ppm_v to micrograms per liter is correct.

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check the conversions on the other samples.	
6. **Section 2.2.2.4, p. 2-22, paragraph 1. Figure 2-8 shows only two surface samples (3DBS, 3LF3) taken from Unit 1, not six as stated in the text. There are also two samples collected outside the Unit 1 boundary. Silvex is not shown in Figure 2-8 as being detected in Unit 1 samples unless sample 3UGS is considered a the Unit 1 sample. Please clarify the number and location of samples by including a table summarizing all of the samples collected in each unit. If all results were ND or below screening criteria and the sample is not shown on Figures 2-8 or 2-9, indicated this on the table.**	**RESPONSE 6:** The number of samples collected per unit is presented in a table in the draft final RI. The number of samples is correct. As discussed above, the Unit 1 boundary was redrawn in the conclusions of the RI after all information on this unit compiled and assessed, including whether or not these samples had any risks associated with them.
7. **Section 2.2.2.4, p. 2-22, paragraph 2. The second sentence states that 18 samples were collected from Unit 1. However, most of these samples were actually not collected from borings within the Unit 1 boundaries. Wells M26, M64, and 65X are well outside the Unit 1 limits as shown. In actuality, only one boring was completed within the Unit 1 boundaries. The third sentence talks about Site 4 – yet this Feasibility Study is for Site 3. Please explain how Site 4 samples are relevant, since these are cross-gradient samples. Please revise the text so that only data from Unit 1 or relevant downgradient locations is discussed. Also, compare the detected concentrations with relevant screening criteria like the Region IX PRGs.**	**RESPONSE 7:** In the draft final RI, it is explained that the 18 samples collected during the installation of the outlying monitoring wells are used to assess whether landfill contaminants may have extended out from the landfill in subsurface soils. The reason all detected contaminants are shown is because the actual number of detections is relatively small and the concentrations are low. By showing all detections, it emphasizes that there are no contaminants from the landfill in the subsurface. Samples from the Site 4 area are included because they provide valuable information on whether the landfill has impacted this area and whether there are other sources in the area (Tank Farm No. 5 appears to be a source of TPH and benzene in groundwater).
8. **Section 2.2.2.4, p. 2-28, paragraph 2. The text states that subsurface samples were not collected during Phase II. Figure 2-9 shows two Phase II soil borings within Unit 3. Sample 300-B4 is shown as a Phase II sample complete with data at various depths. Please correct or explain.**	**RESPONSE 8:** Boring 300_B4 is a soil boring completed during the RCRA Facility Assessment. Because the RI/FS represents a compilation of all data, results from this boring are included.
9. **Page 2-29, last paragraph. Boring 3SB5 was also completed in Unit 4 but is not discussed in the text. Please include this boring in the discussion.**	**RESPONSE 9:** Boring 3SB5 was not included because there were no chemicals detected in this boring.

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10. Page 2-47, paragraph 3. The methane content is actually 42 ppm$_v$. See comment 5.	**RESPONSE 10:** See response to comment 5.
11. Section 2.2.3.2, pp. 2-47, 2-48. Although analysis of soil and groundwater were performed to evaluate the impact of infiltration of water and leaching of landfill wastes into the groundwater, no long-term impact to the groundwater was investigated using TCLP (metals and VOCs) analysis of the landfill waste. This analysis is also needed to determine the characteristics of the landfill with regard to hazardous or non-hazardous determination. This characterization will also be important in the ARARs evaluation of the proposed alternatives. For example, if the material within the landfill is characterized as hazardous, a composite RCRA cap should be evaluated with regard to the long-term impact to groundwater and the potential health risks and impact to the environment.	**RESPONSE 11:** Under U.S. EPA guidelines, the wastes in the site are considered as non-hazardous when documentation of sources is not available (U.S. EPA 1989 and NCP preamble). Under this guidance, the lead agency may assume the wastes are non-hazardous unless further analysis or information becomes available to determine whether the wastes are RCRA hazardous wastes. Based on interviews of the landfill operation, the wastes were typical of military and municipal wastes which under the presumptive remedy approach are non-hazardous wastes with small quantities of hazardous wastes involved.
12. Page 2-52, paragraph 1. Please describe the data on which the Unit 1 risk was based. The fact that this risk is based on very few samples and has a high degree of uncertainty should be discussed. Only one sample, collected outside the Unit 1 boundary, is shown on Figures 2-8 and 2-9 with results for arsenic. This is inconsistent. Please explain how arsenic can be a major contribution to risk when it was only detected in one sample. If arsenic was detected in other samples, include the arsenic results on Figures 2-8 and 2-9.	**RESPONSE 12:** The arsenic values have been added to these figures.
13. Page 2-52, paragraph 2. Figures 2-8 and 2-9 do not show that arsenic was detected in Unit 3 samples. Arsenic does not appear to be a concern. This paragraph needs to be revised, or arsenic must be included in the sample results shown on Figures 2-8 and 2-9.	**RESPONSE 13:** The arsenic values have been added to these figures.
14. Page 2-52, paragraph 3. According to Figures 2-8 and 2-9, arsenic and chromium were not found in Unit 4. Arsenic and chromium do not appear to be a concern. This paragraph needs to be revised, or the	**RESPONSE 14:** The arsenic and chromium values have been added to these figures.

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figures should be revised. The text and figures must be consistent.	
15. Section 3.1.2.1, p. 3-5. According to Figures 2-8 and 2-9, arsenic and chromium were not found in soil to any appreciable extent. See comments 12, 13, and 14. The text, calculated risk, and figures must be consistent.	**RESPONSE 15:** The arsenic and chromium values have been added to these figures.
16. Table 3-1. The technical requirements listed in this table are for a non-hazardous solid waste landfill. Hazardous classification testing was not performed to determine if the landfill should be classified as hazardous or non-hazardous material. If the data does not exist, then both classifications need to be considered along with the applicable technical/regulatory requirements.	**RESPONSE 16:** Both hazardous (Title 22) and non-hazardous (Titles 14 and 23) waste regulations are considered in the ARARs discussion for this site. The discussion of ARARs in Sections 3 and Appendix A also addresses both hazardous and non-hazardous waste regulations. However, because this landfill is considered as a non-hazardous municipal/military landfill, technical requirements for closure and post-closure monitoring of the site are for non-hazardous landfills.
17. Section 3.1.3, p. 3-13, paragraph 2. The geochemical and modeling basis for the statement: "metals present in groundwater are not expected to migrate downgradient past a transition zone because groundwater conditions will cause the metals to precipitate," is unclear. Please provide additional information and a reference to these data and modeling results.	**RESPONSE 17:** The bases of this statement are summarized in the fate and transport section of Section 2 in the FS and Section 5 of the Draft Final RI.
18. Section 3.1.4, p. 3-13. Please state the acceptable risk for each of the receptors. The acceptable risk may show that there is no problem with most of the site regarding industrial workers and that the only real threat is from potential groundwater consumption. The basis for these RAOs needs to be better justified.	**RESPONSE 18:** The Navy considers risks less than 10^{-6} for residential and less than 10^{-5} for industrial to be generally acceptable. These risk values are the basis of Table 3-3. The RAOs that have been selected for Site 3 are based on the presumptive remedy approach. However, as noted previously, a landfill cap is proposed to prevent infiltration into landfill materials and direct contract with landfill wastes.
19. Section 3.2, p. 3-14, paragraph 2. The statement, "because neither the exact location nor the chemical nature of the buried waste in the landfill is known,...," suggests the need for further delineation and characterization of the landfill materials for all potential response actions including containment. In order to determine the type of cap	**RESPONSE 19:** The presumptive remedy approach does not require complete characterization of landfill wastes. Under U.S. EPA guidelines, the wastes in the site are considered as non-hazardous when documentation of sources is not available (U.S. EPA 1989 and NCP preamble). The statement has been deleted from the FS.

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system and the extent of the area to be capped, the waste should be characterized as hazardous or non-hazardous through TCLP tests and hazardous characteristics testing. The extent of wastes should also be delineated.	
20. Page 3-17, paragraph 1. The statement that "Unit 3...contamination consists primarily of petroleum hydrocarbons" is not correct. Unit 3 is called a solvent spill area and contains VOCs, metals, herbicides and SVOCs. The fact that there are petroleum compounds is of secondary importance since the risk is due to non-petroleum analytes. This cannot be considered a petroleum issue only and Unit 3 cannot be considered for no further action under the petroleum exclusion. Include Unit 3 in this Feasibility Study.	**RESPONSE 20:** The VOCs, metals, herbicides, and SVOCs detected at Unit 3 do not exceed the RBCs. Therefore, this unit should be considered eligible for no further action.
21. Section 3.4, p. 3-17. It is not clear why landfill gas collection and leachate collection are included when previous sections indicate that there is no landfill gas of concern and leachate is not present. Please clarify the reason for including these remedies.	**RESPONSE 21:** Landfill gas collection and leachate collection are included for completeness because these are presumptive remedies for landfill sites. They are also screened out in Section 3 as unnecessary for Site 3.
22. Section 3.4.2, p. 3-18, paragraph 2. Please reference the geochemical data that supports the statement in this paragraph with regard to the precipitation of metals in the groundwater immediately downgradient of the site.	**RESPONSE 22:** See refer to Section 2 of the FS or the fate and transport analysis in the RI.
23. Section 3.4.4, p. 3-19, paragraph 1. Please explain how a cap will control landfill gas. A landfill cap will not stop the production of landfill gas and will tend to divert landfill gas horizontally where it may still be a problem.	**RESPONSE 23:** Agreed. This statement has been deleted.
24. Section 3.5.1.2, p. 3-20, 2nd bullet. Please revise to clarify if the 30 mil liner is in addition to the clay layer or is an alternate to the clay layer.	**RESPONSE 24:** The 30-mil liner is an alternate to the clay barrier. The text has been revised to make this clear.
25. Section 3.5.2, p.3-24. Prevention of groundwater consumption should be included as an institutional control because that is where most of the risk originates. Please enhance the discussion of groundwater	**RESPONSE 25:** Deed restrictions are negotiated at the time of a BRAC transfer, according to Department of Navy policy. Until that time occurs, the restrictions are controlled through the Base Master Plan.

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restrictions in the institutional controls.	
26. Figure 4-1. Although the drainage ditch shown on top of the landfill cover system is stabilized with gunite, long-term settlement/exposure of these ditches may make them susceptible to erosion. Erosion damage of the protective cover should be minimized. Consider allowing stormwater to sheet flow to drainage ditches outside the capped areas.	**RESPONSE 26:** The drawings are revised to show drainage ditches with gunite liners. This element is shown under the presumption that the Site 3 area is used in a similar manner to today's uses. If an industrial center is placed over the site, additional work may be needed to assure that drainage is protective of the landfill cap and harmonious with site usage.
27. Section 4.3, p. 4-5. This alternative may not be acceptable. If the site has currently unacceptable risks due to contact with soil (which should to be determined in this Feasibility Study), then regrading and compacting the existing contaminated surface soil will do nothing to meet the RAOs. This alternative should be evaluated more carefully to see if it is acceptable.	**RESPONSE 27:** The discussion of Alternative 3 has been revised to note that the 4 feet of soil for the native soil cap will be imported from an off-site borrow source.
28. Section 4.3/4.3.1, p. 4-5 and Figure 4-2. The information presented in these two sections and on the referenced figure is somewhat confusing. It appears that for this alternative, the Navy is proposing to use the existing soil cover which is reported to be at least 6 feet thick as the landfill cap with the exception that the top 2 feet of this cover soil will be excavated and replaced as recompacted material using 6 inch thick, controlled fill construction techniques. If this is accurate, the text should be revised to make this remedial concept more clear. For example, the second sentence of Section 4.3 which reads "In this alternative the uppermost 4 feet of the existing soil cover over the landfill will be used and substituted as a single-layer cap consisting of native soil...." is confusing and inconsistent with the proposed capping alternative concept. In addition, it is recommended that Figure 4-2 be revised to show one soil layer labeled "existing soil" of minimum 6 foot thickness with a dashed line at the 2 foot depth with that zone labeled "existing soil cover to be excavated and replaced as recompacted material in 6 inch thick controlled lifts."	**RESPONSE 28:** The text has been revised to indicate that the upper 4 feet will be excavated and borrow source soils will be used to form the monolithic cap.

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29. Section 4.3.1, p. 4-5. **Please indicate what the native soil type is (USC, gradation etc.) that would be used for the landfill cap.**	**RESPONSE 29:** The native soil ranges from a silty sand to sandy silt in the Topanga Formation. One undisturbed soil sample from 02NEW1 had a hydraulic conductivity of 2×10^{-6}.
30. Section 4.3.2, p. 4-7. **Please discuss implementation of groundwater use restrictions. Current uses may include irrigation water, stock water, human consumption, etc.**	**RESPONSE 30:** Deed restrictions are negotiated at the time of a BRAC transfer, according to Department of Navy policy. Until that time occurs, the restrictions are controlled through the Base Master Plan.
31. Section 4.4, p. 4-8. **None of the four capping system alternatives presented in this section use a drainage layer above the low permeability barrier layer. It is recommended that one be considered. This layer could consist of a drainage net with over and underlying filtration geotextiles, a drainage composite, or a high permeability granular soil layer with overlying filtration geotextile. A drainage layer is especially important for this site where landfill surface grades are very flat, and where a higher percentage of rainwater can therefore infiltrate into the capping system.**	**RESPONSE 31:** We agree that a drainage layer needs to be considered for this site and plan to address the need for and design of this layer at the detailed design phase.
32. Page 4-11, paragraph 2. **Reuse of contaminated surface soil that exceeds acceptable risks (TBD) will not meet ARARs. The intent of a cap is to cover the contaminated surface soil to remove the exposure pathway. This alternative should be revised based on acceptable risk.**	**RESPONSE 32:** The discussion of Alternative 4 has been modified to indicate that soil for the 2-foot vegetative layer for the single barrier landfill cap will be obtained from the borrow source between Site 2 and Site 17.
33. Section 4.4, p. 4-11, paragraph 2. **It is stated that a 1 foot thick foundation soil layer will be constructed with the excavated existing soil cover material. This is inconsistent with a sentence in the previous paragraph as well as Figure 4-4 in which a 2 foot "foundation layer" is designated. Please revise to be consistent.**	**RESPONSE 33:** Alternatives 4, 5, and 6 will utilize a 2-foot foundation layer. This comment is not applicable to Alternative 3 which is a monolithic cap.
34. Section 4.4.1, p. 4-12. **The 3rd bullet says clean soil is needed on top of the barrier layer. The following paragraphs in the report discuss using the existing contaminated surface soil as the vegetative cover which does nothing to reduce the risk if it is shown to be too high. This alternative should be revised.**	**RESPONSE 34:** This discussion has been modified to indicate that soil for the vegetative layer will be imported from the borrow source.

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35. Section 4.4.2, p. 4-13. Amending soil with bentonite to create a low permeability material is typically only practical for non-plastic granular soils where uniform blending and hydration of the bentonite is effective and efficient. It is unclear from the information presented if the existing soil cover to be excavated and amended with bentonite as proposed in Section 4.4.2 is granular. Please clarify.	**RESPONSE 35:** This would need to be studied in greater detail. At this time, the borrow source is likely to provide a non-plastic soil, however, a larger number of samples of the borrow source are needed to assess whether blending would be effective. Additionally, the soil/bentonite barrier layer is not as desirable as other options for a barrier. Therefore, additional studies of a possible blending process are not likely to be necessary.
36. Section 4.4.2, p. 4-13. Use of the contaminated surface soil for the protective vegetative layer will not reduce the risk from surface soils. Please revise.	**RESPONSE 36:** This discussion has been modified to indicate that soil for the vegetative layer will be imported from the borrow source.
37. Section 4.4.2, p. 4-14, paragraph 1. The figure shows a 2 foot foundation layer and the text discusses a 1 foot layer. Please correct.	**RESPONSE 37:** The text has been revised to indicate that a 2-foot foundation layer will be used.
38. Section 4.4.3, p. 4-14 and Section 4.4.4, p. 4-16. Use of the contaminated surface soil for the protective vegetative layer will not reduce the risk. Please revise.	**RESPONSE 38:** This discussion has been modified to indicate that soil for the vegetative layer will be imported from the borrow source.
39. Section 4.4.4, p. 4-16, paragraph 1. Please explain why 60 mil FML (or thicker) was proposed. Typically, 40 mil is the FML thickness used in a landfill capping system.	**RESPONSE 39:** A 60 mil FML barrier was proposed because it is easier to work with (e.g., lay out, weld) and because it is more expensive than a thinner barrier. The use of the 60 mil FML, especially for cost purposes, is considered conservative.
40. Section 4.4.4, p. 4-16 paragraph 3. Extrusion welding of polyethylene FMLs (e.g., HDPE, LLDPE, VLDPE) is typically only used in tight, limited access areas such as anchor trenches, sumps, etc. where larger fusion welding equipment cannot be used. In general, fusion welding is preferred wherever possible since it produces a double track weld (i.e., essentially two welds) with an intermediate air channel which can be pressure tested pneumatically. In contrast, extrusion welds only produce a single weld which is tested using a much less accurate and secure vacuum box procedure. Please justify the use of extrusion welding, or revise this paragraph.	**RESPONSE 40:** This statement has been revised to indicate that fusion, not extrusion, welding will be used.

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41. Figure 4-7, p. 4-16 and Section 4.4.4. **A high density polyethylene (HDPE) FML is not the best choice of geomembrane for a landfill capping system because of its rigidity, which could cause it to tear if it were forced to stretch biaxially to accommodate underlying differential settlement features in the waste mass (i.e., pothole or crater-like depressions). Instead, low density polyethylene materials such as LLDPE and VLDPE are generally used for this purpose because of their flexibility and excellent elongation properties. These materials are not as chemically resistant as HDPE, but this is irrelevant for a landfill capping system in which the only liquid the FML will contact is infiltrating rainwater. Low density polyethylene materials should also be more economical than HDPE. Please delete the reference to HDPE as a potential landfill cap material throughout these sections.**	**RESPONSE 41:** The cost estimating package (RACER) includes HDPE and several other synthetic layers as options. HPDE was used in the cost estimate because it is one of the more expensive and durable membranes. Therefore, the cost are conservative and use a durable product that is readily available. The actual membrane layer would be evaluated in greater detail at the detail design stage if this option is chosen as the preferred capping method.
42. Section 4.5, p. 4-17, paragraph 2, last two sentences. **Asphalt will most likely require more than minimum maintenance. It tends to crack and become perforated with grasses or other plants and then would allow filtration. Please reword.**	**RESPONSE 42:** This discussion has been revised as suggested.
43. Figures 4-10 and 4-11. **Please clarify the purpose of the text "synthetic membrane liner," which is found beneath the label "3 inch-thick sand layer," since it is not clear if this indicates another layer of geotextile fabric.**	**RESPONSE 43:** This is a typographic error. The label has been deleted from the figure.
44. **Comment missing**	
45. **Comment missing**	
46. Figures 4-10 and 4-11. **The 3 inch thick sand layer has apparently been included to prevent abrasive forces generated during casting of the concrete liner from tearing the underlying FML. A thick, nonwoven needle punched geotextile (³ 30 oz./yd²) will serve the same purpose and is much simpler to place. It should also be cost competitive with the sand. Please consider this option.**	**RESPONSE 46:** A sand layer is considered more protective than a geotextile layer in this application. The reference to the CPE has been deleted. Many of these elements of the capping system are conveniently available in the RACER program. If this option is a preferred alternative in the record of Decision, then a more in-depth

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Chlorinated polyethylene (CPE) geomembrane is not typically used in landfill final cover systems. Generally, PVC or low density polyethylene materials (i.e., LLDPE or VLDPE) are typically used for this purpose because of their flexibility and excellent elongation properties which makes them capable of stretching without tearing over areas of large differential settlement (i.e., pothole and crater-like depressions) which can occur in an underlying waste mass. Please revise. **An 80 mil thick geotextile is very rarely specified, may not be readily available (i.e., may require a special order for manufacture), and appears to be overly conservative for use as a separation fabric between an FML and an underlying soil layer, especially if the maximum particle size of this layer is restricted by specification to be no larger than 1 inch. In this case, a 12 to 18 oz/yd^2 nonwoven needle punched geotextile should be more than adequate. Please reevaluate the materials.**	analysis of the appropriate design will be conducted.
47. **Figure 4-11. Figures 4-10 and 4-11 are inconsistent regarding the geotextile cushioning layers used in conjunction with the FML and the 3 inch thick sand cushioning layer. In particular, Figure 4-10 requires use of only a geotextile underliner beneath the FML while Figure 4-11 requires geotextile under and overliners both above and below the FML. Both presently require the 3 inch thick sand layer. For this particular conceptual design, nonwoven needle punched geotextiles should be placed both above and below the FML with a more heavy duty (i.e., greater weight) geotextile used as the overliner because of the much greater abrasive and puncturing effects of the concrete pavement (Figure 4-10) or crushed aggregate base course (Figure 4-11) as compared to the soil "foundation layer" which underlies the FML. If the geotextile overliner is properly designed with adequate puncture and tear strength, and abrasion resistance, the 3 inch thick sand cushioning layer can be eliminated. Please reevaluate the proposed materials.**	**RESPONSE 47:** These figures have been revised to show a sand cushioning layer and to eliminate the geotextile overliners. If sand is used for protection, the geotextile is not necessary.

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48. Section 5.2.1.2, p. 5-4, Overall Protection. The site could still be a risk since no monitoring is performed. This section should be rewritten to include the uncertainties and the lack of long-term monitoring as additional reasons why Alternative 1 is not considered protective of human health and the environment.	**RESPONSE 48:** The Risk-Based Concentrations (RBCs) for chemicals detected in the soils of the site are proposed as cleanup goals and have been added (Table 3-3).
49. Section 5.2.1.1, p. 5-5, Long-Term Effectiveness. The need to reduce risks associated with the landfill has not been established. Cleanup risk goals need to be determined. Contact with the landfill wastes has not been shown to be a concern. Please revise.	**RESPONSE 49:** Under the presumptive remedy approach, containment by a capping system will prevent contact with landfill wastes. In general, risks to human health and the environment are inherent with most municipal and military wastes. These risks were not characterized at the site. However, rendering the exposure pathway incomplete by capping reduces that inherent risk to below levels usually considered acceptable.
50. Section 5.2.2.2, p. 5-6, Overall Protection. It is not known if this alternative is protective since there is no information that shows that the exposed landfill contents would exceed risk criteria. Protection from "potential" risks is not a criteria for an alternative to be protective. Therefore, the overall protection of human health may be acceptable. Please revise.	**RESPONSE 50:** See response to comment 48.
51. Page 5-9, paragraph 1. The overall protection of this alternative cannot be determined until the cleanup risk goals have been determined. Please list the cleanup goals.	**RESPONSE 51:** See response to comment 49.
52. Section 5.2.3.2, p. 5-9; Section 5.2.4.1, p. 5-14; Section 5.2.4.2, p. 5-19; Section 5.2.4.2, p. 5-21; and Section 5.2.4.2, p. 5-28; Overall Protection. The overall protection of these alternatives cannot be determined until the cleanup risk goals have been determined. Please list the cleanup goals.	**RESPONSE 52:** See response to comment 48.
53. Tables 5-1 through 5-10. Please provide a detailed breakdown of the costs associated with the post closure monitoring.	**RESPONSE 53:** This breakdown has been added to the cost estimate for Site 3.
54. Section 5.2.5.1, p. 5-32 and Section 5.2.5.2, p. 5-36, ARARs. Please	**RESPONSE 54:** A discussion has been added to the appendix presenting the

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include the crack area used for the infiltration calculations.	HELP model which outlines the assumptions used to assess the effects of cracks and formulation of the effective hydraulic conductivity of pavements.
55. Section 6.1, p. 6-1. See previous comments on the protection of human health and the environment for Alternatives 1 and 2. Lowering the risks may not be necessary depending on how the cleanup goals are set.	**RESPONSE 55:** Because samples were not collected from the landfill wastes and unless a cap is placed other the landfill trench, a potential threat exists from contact with the wastes. Therefore, capping alternatives are protective of human health and the environment.
56. Table 6-4. See previous comments for Alternatives 1 and 2 regarding protection.	**RESPONSE 56:** See response to comment 56.
57. Page 7-1, 1st bullet. See earlier comments regarding protection. Before saying that they are unprotective, there needs to be an unacceptable risk. This is not clearly demonstrated in this Feasibility Study.	**RESPONSE 57:** See response to comment 49.
58. Table A4-1, p. A4-6. The statement that the landfill is characterized as non-hazardous and therefore RCRA closure requirements are not applicable needs to be substantiated with analytical data on the landfill material.	**RESPONSE 58:** Under U.S. EPA guidelines, the wastes in the site are considered as non-hazardous when documentation of sources is not available (U.S. EPA 1989 and NCP preamble). Under this guidance, the lead agency may assume the wastes are non-hazardous unless further analysis or information becomes available to determine whether the wastes are RCRA hazardous wastes. Based on interviews of the landfill operation, the wastes were typical of military and municipal wastes which under the presumptive remedy approach are non-hazardous wastes with small quantities of hazardous wastes involved.
59. Page C-4, Evapotranspirational Demand. Provide justification for using an evaporative depth of 24 inches for modeling Alternatives 5a and 5b.	**RESPONSE 59:** The justification has been added to the HELP appendix.
60. Table C-2. The justification for modifying the HELP model simulation to obtain lower infiltration rates for Alternatives 5 and 6 should be provided.	**RESPONSE 60:** This discussion is added to the HELP model appendix.

RESPONSE TO COMMENTS
ON THE SENSITIVITY ANALYSIS OF CAP DESIGNS
FOR SITES 3 AND 5
MCAS EL TORO, CALIFORNIA

Originator: Glenn R. Kistner, RPM U.S. EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 9 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. These documents present the sensitivity analysis conducted for Alternatives 5 and 6 for Sites 3 and 5. This sensitivity analysis was based on the effect of changes in the evaporative depth and curve number. While resulting infiltration rates make intuitive sense, the scientific reasoning to support changing these parameters is missing. Therefore, it appears to a reader that these input parameters were adjusted to meet a preconceived notion of what the infiltration values should be. Please provide justification to support varying these input parameters.	**RESPONSE 1:** The HELP appendix has been revised to explain the choice of curve numbers and evaporative depth for Alternatives 5 and 6. In the case of curve number, a reference is provided. In the case of evaporative depth, pore size has been considered. The smaller the pore size, the deeper the evaporative zone. To provide additional assurance that the evaporative depth is reasonable, sensitivity runs have been performed wherein this parameter is varied from 24 inches (base case) to 18 inches.
2. The hydraulic conductivity values used for pavement were not changed in this sensitivity analysis. No justification was provided in these documents for the chosen hydraulic conductivity values, nor was any attempt made to account for sealing of cracks under a maintenance program; a moderately aggressive maintenance program would minimize the number and size of cracks and decrease the permeability of the pavement significantly. Since the HELP model is very sensitive to permeability, it would have been appropriate to explore the effect of varying this parameter.	**RESPONSE 2:** Sensitivity runs varying the hydraulic conductivity of concrete and asphalt have been added to the HELP appendix. We agree that an aggressive maintenance program would minimize the number and size of cracks and decrease the permeability. The results provided in the appendix are therefore considered to be conservative. Even under these conservative conditions, the infiltration into the landfill is very low (0.37 inches per year for concrete; 0.29 inches per year for asphalt). This is lower than the prescriptive (clay cap) infiltration rate of 0.48 inches/year and the native soil cap infiltration rate of 0.50 inches/year.
SPECIFIC COMMENTS (applicable to both Sites 3 and 5)	***RESPONSES TO SPECIFIC COMMENTS***
1. Section 3.2, pp. 6 through 8. Justify the basis for using a value of 10^{-5} cm/s for the hydraulic conductivity of concrete and asphalt paving. Describe the basis for calculating an "equivalent hydraulic conductivity" as a function of crack width and spacing. Specify the crack width and spacing values that were used in this calculation. Explain why an O&M plan was not considered to seal cracks. Explain why a soil evaporative zone of 24 inches is appropriate when the paving is 4 to 6 inches thick.	**RESPONSE 1:** This discussion, along with a supporting equation, has been added to the Draft Final FS.

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2. Section 3.3.1, p. 9. Since hydraulic conductivity of the pavement is a function of the crack width and spacing, it does not appear to be appropriate to use the SEDMX formula for paving. Please explain why this formula was used.	**RESPONSE 2:** Agreed. This formula has been deleted.
3. Section 3.3.2, p. 10. Note that SCS curve numbers are derived for soils. Is there a SCS curve number in the literature for paved surfaces? If so, please provide additional information. If not, discuss why higher curve numbers are appropriate for pavement.	**RESPONSE 3:** The curve number of 98 for concrete and asphalt is chosen based on a Soil Conservation Service publication that is now referenced in the Draft Final FS.

RESPONSE TO COMMENTS
DRAFT PHASE II FEASIBILITY STUDY REPORT
FOR OPERABLE UNIT 2C - SITE 5
MCAS EL TORO, CALIFORNIA

Originator: Peter M. Janicki Cal EPA **To:** Tayseer Mahmoud DTSC **Date:** 2 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. **In the event a landfill clean closure or consolidation are to be chosen (this applies to all four landfill sites: 3, 5, 2, and 17) as a part of final landfill closure and if these activities result in either vertical and/or lateral expansion of the remaining landfill units, such expansion must comply with the applicable U.S. EPA Subtitle D regulations regarding bottom liner installation. However, a regional water quality control board (Santa Ana Regional Water Quality Control Board) has the authority to exempt the proposed landfill expansion from bottom landfill liner installation requirement, if the project proponent (U.S. Department of Navy) can demonstrate that the absence of liner poses no increased environmental threat to the groundwater quality in the landfill area. The Santa Ana Regional Water Quality Control Board staff should be contacted directly in this matter.**	**RESPONSE 1:** Comment noted.
2. **If available, information regarding both short term and long term postclosure land use should be taken into consideration when selecting the remediation alternatives applicable to each site. Consistently, the submitted remedial investigation and feasibility study documents have stated that the presumptive remedy approach was chosen for closure of landfill units at El Toro MCAS.** **Because of this approach, only a limited site investigation (this applies to all four landfill units) regarding waste characterization, landfill vertical and lateral extent, and landfill gas generation potential has been conducted. Although the gathered information is sufficient to close the landfill units in accordance with the minimum closure standards, it also limits future postclosure land uses for these sites. For example, if an irrigated park or golf course is to be developed on some landfill units, closure requirements may be far more stringent than if the site is to be left as non-irrigated open space**	**RESPONSE 2:** The proposed reuse for Site 5 is recreational (golf). The site could be part of the course or utilized for a maintenance shop, club house, or parking lot. For this reason, we have included a variety of alternatives in the FS, including a native soil cover, a single barrier cover, and asphalt and concrete covers. The discussion of each alternative has been revised in light of the potential reuse plan.

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(under presumptive remedy approach). **Thus, if a defined postclosure land use exists for any of the landfill units, this end land use should be factored into remediation alternatives. For example, it would be futile to review final closure design involving use of a concrete or asphalt cap when it is already known that a site will be developed into a landscaped and irrigated recreational area (a park or golf course).** **Also, certain postclosure land uses may have negative impact on both short-term and long-term longevity of materials chosen for landfill final cover.** **Please note that since it was indicated that the postclosure land use for Site 5 is to be an irrigated golf course, both concrete and asphalt caps appear to not be applicable (unless this site is to be utilized not for the actual green areas but for facilities related to the golf course such as maintenance shop, club house or parking lot). Please refer to the CIWMB letter of October 25, 1996, for detailed information on potential issues related to the construction of a golf course on Site 5.**	
3. A more accurate estimate of waste quantities contained in the landfill should be provided in order to validate the proposed grading plan. **Also, if applicable, the text must discuss an action plan for waste removal, underlying soil verification testing, and regrading activities.**	**RESPONSE 3:** An estimate of the waste quantities at Site 5 has been added to the FS in the Executive Summary, Section 3, and the cost appendix.. Under the Clean Closure alternative, all wastes, including those from the operational landfill and from the bermed investigation-derived waste (IDW) areas would be consolidated into Site 17. Under the other alternatives considered in the FS, the IDW would be consolidated into the main landfill. Because the clean closure option is not cost effective, no removal plan has been included with the FS for clean closure.
4. Since the previously reviewed Remedial Investigation Report did not include an adequate lateral/vertical waste extent investigation, it is	**RESPONSE 4:** The wastes were adequately characterized laterally by trenching air photo review, mapping, geophysics, and interviews. In the

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unclear how the depths of the landfill gas monitoring probes have been chosen.	vertical extent, waste extent has been estimated by reviewing interviews with personnel that were involved with landfill operations. According to these interviews, the tops of semi-tractors with trailers were level with the ground surface, suggesting that the trench was approximately 15 feet deep. Monitoring gas probes are required to be drilled to the maximum depth of the landfill within 1,000 feet of the probe. At Site 5, the probes will be installed to a maximum depth of 30 feet bgs. An explanation of how the probe depths were determined has been added to the cost estimating appendix.
5. For the analyses of costs associated with each of the final cover alternatives, it should be clarified that the postclosure maintenance costs are provided on a per year basis.	**RESPONSE 5:** Postclosure maintenance costs are not provided on an annual basis, but are provided on a net present worth basis for the duration of the postclosure monitoring and maintenance period (assumed to be 30 years).
6. The analyses of the proposed final cover alternatives do not account for soil loss resulting from surface erosion. Specifically, soil loss analyses should be conducted for the proposed final site configuration for alternatives using a soil cover. A commonly used method to evaluate soil losses is the Universal Soil Loss Equation with acceptable soil loss not exceeding two tons per acre per year.	**RESPONSE 6:** We plan to perform this calculation as part of the final remedial design.
7. Similarly, the drainage system design considered for this project must be supported by appropriate drainage calculations yielding channel sizing and validating energy dissipating features (if present). In addition, the issue of flow capacity of the downstream facilities should be included. Sediment load must be included in channel sizing calculations.	**RESPONSE 7:** A drainage calculation has been prepared to support the channel sizing and validate the energy dissipating features. The following has been added to Page 4-7 of the FS: "The estimated discharge at the lower end of the landfill is 2.8 cfs. The surface features proposed in this FS will not increase the drainage area to the downstream drainages. Therefore the drainages are not expected be adversely affected." A safety margin has been included in the channel sizing to accommodate such issues as sediment load. However, sediment load will be addressed in more detail during the remedial design phase.
8. When analyzing final cover costs, the costs related to construction of	**RESPONSE 8:** The cost of a test pad has been added to the costs of each

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a final cover test pad should be included when applicable.	alternative as appropriate.
9. For the alternatives proposing the use of synthetic or geocomposite low permeability materials, the need for a drainage layer should be discussed.	**RESPONSE 9:** For simplicity, the landfill cap alternatives are presented in the FS without a drainage layer. The need for such a layer will depend upon the preferred alternative and will be evaluated during the detailed design phase.
10. It should be noted that if a chosen final cover consists of a monolithic soil cap (Alternatives 3 and 4), in accordance with regulations included in 14 CCR, section 17773 (c), such design shall be submitted and reviewed as an engineered alternative to the prescriptive cover. Please refer to the aforementioned regulation for the specific submittal requirements.	**RESPONSE 10:** Comment noted.
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
11. Figure 4-3, Typical Drainage Cross Sections, should include final cover materials on the drainage system cross-sections. Specifically, anchoring points for the synthetic and geocomposite materials and keying locations for earth materials should be shown.	**RESPONSE 11:** This level of detail will be developed at the detailed design phase.
12. Section A.4.1.2 cites Article 7.8 of Title 23 CCR, which should be changed to Article 7.8 of Tittle 14 CCR.	**RESPONSE 12:** The citation has been revised as noted.
13. Section B.2.3, Landfill Gas Monitoring and Reporting Frequency, states that perimeter landfill gas monitoring will be conducted semiannually for the first five years following landfill closure. In accordance with 14 CCR, section 17783.11, these inspections should be conducted quarterly, at least until the landfill gas situation stabilizes and monitoring results become consistent.	**RESPONSE 13:** The proposed monitoring plan has been revised to indicate that perimeter landfill gas monitoring will be performed on a quarterly basis until the landfill gas situation stabilizes.
14. Section B.5.1, Landfill Cap Inspection, states that the final cover will be inspected monthly for the first six months after site capping and then semiannually for the next four and one-half years, and annually for the remaining 25 years. Cap inspections should be conducted on a quarterly basis and following major storm events until full site	**RESPONSE 14:** The monitoring plan has been revised to indicate that cap inspections will be conducted on a quarterly basis and following major storm events until full revegetation occurs.

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revegetation occurs. Upon site condition stabilization, a lesser frequency may be proposed.	
15. Section B.5.2, Drainage System Inspection, should state that the drainage system will be monitored quarterly and after major storm events, until site conditions stabilize; upon approval, a lesser frequency may then be allowed. Also, it should be stated that repairs and maintenance of the drainage system will be conducted prior to the next storm event.	**RESPONSE 15:** The monitoring plan has been revised to indicate that the drainage system will be monitored on a quarterly basis and following major storm events until site conditions stabilize.

RESPONSE TO COMMENTS
DRAFT PHASE II FEASIBILITY STUDY REPORT
FOR OPERABLE UNIT 2C - SITE 3
MCAS EL TORO, CALIFORNIA

Originator: Peter M. Janicki Cal EPA **To:** Tayseer Mahmoud DTSC **Date:** 2 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. In the event a landfill clean closure or consolidation are to be chosen (this applies to all four landfill sites: 3, 5, 2, and 17) as a part of final landfill closure and if these activities result in either vertical and/or lateral expansion of the remaining landfill units, such expansion must comply with the applicable U.S. EPA Subtitle D regulations regarding bottom liner installation. However, a regional water quality control board (Santa Ana Regional Water Quality Control Board) has the authority to exempt the proposed landfill expansion from bottom landfill liner installation requirement, if the project proponent (U.S. Department of Navy) can demonstrate that the absence of liner poses no increased environmental threat to the groundwater quality in the landfill area. The Santa Ana Regional Water Quality Control Board staff should be contacted directly in this matter.	**RESPONSE 1:** Comment noted.
2. If available, information regarding both short term and long term postclosure land use should be taken into consideration when selecting the remediation alternatives applicable to each site. Consistently, the submitted remedial investigation and feasibility study documents have stated that the presumptive remedy approach was chosen for closure of landfill units at El Toro MCAS. **Because of this approach, only a limited site investigation (this applies to all four landfill units) regarding waste characterization, landfill vertical and lateral extent, and landfill gas generation potential has been conducted. Although the gathered information is sufficient to close the landfill units in accordance with the minimum closure standards, it also limits future postclosure land uses for these sites. For example, if an irrigated park or golf course is to be developed on some landfill units, closure requirements may be far more stringent than if the site is to be left as non-irrigated open space**	**RESPONSE 2:** The reuse plan for Site 3 is light industrial or commercial. The FS has been revised to address this potential reuse of the site and to discuss each alternative with respect to the proposed reuse.

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(under presumptive remedy approach). **Thus, if a defined postclosure land use exists for any of the landfill units, this end land use should be factored into remediation alternatives. For example, it would be futile to review final closure design involving use of a concrete or asphalt cap when it is already known that a site will be developed into a landscaped and irrigated recreational area (a park or golf course).** **Also, certain postclosure land uses may have negative impact on both short-term and long-term longevity of materials chosen for landfill final cover.** **Please note that since it was indicated that the postclosure land use for Site 3 is to be a light industrial development, both concrete and asphalt caps remain viable options.**	
3. **A more accurate estimate of waste quantities contained in the landfill should be provided in order to validate the proposed grading plan.** **Also, the text must discuss an action plan for waste removal, underlying soil verification testing, and regrading activities.**	**RESPONSE 3:** An estimate of the waste quantities at Site 3 has been added to the FS. However, these wastes estimates are speculative because wastes disposal at Site 3 occurred in trenches that were dug randomly in the area of Unit 1. Review of air photos did find possible trenches; however, their locations change frequently over time in the photos. Under the Clean Closure alternative, all wastes and soil would be consolidated into Site 17. Because the clean closure option is not cost effective, no removal plan has been included with the FS for clean closure.
4. **Since the previously reviewed Remedial Investigation Report did not include an adequate lateral/vertical waste extent investigation, it is unclear how the depths of the landfill gas monitoring probes have been chosen.**	**RESPONSE 4:** The lateral extent of wastes were characterized by trenching air photo review, mapping, geophysics, and interviews. In the vertical extent, waste extent has been estimated by reviewing interviews with personnel that were involved with landfill operations and from one soil boring that encountered wastes. Monitoring gas probes are required to be drilled to the maximum depth of the landfill within 1,000 feet of the probe. At Site 3, the probes will be installed to a maximum depth of 30 feet bgs. An explanation of how the probe depths were determined has been added to the cost estimating

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	appendix.
5. For the analyses of costs associated with each of the final cover alternatives, it should be clarified that the postclosure maintenance costs are provided on a per year basis.	**RESPONSE 5:** Postclosure maintenance costs are not provided on an annual basis, but on a net present worth basis for the duration of the post-maintenance period (assumed to be 30 years).
6. The analyses of the proposed final cover alternatives do not account for soil loss resulting from surface erosion. Specifically, soil loss analyses should be conducted for the proposed final site configuration for alternatives using a soil cover. A commonly used method to evaluate soil losses is the Universal Soil Loss Equation with acceptable soil loss not exceeding two tons per acre per year.	**RESPONSE 6:** We plan to perform this calculation as part of the final remedial design.
7. Similarly, the drainage system design considered for this project must be supported by appropriate drainage calculations yielding channel sizing and validating energy dissipating features (if present). In addition, the issue of flow capacity of the downstream facilities should be included. Sediment load must be included in channel sizing calculations.	**RESPONSE 7:** A drainage calculation has been prepared to support the channel sizing and validate the energy dissipating features. The following has been added to the FS: "The estimated discharge onto the landfill cover will be diverted and the total estimated discharge at the lower end of the cover is 136 cfs. The existing drainage channel, Agua Chinon Wash, will be improved with riprap protection as shown in cross sections C-C' and will be designed to carry the 100-year storm event without eroding the landfill. The surface features proposed in this FS will not increase the drainage area to the channel downstream of the landfill and the graded slopes will remain approximately the same. Therefore the existing channel downstream of the landfill is not expected be adversely affected and no additional protection of this area is planned." A safety margin has been included in the channel sizing to accommodate such issues as sediment load. However, sediment load will be addressed in more detail during the remedial design phase.
8. When analyzing final cover costs, the costs related to construction of a final cover test pad should be included when applicable.	**RESPONSE 8:** Costs for a test pad have been added into the Draft Final FS as appropriate and are shown as a separate line item.
9. For the alternatives proposing the use of synthetic or geocomposite low permeability materials, the need for a drainage layer should be	**RESPONSE 9:** For simplicity, the landfill cap alternatives are presented in the FS without a drainage layer. The need for such as layer will depend upon

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discussed.	the preferred alternative and will be evaluated during the detailed design phase of this project.
10. It should be noted that if a chosen final cover consists of a monolithic soil cap (Alternatives 3 and 4), in accordance with regulations included in 14 CCR, section 17773 (c), such design shall be submitted and reviewed as an engineered alternative to the prescriptive cover. Please refer to the aforementioned regulation for the specific submittal requirements.	**RESPONSE 10:** Comment noted.
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
11. Figure 4-3, Typical Drainage Cross Sections, should include final cover materials on the drainage system cross-sections. Specifically, anchoring points for the synthetic and geocomposite materials and keying locations for earth materials should be shown.	**RESPONSE 11:** Final cover materials and, especially, anchoring points for the synthetic and geocomposite materials will be developed at the detailed design phase.
12. Section A.4.1.2 cites Article 7.8 of Title 23 CCR, which should be changed to Article 7.8 of Tittle 14 CCR.	**RESPONSE 12:** This citation has been revised as noted.
13. Section B.2.3, Landfill Gas Monitoring and Reporting Frequency, states that perimeter landfill gas monitoring will be conducted semiannually for the first five years following landfill closure. In accordance with 14 CCR, section 17783.11, these inspections should be conducted quarterly, at least until the landfill gas situation stabilizes and monitoring results become consistent.	**RESPONSE 13:** The monitoring plan has been revised to indicate that perimeter landfill gas monitoring will be performed on a quarterly basis until the landfill gas situation stabilizes.
14. Section B.5.1, Landfill Cap Inspection, states that the final cover will be inspected monthly for the first six months after site capping and then semiannually for the next four and one-half years, and annually for the remaining 25 years. Cap inspections should be conducted on a quarterly basis and following major storm events until full site revegetation occurs. Upon site condition stabilization, a lesser frequency may be proposed.	**RESPONSE 14:** The monitoring plan has been revised to indicate that cap inspections will be conducted on a quarterly basis and following major storm events until full revegetation occurs.

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15. Section B.5.2, Drainage System Inspection, should state that the drainage system will be monitored quarterly and after major storm events, until site conditions stabilize; upon approval, a lesser frequency may then be allowed. Also, it should be stated that repairs and maintenance of the drainage system will be conducted prior to the next storm event.	**RESPONSE 15:** The monitoring plan has been revised to indicate that the drainage system will be monitored on a quarterly basis and following major storm events until site conditions stabilize.

RESPONSE TO COMMENTS
DRAFT PHASE II FEASIBILITY STUDY REPORT
FOR OPERABLE UNIT 2C - SITE 5
MCAS EL TORO, CALIFORNIA

Originator: Glenn R. Kistner, RPM Cal EPA **To:** Joseph Joyce, BRAC Environmental Coordinator MCAS El Toro **Date:** 9 December 1996	**CLEAN II Program** **Contract No. N68-711-92-D-4670** **CTO-0076** **File Code: 0214**
GENERAL COMMENTS	***RESPONSES TO GENERAL COMMENTS***
1. Numerical cleanup goals should be established in this document. One of the first tasks in developing a Feasibility Study (FS) is to determine the cleanup goals so that the areas of concern can be established. This is not done in this document. Therefore, it is not known whether any of the units require action. Based on the risks calculated, it appears that most risks are below the acceptable risk criteria of 10^{-6}. This document should include a discussion of numerical cleanup goals (not just RAOs). This is fundamental to evaluating the alternatives. It is virtually impossible to evaluate the effectiveness and protectiveness of the alternatives without cleanup goals.	**RESPONSE 1:** Numerical cleanup goals, in the form of risk-based concentrations, have been added to the FS in Table 3-3 and Appendix B. These RBCs will be used to confirm the adequacy of cleanup in areas that are consolidated into the main operational landfill (i.e., the investigation-derived waste piles).
2. The risk assessment shows that there are no real risks that exceed typical guidelines (10^{-6}) associated with this site. Soil risks are well below criteria and groundwater is not likely to result in metals migration that could result in exceedances of offsite risk criteria. Therefore, the RAOs that were selected (Section 3.1.4) do not appear to be necessary to protect human health.	**RESPONSE 2:** The investigation of all of the landfill sites at MCAS El Toro was based on a presumptive remedy approach. Under the presumptive approach, the landfill contents are to be contained in order to protect human health and the environment. Because historical information about this landfill indicates it is typical of a military/municipal landfill and landfill wastes are believed to be very close to the surface at Site 5 (within 1 to 5 feet of the surface) where contact with the wastes could occur, the RAO of implementing a cap is recommended. The reuse scenario proposed for this site [recreational (golf)] could result in direct human contact with wastes (e.g., through installation of sprinklers, divots, etc). The proposed landfill cap is designed to prevent direct contact with these wastes.
3. Throughout the document, the no action and institutional controls are evaluated as not protective of human health or the environment yet no unacceptable risk to humans (risk was 10^{-5}) was calculated. The risk to wildlife also appeared to be acceptable. It appears that there is a disconnect between risks and the need for an expensive remedy to prevent a nonexistent problem. If a cap is necessary to comply with state regulations or because of proposed future use, this justification	**RESPONSE 3:** Although the risk at Site 5 is less than 10^{-6}, landfill wastes are not completely characterized and are close to surface. The proposed reuse of this site is recreational (golf). To ensure that contact is not made with landfill wastes, Alternatives 3 through 6 include a landfill capping system design to reduce infiltration and prevent direct contact with waste materials. The FS also includes one alternative (Alternative 1) that involves no action and one alternative (Alternative 2) that involves only institutional controls (deed

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must be provided.	restrictions and monitoring).
4. The most probable risk is associated with groundwater transport of metals from the landfill although this appears unlikely based on the limited groundwater and background data available. Because of the lack of significant risk, it seems that the most cost effective remedial action would be to implement periodic groundwater monitoring (Institutional Controls) to determine if there was a risk that warranted more significant action. This could be addressed at the 5 year review period. The FS should be revised to allow this as an acceptable alternative.	**RESPONSE 4:** Groundwater monitoring is part of Alternatives 2, 3, 4, 5 and 6. Alternative 2 involves only access controls and monitoring. Additions have been made to the FS that discuss the effects of natural precipitation of metals in groundwater as groundwater migrates away from the site. To assess this natural phenomenon, long-term monitoring of groundwater was recommended in the Draft Final RI and in the Draft Final FS.
5. Although stability of the cover system does not appear to be an issue due to the relatively gentle grades and minimal side slopes, a drainage layer above the barrier layer (clay, geomembrane, of GCL) should be evaluated depending on the future use of the capped area where a vegetative cover is used. If the capped area will be subject to vehicle access or other activity when the vegetative layer is saturated damage to the cap may occur. The vertical location of the drainage layer will depend on the depth of saturation based on the HELP runs and the future use of the site. This will likely only be an issue during the heavy precipitation months of January and February, but this issue should be considered in the FS.	**RESPONSE 5:** We agree that a drainage layer needs to be considered for this site and plan to address the need for and design of this layer at the detailed design phase.
6. Actual site climatological data (mean temperatures, monthly rainfall) should be obtained from El Toro (climatological data is normally collected at military airfields) as a comparison to the default data used for Los Angeles, California.	**RESPONSE 6:** Actual climatological data from MCAS El Toro will be used in a detailed design of the cap. However, the difference in data from Los Angeles and MCAS El Toro is not significantly different (approximately 10 to 12.5 inches/year at MCAS El Toro versus 13.5 inches/year of rainfall at Los Angeles).
SPECIFIC COMMENTS	***RESPONSES TO SPECIFIC COMMENTS***
1. Section 1, p. 1-1. Please define the relationship between the Phase I and Phase II investigations. If the Phase II investigation was performed to	**RESPONSE 1:** The Phase II RI was designed to fill in data gaps, provide information to complete the human health risk assessment, and provide

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fill in data gaps, please state this.	specific information to assess the application of presumptive remedies for municipal/military landfills. This is now noted in the FS.
2. **Section 2, p. 2-1, 1st sentence. Please state if this summary includes both the Phase I and II RI investigations.**	**RESPONSE 2:** Clarification has been added as noted. The summary information in Section 2 includes the results of both the Phase I and Phase II investigations. Because the Phase I and II investigations along with the Air SWAT comprise the full RI, the summary information is meant to summarize the full RI and not separate components of the RI.
3. **Section 2.2.1.1, p. 2-5, paragraph 2, sentence 3. From Figure 2-2, it appears that the majority of the site has slopes between 0 -3%. Slopes between 3 -10% are not present at "most" of the site. Please revise wording of this sentence.**	**RESPONSE 3:** The reference to the 3-10% slopes has been removed from this sentence because the 3-10% slopes are a minor portion of the site.
4. **Section 2.2.2.2. Please use consistent units in the text and figures. It is difficult for the reader to correlate the discussion in the text with the data presented on the figures when the units are different.**	**RESPONSE 4:** The difference in units has to do with the fact that the results are reported in a different format from the Air SWAT and the Phase II RI. Also there are differences in how the different samples are reported (i.e., instantaneous results are reported in ppm because they are readings from a PID; integrated and ambient results are reported in µg/L because they are reported from an analytical laboratory; and the flux chamber results are reported in $\mu g/m^2/min$ and are a measure of concentration over time).
5. **Section 2.2.2.2, p. 2-11, 1st sentence. Specify the constituent to which the 500 ppm_v refers.**	**RESPONSE 5:** The 500 ppm_v refers to total organic compounds as methane. This sentence has been restructured to reflect this change.
6. **Section 2.2.3.1, p. 2-26. The first paragraph on this page indicates that metals were found in slightly higher concentrations downgradient of the landfill which suggests migration from the landfill. The fifth paragraph indicates that only nickel has downgradient concentrations in excess of upgradient concentrations. Please clarify.**	**RESPONSE 6:** The fifth paragraph has been rewritten to indicate that nickel appears to have had the most amount of migration while other metals have been slightly elevated downgradient.
7. **Section 2.2.3.2, p. 2-30, paragraph 2. There is no definitive evidence that the source of PCE is upgradient from the site. Various surface and subsurface soil contaminants were found in these areas which suggests**	**RESPONSE 7:** No PCE in soil was found during the RI, suggesting that the landfill may not be the source of the PCE. In particular the PCE was found in the upgradient well which supports an interpretation of an upgradient source.

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that poor disposal practices associated with the landfill may be responsible for these contaminants. Please revise.	
8. **Section 2.2.3.2, p. 2-31, paragraph 1. This paragraph (and the second paragraph on page 2-30) seems to imply that there is another OU that needs to be addressed. It seems prudent to include soil surrounding the landfill as part of the landfill OU since disposal practices may have resulted in any surrounding contamination. By not including this soil as part of the landfill (as indicated in this paragraph), it may open the door for designating another OU to address the surrounding contamination.**	**RESPONSE 8:** Because the lysimeter was positioned adjacent to the landfill trench, it is conceivable that the source of the dioxins is from the surface.
9. **Page 2-31, paragraph 4. See comment 7 regarding PCE sources.**	**RESPONSE 9:** See response to comment 7.
10. **Section 2.2.3.2. Although analysis of soil and groundwater were performed to evaluate the impact of infiltration of water and leaching of landfill wastes into the groundwater, no long-term impact to the groundwater was investigated using TCLP (metals and VOCs) analysis of the landfill waste. This analysis is also needed to determine the characteristics of the landfill with regard to hazardous or non-hazardous determination. This characterization will also be important in the ARARs evaluation of the proposed alternatives. For example, if the material within the landfill is characterized as hazardous a composite RCRA cap should be evaluated with regard to the long-term impact to groundwater and the potential health risks and impact to the environment.**	**RESPONSE 10:** Under U.S. EPA guidelines, the wastes in the site are considered as non-hazardous when documentation of sources is not available (U.S. EPA 1989 and NCP preamble). Under this guidance, the lead agency may assume the wastes are non-hazardous unless further analysis or information becomes available to determine whether the wastes are RCRA hazardous wastes. Based on interviews of the landfill operation, the wastes were typical of military and municipal wastes which under the presumptive remedy approach are non-hazardous wastes with small quantities of hazardous wastes involved.
11. **Section 3.1.1, page 3-5, 3rd bullet. See comment 7 regarding PCE sources.**	**RESPONSE 11:** See response to comment 7.
12. **Table 3-1. The technical requirements listed in this table are for a non-hazardous solid waste landfill. As discussed in the previous comment, no hazardous classification testing was performed to determine if the landfill should be classified as hazardous or non-hazardous material. If the data does not exist, then both classifications need to be considered**	**RESPONSE 12:** Table 3-1 has been revised to include pertinent hazardous (Title 22) and non-hazardous (Titles 14 and 23) waste regulations. The discussion of ARARs in Sections 3 and Appendix A also addresses both hazardous and non-hazardous waste regulations. However, because this landfill is considered as a non-hazardous municipal/military landfill, technical

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along with the applicable technical/regulatory requirements.	requirements for closure and post-closure monitoring of the site are for non-hazardous landfills.
13. **Section 3.1.3, p. 3-13, paragraph 2. The geochemical and modeling basis for the statement: "metals present in groundwater are not expected to migrate downgradient past a transition zone because groundwater conditions will cause the metals to precipitate" is unclear. Please provide additional information and a reference to these data and modeling results** **Also, please provide justification for the statement made in sentence 2.**	**RESPONSE 13:** The bases of this statement are summarized in the fate and transport section of Section 2 in the FS and Section 5 of the Draft Final RI.
14. **Section 3.1.4, p. 3-13, bullets 1 and 2. It is not clear why these RAOs were selected. The risks, according to the risk assessment, for soil are on the order of 10^{-8} or less which is well below the risk action level. Section 2.2.3.2 implies that the groundwater metals problem is due to background concentrations and not necessarily due to metals leaching from the landfill; and that migration of the metals is unlikely due to oxidizing conditions. Therefore, it seems that there is no specific risks to warrant the RAOs. A more appropriate RAO might be to "Continue to ensure the lack of risk resulting from the landfill".**	**RESPONSE 14:** The RAOs that have been selected for Site 5 are based on the presumptive remedy approach. Capping is proposed because of the proximity of wastes to the surface at the site.
15. **Section 3.2, p. 3-14, paragraph 2. The statement, "because neither the exact location nor the chemical nature of the buried waste in the landfill is known,...," suggests the need for further delineation and characterization of the landfill materials for all potential response actions including containment. In order to determine the type of cap system and the extent of the area to be capped, the waste should be characterized as hazardous or non-hazardous through TCLP tests and hazardous characteristics testing. The extent of waste should also be delineated.**	**RESPONSE 15:** The presumptive remedy approach does not require complete characterization of landfill wastes. Under U.S. EPA guidelines, the wastes in the site are considered as non-hazardous when documentation of sources is not available (U.S. EPA 1989 and NCP preamble). The statement has been deleted from the FS.
16. **Section 3.4, p. 3-17. It is not clear why landfill gas collection and leachate collection are included when previous sections indicate that**	**RESPONSE 16:** Landfill gas collection and leachate collection are included because these are part of the presumptive remedies for landfills. We agree that

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there is no landfill gas of concern and leachate is not present. Please clarify the reason for including these remedies.	these remedies are not necessary and have screened them out in Section 3.
17. Section 3.4.4, p. 3-18, paragraph 5. Please explain how a cap will control landfill gas. A landfill cap will not stop the production of landfill gas and will tend to divert landfill gas horizontally where it may still be a problem.	**RESPONSE 17:** This statement has been deleted. Given the low levels of methane and other VOCs present at the site, passage of these gases through the landfill cap is not a concern and may be preferable to diverting the gas laterally to the perimeter of the landfill.
18. Section 3.5.1.2, p. 3-20, 2nd bullet. Please revise to clarify if the 30 mil liner is in addition to the clay layer or is an alternate to the clay layer.	**RESPONSE 18:** The 30 mil liner is an alternate to the clay layer. This has been clarified in the text.
19. Section 3.5.2, p. 3-23. The institutional controls seem to be focused on protecting the cap rather than on preventing groundwater consumption. Contact with soil has been shown not to be a significant risk. Prevention of groundwater consumption should be included as an institutional control because that is where most of the risk originates. Please enhance the discussion of groundwater restrictions in the institutional controls.	**RESPONSE 19:** The discussion of institutional controls has been expanded to include groundwater restrictions.
20. Figure 4-1. Although the drainage ditch shown on top of the landfill cover system is stabilized with gunite, long-term settlement/exposure of these ditches may make them susceptible to erosion. Erosion damage of the protective cover should be minimized. Consider allowing stormwater to sheet flow to drainage ditches outside the capped areas.	**RESPONSE 20:** The drawings are revised to show drainage ditches with gunite liners. This element is shown under the presumption that the Site 5 area is used in a similar manner to today's uses. If a golf course is placed over the site, additional work will be needed to assure that the landfill cap design is harmonious with the planned usage of the site.
21. Section 4.3.1, p. 4-5. Please indicate the native soil type (USC, gradation etc.) that would be used for the landfill cap.	**RESPONSE 21:** The native soil ranges from a silty sand to sandy silt in the Topanga Formation. One undisturbed soil sample from 02NEW1 had a hydraulic conductivity of 2×10^{-6}.
22. Section 4.3.2, p. 4-7. Please discuss implementation of groundwater use restrictions. Current uses may include irrigation water, stock water, human consumption, etc.	**RESPONSE 22:** Deed restrictions are negotiated at the time of a BRAC transfer, according to Department of Navy policy. Until that time occurs, the restrictions are controlled through the Base Master Plan.
23. Section 4.4, p. 4-8. None of the four capping system alternatives presented in this section use a drainage layer above the low permeability	**RESPONSE 23:** We agree that a drainage layer needs to be considered for this site and plan to address the need for and design of this layer at the detailed

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barrier layer. It is recommended that one be considered. This layer could consist of a drainage net with over and underlying filtration geotextiles, a drainage composite, or a high permeability granular soil layer with overlying filtration geotextile. A drainage layer is important for this site because landfill surface grades are very flat, and because a higher percentage of rainwater can infiltrate into the cap when the slopes are shallow.	design phase.
24. **Section 4.4.2, p. 4-13. Amending soil with bentonite to create a low permeability material is typically only practical for non-plastic granular soils where uniform blending and hydration of the bentonite is effective and efficient. It is unclear from the information presented if the existing soil cover to be excavated and amended with bentonite as proposed in Section 4.4.2 is granular. Please clarify.**	**RESPONSE 24:** This would need to be studied in greater detail. At this time, the borrow source is likely to provide a non-plastic soil; however, a larger number of samples of the borrow source are needed to assess whether mixing this soil with bentonite is effective. In addition, based on the FS evaluation, the soil/bentonite barrier layer is not as desirable as other options for a barrier. Therefore, additional studies of a possible blending process are not likely to be necessary.
25. **Section 4.4.4, p. 4-15, paragraph 1. Please explain why 60 mil FML (or thicker) was proposed. Typically, 40 mil is the FML thickness used in a landfill cap.**	**RESPONSE 25:** A 60-mil liner is being proposed because this type of liner is easier to install and weld and is considered more durable and resistant to burrowing. This type of liner is also more costly and represents a more conservative design for cost purposes. The actual thickness of the liner will be fixed at the time of detailed design.
26. **Section 4.4.4, p. 4-15, paragraph 2. Extrusion welding of polyethylene FMLs (e.g., HDPE, LLDPE, VLDPE) is typically only used in tight, limited access areas such as anchor trenches, sumps, etc. where larger fusion welding equipment cannot be used. In general, fusion welding is preferred wherever possible since it produces a double track weld (i.e., essentially two welds) with an intermediate air channel which can be pressure tested pneumatically. In contrast, extrusion welds only produce a single weld which is tested using a much less accurate and secure vacuum box procedure. Please justify the use of extrusion welding, or revise this paragraph.**	**RESPONSE 26:** The type of welding has been changed from extrusion to fusion.
27. **Figure 4-7, p. 4-15 and Section 4.4.4. A high density polyethylene**	**RESPONSE 27:** The cost estimating package (RACER) includes HDPE and

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(HDPE) FML is not the best choice of geomembrane for a landfill capping system because of its rigidity, which could cause it to tear if it were forced to stretch biaxially to accommodate underlying differential settlement features in the waste mass (i.e., pothole or crater-like depressions). Instead, low density polyethylene materials such as LLDPE and VLDPE are generally used for this purpose because of their flexibility and excellent elongation properties. These materials are not as chemically resistant as HDPE, but this is irrelevant for a landfill capping system in which the only liquid the FML will contact is infiltrating rainwater. Low density polyethylene materials should also be more economical than HDPE. Please delete the reference to HDPE as a potential landfill cap material throughout these sections.	several other synthetic layers as options. HPDE was used in the cost estimate because it is one of the more expensive and durable membranes. Therefore, the cost are conservative and use a durable product that is readily available. The actual membrane layer would be evaluated in greater detail at the detail design stage if this option is the preferred capping method.
28. Section 4.5, p. 4-16, last two sentences. Asphalt will most likely require more than minimum maintenance. It tends to crack and become perforated with grasses or other plants and then would allow infiltration. Please reword.	**RESPONSE 28:** Agreed. The discussion of the maintenance of asphalt has been revised as suggested.
29. Figures 4-10 and 4-11. Please clarify the purpose of the text "synthetic membrane liner," which is found beneath the label "3 inch-thick sand layer" since it is not clear if this indicates another layer of geotextile fabric.	**RESPONSE 29:** This is a typographic error and this label has been deleted from the figure.
30. Figures 4-10 and 4-11. The 3 inch thick sand layer has apparently been included to prevent abrasive forces generated during casting of the concrete liner from tearing the underlying FML. A thick, nonwoven needle punched geotextile (^{3} 30 oz./yd^2) will serve the same purpose and is much simpler to place. It should also be cost competitive with the sand. Please reevaluate this preliminary specification. **Chlorinated polyethylene (CPE) geomembrane is not typically used in landfill final cover systems. Generally, PVC or low density polyethylene materials (i.e., LLDPE or VLDPE) are typically used for this purpose because of their flexibility and excellent elongation properties which**	**RESPONSE 30:** The reference to the CPE has been deleted. Many of these elements of the capping system are conveniently available in the RACER program. If this option is a preferred alternative in the record of Decision, then a more in-depth analysis of the appropriate design will be conducted.

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makes them capable of stretching without tearing over areas of large differential settlement (i.e., pothole and crater-like depressions) which can occur in an underlying waste mass. Please revise. **An 80 mil thick geotextile is very rarely specified, may not be readily available (i.e., may require a special order for manufacture), and appears to be overly conservative for use as a separation fabric between an FML and an underlying soil layer, particularly if the maximum particle size of this layer is restricted by specification to be no larger than 1 inch. In this case, a 12 to 18 oz/yd^2 nonwoven needle punched geotextile should be more than adequate. Please reevaluate the proposed material.**	
31. Figure 4-11. Figures 4-10 and 4-11 are inconsistent regarding the geotextile cushioning layers used in conjunction with the FML and the 3 inch thick sand cushioning layer. In particular, Figure 4-10 requires use of only a geotextile underliner beneath the FML while Figure 4-11 requires geotextile under and overliners both above and below the FML. Both presently require the 3 inch thick sand layer. For this particular conceptual design, nonwoven needle punched geotextiles should be placed both above and below the FML with a more heavy duty (i.e., greater weight) geotextile used as the overliner because of the much greater abrasive and puncturing effects of the concrete pavement (Figure 4-10) or crushed aggregate base course (Figure 4-11) as compared to the soil "foundation layer" which underlies the FML. If the geotextile overliner is properly designed with adequate puncture and tear strength, and abrasion resistance, the 3 inch thick sand cushioning layer can be eliminated. Please reevaluate the proposed materials.	**RESPONSE 31:** Figures 4-10 and 4-11 have been revised to eliminate the geotextile overlying the FML. We believe the sand layer is more effective in this particular application.
32. Section 5.2.1.2, p. 5-4, Overall Protection. Please explain why prevention of contact is important when unacceptable risks were not found. The site could still be a risk if no monitoring is performed. This	**RESPONSE 32:** Under the presumptive remedy approach, containment by a capping system will prevent contact with landfill wastes. In general, risks to human health and the environment are inherent with most municipal and

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section should be rewritten to include the uncertainties and the lack of long-term monitoring as additional reasons why Alternative 1 is not considered protective of human health and the environment.	military wastes. These risks were not characterized at the site. However, rendering the exposure pathway incomplete by capping reduces that inherent risk to below levels usually considered acceptable.
33. Section 5.2.1.2, p. 5-5, Long-Term Effectiveness. The need to reduce risks associated with the landfill has not been established. Cleanup goals need to be determined. Contact with the landfill wastes has not been shown to be a concern. Please revise.	**RESPONSE 33:** Cleanup goals have been added (Table 3-3).
34. Section 5.2.2.2, p. 5-6, Overall Protection. It is not known if this alternative is protective since there is no information that shown that the exposed landfill contents would exceed risk criteria. Protection from "potential" risks is not a criteria for an alternative to be protective. Therefore, the overall protection of human health may be acceptable. Please revise.	**RESPONSE 34:** See response to comment 32.
35. Tables 5-1 through 5-10. Please provide a detailed breakdown of the costs associated with the post closure monitoring.	**RESPONSE 35:** Tables 5-1 through 5-10 have been expanded to include a detailed breakdown of costs associated with postclosure monitoring.
36. Section 5.2.5.1, p. 5-31 and Section 5.2.5.2, p. 5-34; ARARs. Please include the crack area used for the infiltration calculations.	**RESPONSE 36:** A discussion has been added to the appendix presenting the HELP model which outlines the assumptions used to assess the effects of cracks and formulation of the effective hydraulic conductivity of pavements.
37. Section 6.1, p. 6-1. See previous comments on the protection of human health and the environment for Alternatives 1 and 2. Lowering the risks may not be necessary depending on how the cleanup goals are set.	**RESPONSE 37:** See response to comment 32.
38. Table 6-4. See previous comments for Alternatives 1 and 2 regarding protection.	**RESPONSE 38:** See response to comment 32.
39. Page 7-1, 1st bullet. See earlier comments regarding protection. Before saying that they are unprotective, there needs to be an unacceptable risk. This is not clearly demonstrated in this Feasibility Study.	**RESPONSE 39:** See response to comment 32.
40. Table A4-1, p. A4-6. The statement that the landfill is characterized as	**RESPONSE 40:** Under U.S. EPA guidelines, the wastes in the site are

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non-hazardous and therefore RCRA closure requirements are not applicable needs to be substantiated with analytical data on the landfill material. See Comments 1 and 2.	considered as non-hazardous when documentation of sources is not available (U.S. EPA 1989 and NCP preamble). Under this guidance, the lead agency may assume the wastes are non-hazardous unless further analysis or information becomes available to determine whether the wastes are RCRA hazardous wastes. Based on interviews of the landfill operation, the wastes were typical of military and municipal wastes which under the presumptive remedy approach are non-hazardous wastes with small quantities of hazardous wastes involved.
41. **Table C-2. The justification for modifying the HELP model simulation to obtain lower infiltration rates for Alternatives and 5 and 6 should be provided.**	**RESPONSE 41:** This discussion has been added to the HELP model appendix.