

APPENDIX E

Response to Comments

Response to Comments
 DRAFT Group 2 Remedial Investigation / Feasibility Study Work Plan, dated August 1, 2008
 Review Comments provided by Judy Huang of EPA, dated October 3, 2008

No.	Comment Type / Report Section	Comment/Response
1	General Comment	<p>Comment:</p> <p>The Draft Group 2 Remedial Investigation/Feasibility Study Work Plan, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas, Former Fort Ord, Monterey, California, dated August 1, 2008 (hereinafter referred to as the Draft Group 2 RI/FS WP), contains Appendix A, CSUMB Off-Campus MRA Conceptual Site Model (CSM). This CSM contains a Table 6.3-2, which lists the types of munitions and explosives of concern (MEC) previously recovered from what is now identified as the "CSUMB Off-Campus Munitions Response Area (MRA)." The table lists a number of items with a hazard classification value of zero (0). The definition of this classification is "inert MEC," which was extracted from the Final Fort Ord Ordnance and Explosives Risk Assessment Protocol and the August 22, 2005, update thereof. There is a nomenclature disclaimer found in Table 6.3-2 that notes that any errors in terminology and other listed data are a result of misinformation from the data sources.</p> <p>While it is understood that the nomenclature used by the Military Munitions Response Program over the years has changed dramatically, the term "inert MEC" is an oxymoron. If an item is inert it cannot be classed as MEC. As a result, the potential exists that a significant number of the items listed in Table 6.3-2 as MEC are actually munitions debris (MD) instead and represent no explosives hazard. The table lists a total of 1,553 items identified as MEC recovered from the MRS. However, if the 617 items listed with a hazard classification of zero (0) (MD) are subtracted, the total quantity of MEC found on the site is lowered to 936, which is a significant reduction (approximately 40 percent) in the items representing an explosives hazard recovered from the site.</p> <p>Please review the Draft Group 2 RI/FS WP and ensure that this information is presented at an appropriate location therein. In addition, please remove the term "inert MEC" from the narrative portion of the document wherever it occurs.</p> <p>Response:</p> <p>As one of the work plan objectives (identified in Section 4.3), the existing data in the Army's MMRP database will undergo a validation process to verify the accuracy of the data, which will include the assigned hazard classifications. If it is determined that an item was assigned an incorrect hazard classification or should be reclassified as MD, FORA and the ESCA</p>

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		<p>RP Team, in consultation with the Army and the regulatory agencies, will revise the table for presentation in the Group 2 Remedial Investigation/Feasibility Study report and provide recommendations to the Army for updating the information presented in the MMRP database.</p> <p>The term "inert MEC" was replaced with "inert munitions item" everywhere that it occurs in the narrative portions of the work plan.</p>
2	General Comment	<p>Comment:</p> <p>There are a number of instances where demolition activities are described and the only type of blasting caps listed as being used on the site is "electric blasting caps." However, the table cited in General Comment 1 above lists a nonelectric blasting cap as having been discovered as MEC on the CSUMB Off-Campus MRA. As both types are normally used on sites where demolition of explosives is conducted during training, these descriptions should omit the term "electric" from the statement unless there is definitive evidence that only electric blasting caps were used on the site. Please make this change.</p> <p>Response:</p> <p>The word "electric" has been deleted from references to "electric blasting caps" in Section 3.0 where demolition activities are described.</p>
1	Specific Comment: Section 1.3.1, Cleanup Program Under the Army, Page 1-2	<p>Comment:</p> <p>This section incorrectly refers to the Central Coast Regional Water Quality Control Board as the Monterey Bay Regional Water Quality Control Board. Please correct the reference.</p> <p>Response:</p> <p>The sentence has been revised as follows:</p> <p>"To oversee the cleanup of the base, the Army, DTSC, Monterey Bay Central Coast Regional Water Quality Control Board (RWQCB), and EPA entered into a Federal Facility Agreement (FFA).</p>
2	Specific Comment: Section 4.9 Community Involvement, First	<p>Comment:</p> <p>Please add an additional sentence to state that the Community Involvement and Outreach Plan has been approved by EPA in consultation with DTSC.</p>

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	Paragraph, Page 4-9	<p>Response:</p> <p>The paragraph has been revised as follows:</p> <p>“Community relations activities for Group 2 are intended to keep communities informed of MEC-related activities at the former Fort Ord, and to help supporting agencies respond to community concerns. Community relations activities for the ESCA RP are described in the Community Involvement and Outreach Program (CIOP) Plan (ESCA RP Team 2008a). The CIOP Plan <i>has been approved by the EPA in consultation with the DTSC and</i> is an addendum to the Army’s Community Relations Plan (CRP) Update No. 3 (Army 2006).</p>
3	Specific Comment: Section 4.9.4 Roles of State and Local Authorities, Page 4-11	<p>Comment:</p> <p>This section states that "State and local government cooperation has included regulatory agency involvement through out the ESCA RP. FORA and its contractors continue to meet regularly with the regulatory agencies and local jurisdictions with respect to the ongoing munitions response activities." In addition to State and local agencies, several Federal government agencies are also involved in the ESCA remediation program. Please revise the heading of the section and the text to reflect this.</p> <p>Response:</p> <p>The section has been revised as follows:</p> <p>4.9.4 Roles of <i>Federal</i>, State, and Local Authorities</p> <p><i>Federal</i>, State, and local government cooperation has included regulatory agency involvement throughout the ESCA RP. FORA and its contractors continue to meet regularly with the regulatory agencies and local jurisdictions with respect to the ongoing munitions response activities.</p>
4	Specific Comment: Section 5.6, Risk Assessment, Page 5-2	<p>Comment:</p> <p>This section states that, "Risk assessment will be performed for areas of the MRAs where MEC hazard is identified. In areas where there is no history of military munitions use or where remedial investigation supports the absence of unacceptable levels of explosive hazard, risk assessment is not required to be performed." It is unclear as to exactly what is meant by the term "unacceptable levels of explosive hazard" (i.e., what is deemed to constitute an acceptable level of explosive hazard [other than zero]?). Please review</p>

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		<p>Section 5.6 and expand it to better explain the intent of the cited statement.</p> <p>Response:</p> <p>The section has been revised as follows:</p> <p>“Risk assessment will be performed for areas of the MRAs where MEC hazard is identified. In areas where there is no history of military munitions use or where remedial investigation supports the absence of unacceptable levels of explosive hazard (e.g., <i>contiguous areas where no MEC items were found and areas consistent with the Army’s Track 0 and Track 1 criteria</i>), risk assessment is not required to be performed.</p>
5	<p>Specific Comment: Section 5.9.1, Task 9 Remedial Alternatives Screening, Page 5-3</p>	<p>Comment:</p> <p>The third paragraph of this section states that, "Numerical cleanup standards are not available for munitions response actions. Therefore, the PRGs for MEC on the surface and in subsurface soil are developed to address MEC using the most appropriate technologies, to ensure protection of the public consistent with the proposed end use of the property." It is unclear as to exactly what is intended by the phrase "developed to address MEC using the most appropriate technologies, to ensure protection of the public consistent with the proposed end use of the property." Please expand the cited section to better explain what is intended by the quoted phrase.</p> <p>Response:</p> <p>The paragraph which includes the cited phrase has been revised as follows:</p> <p>“Numerical cleanup standards are not available for munitions response actions. Therefore, the PRGs for MEC on the surface and in subsurface soil are developed to address <i>the detection of</i> MEC using the most appropriate technologies, to ensure protection of the public consistent with the proposed end use of the property.”</p>
6	<p>Specific Comment: Table 1, Potential Applicable or Relevant and Appropriate Requirements</p>	<p>Comment:</p> <p>Since there are wetlands adjacent to this RI/FS Work Plan investigation area, there is a potential for on site soil disturbance activity to impact these wetlands and the associated upland habitats that are necessary to support the function of these wetlands. Please include surface water discharge related ARARs such as the Porter-Cologne Water Quality Control Act, and 40 CFR Parts 122, 123, and 123, as implemented by State Water Resources Control Board Order No. 92-08DWQ.</p>

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	(ARARs), Page 1	Response: The Porter-Cologne Water Quality Control Act and the National Pollutant Discharge Elimination System (NPDES), 40 CFR Parts 122, 123, and 125 have been added to the list of potential ARARs in Table 1.

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Review Comments provided by Gail Youngblood of the Army, dated August 27, 2008

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1	p.2-5, Section 2.3.2 Future Land Use	<p>Comment:</p> <p>The paragraph cites equestrian facilities and open space as examples of “habitat reserve” land use. Equestrian facilities would not be considered consistent with habitat reserve uses. Table 7.4-1 indicates that the horse park would be located within parcel E19a.3 which is a future development parcel. Please review this information and reclassify equestrian use as other than habitat reserve.</p> <p>Response:</p> <p>The second sentence of the first paragraph has been revised as follows:</p> <p>“Future land use categories and uses approved in the Fort Ord Base Reuse Plan generally include: residential, such as single-family homes; nonresidential, such as educational and institutional facilities, office and research parks, light-industrial and business parks, and commercial and retail facilities, including roadways and utility corridors; and habitat reserve, such as equestrian facilities and open space.”</p>
2	p.3-2, Section 3.1 CSUMB Off-Campus MR Evaluation	<p>Comment:</p> <p>The section discusses the munitions items that have been removed from the CSUMB Off-Campus MRA. The Fort Ord Military Munitions Response Program (MMRP) database is reviewed and updated periodically. Please continue to check the latest version of the database for any updates that might have been made.</p> <p>Response:</p> <p>The version of the MMRP database used during the development of this work plan was provided to the ESCA RP Team in May 2008. The ESCA RP Team will continue to work closely with the Army to obtain the latest version of the MMRP database, as necessary. The latest version of the MMRP database will be reviewed to ensure that the most up-to-date information is reported during the development of documents.</p>
3	p.3-3, Section 3.2 County North MRA Evaluation	<p>Comment:</p> <p>The section discusses the munitions items that have been removed from the County North MRA. The Fort Ord MMRP database is reviewed and updated periodically. Please continue to check the latest version of the database for any updates that might have been made.</p>

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		<p>Response:</p> <p>The version of the MMRP database used during the development of this work plan was provided to the ESCA RP Team in May 2008. The ESCA RP Team will continue to work closely with the Army to obtain the latest version of the MMRP database, as necessary. The latest version of the MMRP database will be reviewed to ensure that the most up-to-date information is reported during the development of documents.</p>
4	p.4-10, Section 4.9.3	<p>Comment:</p> <p>a. Bullet 1. It is indicated “all CSUMB faculty, staff, and students residing in campus housing will receive a copy of the newsletter while school is in session.” should be reevaluated. Suggestion to instead describe the actions that FORA and/or the ESCA RP Team will take to reach out to the CSUMB.</p> <p>b. Bullet 5. It is indicated that FORA factsheets will be posted on the Army’s Fort Ord Cleanup website. Please revise the text to state that a hyperlink to factsheets posted on the FORA ESCA website is available on the Army’s Fort Ord Cleanup web site www.fortordcleanup.com.</p> <p>Response:</p> <p>a. The text in the first bullet has been revised as follows:</p> <ul style="list-style-type: none"> • Publish articles in the quarterly newsletter. Newsletters will be mailed to all interested parties in adjacent communities. Additional interested parties on the FORA ESCA RP mailing list will receive the newsletters. The newsletters will also be posted on the FORA ESCA RP website (http://www.fora.org) and a link to newsletters will be provided on the Army’s Fort Ord Cleanup website (http://www.fortordcleanup.com/community/factsheet.asp). <i>FORA will work with representatives of CSUMB to ensure they are kept apprised of all ESCA-related cleanup activities and have access to relevant information about the ESCA RP. Information about the FORA ESCA RP website will be made available to representatives of CSUMB allowing them to notify their students, staff, and faculty as appropriate. Special emphasis will be placed on coordinating with the university concerning when field construction work will affect access routes, CSUMB cross country trails, and other campus-sponsored activities. FORA will also participate in CSUMB outreach activities as appropriate.</i>

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		<p>b. The fifth bullet has been revised as follows:</p> <ul style="list-style-type: none"> • Publish a fact sheet distributed by direct mail to local residents, community leaders, minority community organizations, and those who have requested to be on the CIOP mailing list. Fact sheets will also be posted on the FORA ESCA RP website, on the Fort Ord Cleanup website, and at community involvement activities. <i>A link to the fact sheets will also be provided on the Army's Fort Ord Cleanup website (http://www.fortordcleanup.com/community/factsheet.asp).</i>
5	Table 1 Potential Applicable or Relevant and Appropriate Requirements (ARARs)	<p>Comment:</p> <p>Please review the "remarks" column so that they address the planned/anticipated CERCLA actions for the Group 2 MRAs.</p> <p>Response:</p> <p>The ARARs table was provided to show the list of potential ARARs considered for the Group 2 RI/FS. These potential ARARs will be further evaluated and refined during Task 10, Remedial Alternatives Evaluation. At this time, the "Remarks" column has been revised to replace references to the Army.</p>
6		<p>Comment:</p> <p>Please coordinate any outreach activities targeting the Department of Defense (DoD) communities that may be affected by the planned field investigation (facilities along Joe Lloyd Way). Our Point of Contact for this matter is Melissa Broadston at 831-393-1284.</p> <p>Response:</p> <p>Outreach activities targeting the DOD communities will be coordinated with Melissa Broadston (or other appropriate BRAC representative). No revisions have been made to the text in response to this comment.</p>
7	Detail/minor comment. p.1-2, Section 1.3.1	<p>Comment:</p> <p>Please see the Army's comments to similar text that appeared in Draft Summary of Existing Data Report (SEDR), Section 2.2. Suggest updating the paragraph to be consistent with the text that is included in the draft final version of SEDR.</p> <p>Response:</p> <p>The text of this section has been revised to reflect changes incorporated into</p>

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		the SEDR based on review comments provided by the Army.

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DRAFT Group 2 Remedial Investigation / Feasibility Study Work Plan, dated August 1, 2008
Review Comments provided by the Marina Equestrian Association, dated September 20, 2008

No.	Comment Type / Report Section	Comment/Response
a.	Specific Comment	<p>Comment:</p> <p>We ask that FORA consider opening CSUMB Off-Campus and County North MRAs for public access as soon as field work is completed and dangers have been removed. Opening the sites while paperwork is completed would reduce the time and burden of lost access and allow MEA and other users to resume our present public uses more quickly.</p> <p>Response:</p> <p>The CSUMB Off-Campus and the County North MRAs are subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Administrative Order on Consent (AOC) filed between FORA and the EPA. Pursuant to CERCLA and the AOC, reuse of the MRAs for any purposes other than MEC remediation is not allowed until the appropriate completion reports have been filed and the EPA, in consultation with the DTSC, agree that the site can safely be used for purposes other than MEC remediation.</p> <p>FORA will work with the regulatory agencies with respect to the Marina Equestrian Association's request to gain access to the MRAs as soon as possible following the completion of the fieldwork effort and regulatory documentation and approval.</p>
b.	Specific Comment	<p>Comment:</p> <p>We ask that FORA consider designating the PG&E pipeline as a third BLM access corridor where it travels across CSUMB Off-Campus and County North areas. This would avoid a potentially dangerous mixing of horses and other users with vehicle traffic on Inter-Garrison Road. The pipeline is an ideal choice because of over 40 years of being excavated, traveled by heavy equipment and regularly maintained. It also has a wide set-back from vegetation and would eliminate the need for users to travel on Inter-Garrison Rd pavement.</p> <p>Response:</p> <p>FORA will consult with the regulatory agencies, the Army, and local emergency service providers to evaluate the possibility of using the PG&E pipeline as an additional access corridor to BLM areas; however, it is possible that this request could be denied since the pipeline crosses the interior of the MRAs where investigation activities will be occurring from September 2010 through September 2011 under the current schedule. FORA</p>

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		will notify representatives of the Marina Equestrian Association under separate cover regarding the final decision on this request.
c.	Specific Comment	<p>Comment:</p> <p>Equestrian use should be added to paragraph 2.3.1 as a daily recreational user.</p> <p>Response:</p> <p>Equestrian use has been added to paragraph 2.3.1.</p>
d.	Specific Comment	<p>Comment:</p> <p>Equestrian use should be included, in paragraphs 2.3.1 and 2.3.2 for past, current and future land use.</p> <p>Response:</p> <p>Equestrian use has been added to paragraphs 2.3.1 and 2.3.2 as past, current, and future land users.</p>
e.	Specific Comment	<p>Comment:</p> <p>We wish to provide testimony that current recreational uses of the Parker Flats MRA are not conflicting and all should be accommodated after remediation. These daily recreational users are hikers, joggers, bikers, dog walkers and horse riders.</p> <p>Response:</p> <p>FORA will work with the regulatory agencies with respect to the Marina Equestrian Association's request to gain access to the MRAs as soon as possible following the completion of the fieldwork efforts and regulatory documentation and approval. In addition, joggers, dog walkers, and horse riders have been added to the list of daily recreational users in the Parker Flats MRA.</p>
f.	Specific Comment	<p>Comment:</p> <p>We ask to have the Marina Equestrian Center acknowledged, where appropriate, as an historic and future source of users to this area due to its close proximity to Parker Flats and its unique connection to the National Park Service.</p>

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No.	Comment Type / Report Section	Comment/Response
		Response: The Marina Equestrian Center will be referenced as a historical and future source of users to the area in the Remedial Investigation/Feasibility Study report to be prepared following the completion of the fieldwork efforts.

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Response to Comments
 DRAFT Group 2 Remedial Investigation / Feasibility Study Work Plan, dated August 1, 2008
 Review Comments provided by Roman Racca of DTSC, dated January 27, 2009

No.	Comment Type / Report Section	Comment/Response
1.	Specific Comment, Glossary, Anomaly Avoidance, Page vii	<p>Comment:</p> <p>“This usually occurs at mixed hazard sites when hazardous, toxic, and radioactive waste hazardous, toxic, and radioactive waste investigations must occur prior to execution of an MEC removal action.”</p> <p>This sentence is redundant and needs to be rewritten.</p> <p>Response:</p> <p>The sentence for this definition has been revised as follows:</p> <p>“This usually occurs at mixed hazard sites when hazardous, toxic, and radioactive waste hazardous, toxic, and radioactive waste investigations must occur prior to execution of an MEC removal action.”</p>
2.	Specific Comment, Glossary, Covenant Deferral Request, Page vii	<p>Comment:</p> <p>Delete the word “that” [first sentence].</p> <p>Response:</p> <p>The word “that” has been deleted from the first sentence of the definition.</p>
3.	Specific Comment, Glossary, Exclusion Zone, Page viii	<p>Comment:</p> <p>Delete the letter “n” [first sentence].</p> <p>Response:</p> <p>The letter “n” has been deleted from the word “an” in the first sentence of the definition.</p>
4.	Specific Comment, Glossary, Record of Decision, Page x	<p>Comment:</p> <p>Delete the letter “n” [first sentence].</p> <p>Response:</p> <p>The letter “n” has been deleted from the word “an” in the first sentence of the definition.</p>
5.	Specific Comment, Section 3.1, MRS-04C, Page 3-1	<p>Comment:</p> <p>Fuze for practice hand grenade. Were practice hand grenades found?</p> <p>Response:</p>

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		<p>Practice hand grenades were not found within the boundaries of MRS-04C. However, practice hand grenades were found in MRS-31, which surrounds MRS-04C. Therefore, the following bullet item has been added to Section 3.1 under MRS-31 on Page 3-2:</p> <ul style="list-style-type: none"> • <i>Training (practice hand grenade fuzes, practice hand grenades, practice rifle grenades, practice mine fuzes, practice mines, practice rockets, and simulators)</i>
6.	Specific Comment, Section 3.1, MRS-07, Page 3-1	<p>Comment:</p> <p>Fuze for practice hand grenade. Were practice hand grenades found?</p> <p>Response:</p> <p>Practice hand grenades were not found within the boundaries of MRS-07. However, practice hand grenades were found in MRS-31, which surrounds MRS-07. Therefore, the following bullet item has been added to Section 3.1 under MRS-31 on Page 3-2:</p> <ul style="list-style-type: none"> • <i>Training (practice hand grenade fuzes, practice hand grenades, practice rifle grenades, practice mine fuzes, practice mines, practice rockets, and simulators)</i>
7.	Specific Comment, Section 3.1, MRS-13C, Page 3-1	<p>Comment:</p> <p>Fuze for practice hand grenade. Were practice hand grenades found?</p> <p>Response:</p> <p>Practice hand grenades were not found within the boundaries of MRS-13C. However, practice hand grenades were found in MRS-31, which is located immediately to the north of MRS-13C. Therefore, the following bullet item has been added to Section 3.1 under MRS-31 on Page 3-2:</p> <ul style="list-style-type: none"> • <i>Training (practice hand grenade fuzes, practice hand grenades, practice rifle grenades, practice mine fuzes, practice mines, practice rockets, and simulators)</i>
8.	Specific Comment, Section 4.3.2.3, First Bullet,	<p>Comment:</p> <p>If no evidence of data QA is conducted, then does this mean that a 10% QA was or will be performed?</p>

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No.	Comment Type / Report Section	Comment/Response
	Page 4-4	<p>Response:</p> <p>The first bullet item of Section 4.3.2.3 relates to a 10 percent quality assurance (QA) effort that <u>was</u> performed as part of the evaluation to validate data.</p> <p>No changes have been incorporated into the document based on this comment.</p>
9.	Specific Comment, Section 4.3.2.3, Third Bullet, Page 4-4	<p>Comment:</p> <p>Please expand on Parson's role in the data base. Did Parson's review and make corrections to the data base generated by the previous contractors or are we referring to work by Parson's?</p> <p>Response:</p> <p>Parsons was under contract with the Army to review and correct the database (which was generated based on the fieldwork conducted by previous contractors) in accordance with an established standard operating procedure, as indicated in the second bullet of Section 4.3.2.3. Therefore, the first sentence of the second bullet has been revised as follows for clarification:</p> <p><i>"Parsons, under contract with the Army, performed a 100 percent QC review of the data in the MMRP database previously generated from work conducted by prior munitions response contractors."</i></p> <p>The remainder of the second bullet describes Parsons' role in reviewing and correcting the database.</p>

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Response to Comments
 Draft Final Group 2 Remedial Investigation / Feasibility Study Work Plan, dated
 February 16, 2009
 Review Comments provided by Judy Huang of EPA, dated March 13, 2009

No.	Comment Type / Report Section	Comment/Response
1	Specific Comment: Table 1, Potential Applicable or Relevant and Appropriate Requirements (ARARs), NPDES, Page 1	<p>Comment:</p> <p>Due to a typographical error in EPA’s original comment, wrong section of the 40 CFR was cited. The correct citation should be 40 CFR Parts 122, 123, and 124.</p> <p>In addition, this particular ARAR should be Location specific not Action specific.</p> <p>Response:</p> <p>The reference has been changed from “40 CFR Parts 122, 122, and 125” to “40 CFR Parts 122, 123, and 124.” The ARAR has been changed from Action Specific to Location Specific.</p>
2	Specific Comment: Page 6-4 and Page 7-4, Sections 6.3.2 and 7.3.2, Hazard Classification Score Tables	<p>Comment:</p> <p>Please replace the term “Inert MEC” with “Inert munitions item” per Response to EPA Comments (Appendix E).</p> <p>Response:</p> <p>Appendices A and B were reproduced directly from the Final Summary of Exiting Data Report (SEDR). This change was not requested during the review period for the SEDR; therefore changing the final document is not recommended. The terminology “Inert Munitions Item” replaces the term “Inert MEC” in ESCA RP Team documents produced after the Final SEDR and will be used throughout the remainder of the ESCA project.</p> <p>No changes to the document have been made in response to this comment.</p>

Response to Comments
Draft Final Group 2 Remedial Investigation / Feasibility Study Work Plan, dated
February 16, 2009
Review Comments provided by Judy Huang of EPA, dated March 13, 2009

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Response to Comments
 Draft Final Group 2 Remedial Investigation / Feasibility Study Work Plan, dated
 February 16, 2009
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1	p.3-2, Section 3.1 CSUMB Off-Campus MRA Evaluation	<p>Comment:</p> <p>The section discusses the munitions items that have been removed from the CSUMB Off-Campus MRA. In the large paragraph on p.3-2 it states that 506 MEC items and five pyrotechnic mixtures “were not assigned a hazard classification value because of insufficient information.” While we understand this to be correct, it creates an apparent conflict with Table 6.3-2 in Appendix A of this work plan. The table shows almost all of the 1,553 listed MEC items have corresponding hazard classification codes. Please provide an explanation in Section 3.2 to clarify that the hazard classification codes shown in Appendix A, Table 6.3-2, may not be consistent with the information in the Fort Ord Military Munitions Response Program (MMRP) database and that the information provided in Section 3.2 of the work plan is consistent with the database.</p> <p>Response:</p> <p>The following text has been added to Section 3.1, Page 3-2:</p> <p>“Of the 957 MEC items and 10 pyrotechnic mixtures recovered from the MRA (which includes insufficient data [ISD] items as defined in the SEDR) that were assigned hazard classifications, 23 items had a hazard classification of 0 (Inert munitions item that will cause no injury), 758 items had a hazard classification of 1 (MEC that will cause an injury or, in extreme cases, could cause major injury or death to an individual if functioned by an individual’s activities), and 171 items had a hazard classification of 2 (MEC that will cause major injury or, in extreme cases, could cause death to an individual if functioned by an individual’s activities). Only 15 items (two antitank rockets, four fragmentation hand grenades, and nine smoke rifle grenades that were unknown models or contained white phosphorous) had a hazard classification of 3 (MEC that will kill an individual if detonated by an individual’s activities). The remaining items recovered from the MRA (596 MEC items and five pyrotechnic mixtures) were not assigned a hazard classification value because of insufficient information. <i>This evaluation is consistent with the information presented in the Army’s MMRP database. In the SEDR, a default hazard classification value of zero was entered into the table if a value was not specified in the Army’s MMRP database (Table 6.3.2; ESCA RP Team 2008a). Table 6.3.2, provided in the SEDR (and reproduced in Appendix A of this report), contains hazard classifications of zero that are not specified for items in the Army’s MMRP database. As part of the Group 2 MRA remedial investigation</i></p>

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		<i>and risk assessment activities, items with unassigned hazard classifications in the Army's MMRP database will be further evaluated by the ESCA RP Team and the most conservative hazard classifications will be assigned to the items."</i>
2	p.3-3, Section 3.2 County North MRA Evaluation	<p>Comment:</p> <p>The section discusses the munitions items that have been removed from the County North MRA. Similar to the previous comment, please provide an explanation to clarify that the hazard classification codes shown in Appendix B, Table 7.3-2, may not be consistent with the information in the MMRP database and that the information provided in Section 3.3 of the work plan is consistent with the database.</p> <p>Response:</p> <p>The following text has been added to Section 3.2, Page 3-4:</p> <p>"Of the 19 MEC items and 1 pyrotechnic mixture recovered from the MRA (which includes ISD items as defined in the SEDR), 16 items were assigned a hazard classification of 1 (MEC that will cause an injury or, in extreme cases, could cause major injury or death to an individual if functioned by an individual's activities) and 2 items were assigned a hazard classification of 2 (MEC that will cause major injury or, in extreme cases, could cause death to an individual if functioned by an individual's activities). The remaining 2 items were not assigned a hazard classification value because of insufficient information. As indicated in Appendix B, only one MEC item (smoke pot) was recovered below ground surface, which was at a depth of 5 inches. The remaining items were reportedly recovered from the ground surface; however, the depth information recorded in the Fort Ord MMRP database for the ISD items may be inaccurately represented in the database and will be evaluated during the RI, as described in Section 4.0 of this work plan. <i>This evaluation is consistent with the information presented in the Army's MMRP database. In the SEDR, a default hazard classification value of zero was entered into the table summarizing the data if a value was not specified in the Army's MMRP database (Table 7.3.2; ESCA RP Team 2008a). Table 7.3.2, provided in the SEDR (and reproduced in Appendix B of this report), contains hazard classifications of zero that are not specified for items in the Army's MMRP database. As part of the Group 2 MRA remedial investigation and risk assessment activities, items with unassigned hazard classifications in the Army's MMRP database will be further evaluated and the most conservative hazard classifications will be assigned to the items."</i></p>

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3	p.5-1, Section 5.4 Sample Analysis/Validation	<p>Comment:</p> <p>Please note that, in addition to the literature review and removal checklists included in Appendix C, reconnaissance and sampling checklists are also available to guide an evaluation of a site where reconnaissance and/or sampling was conducted. This information is available in <i>Draft Final Plan for Evaluation of Previous Work, Ordnance and Explosives RI/FS</i> dated September 8, 2000 (OE-283G) (checklists were updated, see OE-0466).</p> <p>Response:</p> <p>The reconnaissance and sampling checklists have been added to Appendix C.</p>
4	Table 1 Potential Applicable or Relevant and Appropriate Requirements (ARARs)	<p>Comment:</p> <p>a. p.1, National Pollutant Discharge Elimination System (NPDES), 40CFR Parts 122, 123 and 125 and p.3 Porter Cologne Water Quality Act, California Water Code, Division 7, Section 13200. These items have been added to the table in response to a comment by U.S. Environmental Protection Agency (EPA). We understand the intent to be to identify potential ARARs that relate to the protection of wetlands from possible remedial alternative(s) for the CSUMB Off-Campus and the County North MRAs. Although the Army does not necessarily disagree with the intent, the identification of these specific sections of the Clean Water Act and California Water Quality Control Act compel further evaluation. The Army will further discuss this item with EPA and the State of California. Additionally, the "Remarks" indicate that obtaining NPDES and/or state Waste Discharge Requirements (permits) may be required. Please delete the remarks since procedural requirements such as obtaining permits do not become ARARs for onsite remedial actions.</p> <p>b. p.2, California Fish and Game Code Section 4800 et seq. The "Remarks" include a statement: "In fact, the use of fire to set back plant community succession will result in an improvement to wildlife habitat that will benefit mountain lions." This statement implies that prescribed burning is being considered as part of possible remedial alternative(s) for the CSUMB Off-Campus and the County North MRAs. If this is the case, evaluation of vegetation clearance alternatives would be required, and the work plan should then address the procedures for such an evaluation. If prescribed burning is not being considered to be evaluated as a part of any of the possible remedial alternatives for these MRAs, please revise the remarks. Please re-examine the remarks and make</p>

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		<p>appropriate updates to the document.</p> <p>c. p.4, California Clean Air Act, Health and Safety Code Section 41701. The “Remarks” include statements that imply that prescribed burning is being considered as part of possible remedial alternative(s) for the CSUMB Off-Campus and the County North MRAs. If this is the case, evaluation of vegetation clearance alternatives would be required, and the work plan should then address the procedures for such an evaluation. If prescribed burning is not being considered to be evaluated as a part of any of the possible remedial alternatives for these MRAs, please revise the remarks. Please re-examine the remarks and make appropriate updates to the document.</p> <p>d. p.4, California Fish and Game Code Section 3005, Section 4000 et seq., and Title 14, CCR Section 460. The “Remarks” include statements that imply that specific remedial alternatives were evaluated as to whether or not these regulations were applicable or relevant and appropriate. However, no specific remedial alternatives were described in this document. Please re-examine and make appropriate revisions to the remarks.</p> <p>Response:</p> <p>Table 1 identifies an initial list of potential ARARs that may be relevant to possible remedial alternatives outlined during the RI/FS. The applicability of the ARARs listed in the table will be further evaluated in the RI/FS.</p> <p>a. p.1, National Pollutant Discharge Elimination System (NPDES). The reference has been changed from “40 CFR Parts 122, 123, and 125” to “40 CFR Parts 122, 123, and 124”.</p> <p>p.3, The following text has been added to the remarks section: <i>“Under CERCLA, procedural requirements such as obtaining a permit while conducting MEC investigation/remediation do not apply.”</i></p> <p>b. p.2, The remark regarding the use of fire has been deleted from the table, as prescribed burning is not being considered for evaluation as part of the Group 2 MRA remedial alternatives.</p> <p>c. p.4, Prescribed burning is not being considered for evaluation as part of the Group 2 MRA remedial alternatives. This potential ARAR has been deleted.</p>

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		d. p.4, The remarks have been deleted regarding these comments. As part of the FS, an evaluation of the remedial options and the impact on these ARARs will be conducted.
5	Appendix D Anticipated Project Schedule	<p>Comment:</p> <p>This schedule appears outdated. Please provide an updated schedule in the final version of this document.</p> <p>Response:</p> <p>An updated Group 2 Schedule has been provided in Appendix D.</p>
6	Detail/minor comment. p.2-5, Section 2.3.2 Future Land Use	<p>Comment:</p> <p>Based on a previous Army Comment the paragraph was modified to reclassify the equestrian use as a “nonresidential use” other than habitat reserve. Although the updated text is acceptable, please note that it is not exactly the same as the text noted in Appendix E in the response to Army comment 1.</p> <p>Response:</p> <p>In the original response to comments, the text was changed as follows:</p> <p>“Future land use categories and uses approved in the Fort Ord Base Reuse Plan generally include: residential, such as single-family homes; nonresidential, such as educational and institutional facilities, office and research parks, light-industrial and business parks, and commercial and retail facilities, including roadways and utility corridors; and habitat reserve, such as equestrian facilities and open space.”</p> <p>However, the text was modified as follows to address a comment received from the Marina Equestrian Association on the draft version of the work plan:</p> <p>“Future land use categories and uses approved in the Fort Ord Base Reuse Plan generally include: residential, such as single-family homes; nonresidential, such as educational and institutional facilities, office and research parks, light-industrial and business parks, and commercial and retail facilities, including <i>equestrian facilities</i>, roadways, and utility corridors; and habitat reserve, such as equestrian facilities and open space.</p> <p>Given that the Army has reviewed and agreed with the text as it appeared</p>

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		in the Draft Final Group 2 RI/FS Work Plan, no additional changes to the text will be made as a result of this comment.
7	Detail/minor comment. p.4-1, Section 4.1 Summary of the Approach for Group 2	<p>Comment:</p> <p>The second paragraph states that the Residential Quality Assurance (RQA) Pilot Study will be conducted in the Seaside and the Parker Flats MRAs. Please update this section to reflect that a test area within the CSUMB Off-Campus MRA was selected in place of the previously proposed test area in the Parker Flats MRA. This update would make the section consistent with the cited Final Group 1 RI/FS Work Plan, and would reduce the potential for confusion by the public.</p> <p>Response:</p> <p>The paragraph has been modified as follows:</p> <p>“Additionally, an RQA Pilot Study will be conducted in the Seaside and Parker Flats CSUMB Off-Campus MRAs to assess the potential residual risk, if any, posed by undetected MEC, following MEC removal actions, in a portion of the areas planned for future residential development. Schools are considered by DTSC to be equivalent to residential use. The RQA Pilot Study work plan was presented in Volume 2 of the Final Group 1 RI/FS Work Plan, which was submitted for the Seaside and Parker Flats CSUMB Off-Campus MRAs (ESCA RP Team 2008b). Results of the RQA Pilot Study will be incorporated into the Group 2 RI/FS Report.”</p>
8	Detail/minor comment. p.4-10, Section 4.9.3 Implementation of Community Relation Activities, Bullet 1	<p>Comment:</p> <p>In response to previous Army comment, this bullet has been revised. However, the updated text is not exactly the same as the text noted in Appendix E: the third sentence was modified to read “aCSUMB faculty, staff, and students residing in campus housing will receive a copy of the newsletter while school is in session” rather than being deleted as indicated in Appendix E.</p> <p>Response:</p> <p>The first bullet has been modified to be consistent with previous responses to the Army’s comments, as follows:</p> <ul style="list-style-type: none"> • Publish articles in the quarterly newsletter. Newsletters will be mailed to all interested parties in adjacent communities. In addition,

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		<p>CSUMB faculty, staff, and students residing in campus housing will receive a copy of the newsletter while school is in session.</p> <p>Additional interested parties on the FORA ESCA RP mailing list will receive the newsletters. The newsletters will also be posted on the FORA ESCA RP website (http://www.fora-esca-rp.com). A hyperlink to the newsletters posted on the FORA ESCA RP website will also be provided on the Army's Fort Ord Cleanup website (http://www.fortordcleanup.com/community/factsheet.asp). FORA will work with representatives of CSUMB to ensure they are kept apprised of all ESCA-related cleanup activities and have access to relevant information about the ESCA RP. Information about the FORA ESCA RP website will be made available to representatives of CSUMB allowing them to notify students, staff, and faculty as appropriate. Special emphasis will be placed on coordinating with the university when field construction work will affect access routes, CSUMB cross country trails, and other campus-sponsored activities. FORA will also participate in CSUMB outreach activities, as appropriate.</p>

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**Please note: no changes to the Group 2 RI/FS Work Plan were necessary as a result of these comments.

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1	General	<p>Comment:</p> <p>In order to better understand the extent of military training at Former Fort Ord, and the potential contamination from training activities, fundamental questions need to be answered or at least estimated.</p> <p>A story told by a retired sergeant that trained Fort Ord troops: A retired sergeant said he trained soldiers to fire 60mm and 81mm mortars in the northern and northeastern portions of Site 39. He would take out 400 soldiers for bivouac maneuvers (multi day outings in the field). When asked how many rounds each soldier fired in a day, he estimated each man would fire 30 to 60 Mortar rounds. He indicated they were practice mortars. Using a median number of 45 mortars multiplied by 400 soldiers, 18,000 mortars were fired in a day by a single group of trainees. It is understood practice munitions unlike High Explosive (HE) munitions use pyrotechnics for identifying were the rounds hit (spotting)."</p> <p>Note: at the height of training there where 50,000 soldiers at Fort Ord. Estimates are, from 1940-1974 1.5 million troops trained at Fort Ord.</p> <p>a) 1.5 million or more troops trained at Fort Ord. How many millions or billions of pounds of military munitions were used in the training of troops? Any estimates? If not, why not?</p> <p>Response:</p> <p>a) No estimates have been made regarding the total pounds of munitions used during the history of Fort Ord. Estimates of this information would not be relevant to the Group 2 Remedial Investigation/Feasibility Study (RI/FS) Work Plan. A detailed analysis of the types of known or suspected training will be conducted to better understand the extent of military training and munitions use within the Group 2 MRAs. The results will be documented in the Group 2 RI/FS Report. The Army responded to a similar comment received from FOCAG in a previous letter dated August 12, 2008. Please refer to the Army's November 17, 2008 response letter (Administrative Record ESCA-0126).</p>

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2	General	<p>Comment:</p> <p>Most military munitions constituents are known or suspected endocrine disruptors, carcinogens, mutagens, toxicants, etc. The CAG has compiled a list of military munitions constituents found in the types of munitions used at Fort Ord. The list includes the potential negative human health impacts that may result from exposure to each of the constituents. Former Military Training Areas are highly contaminated with hazardous chemicals. If you knew of the potential risk, would you want or allow your children to live on and play in soil possibly contaminated with the Table 1 and Table 2 constituents?</p> <ul style="list-style-type: none"> a) Has the Fort Ord Cleanup Program prepared a list of Munitions Constituents (MC) for all Military Munitions and Training Devices used at former Fort Ord. If not, why not? b) Of the millions or billions of pounds of military munitions used, how many pounds of their constituents were released into the environment? Any estimates? If not, why not? c) Where did the residual contaminants go? d) Could all the contaminants simply disappear? e) Does soil analysis of ranges include every known or suspected OEW/UXO constituent used at Fort Ord? If not, why not? f) Babies and toddlers commonly eat soil and other substances off the ground. Has this risk been analyzed? If not, why not? g) Have Maximum Residual Levels (MRL's) been established for the constituents in the attached Military Munitions Chemicals of Concern Table 1 and Table 2? If not, why not? h) If the extent of residual contamination and MRL's have not been established, how can an acceptable level of cleanup be known for residual or commercial use? i) Is there a screening program in place to monitor for hazardous substances at Fort Ord? If not, why not? Will there be a program to monitor potential negative health impacts of residents living in homes built on former training areas and ranges? If not, why not? j) Perchlorate is known to be a widely used constituent in military munitions used at Fort Ord. Is there testing being conducted to identify the extent of Perchlorate contamination in former training areas and ranges? If not, why not? If yes, the remediation documents don't appear to include any discussion or analysis. k) Synergism and synergistic effects of chemicals are a significant part of

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		<p>Risk Assessment. I don't recall seeing any analysis in the Fort Ord Base Wide RI/FS addressing synergism. Is synergism covered in any Fort Ord Human Health Risk or Environmental Assessments? If not, why not?</p> <p>Response:</p> <p>a - k) The scope of this work plan and the Group 2 RI/FS is limited to MEC Explosive Hazard. Investigation of potential contamination issues other than the explosives hazards associated with MEC at the former Fort Ord will continue to be conducted by the Army. The Army responded to a similar comment received from FOCAG in a previous letter dated August 12, 2008. Please refer to the Army's November 17, 2008 response letter (Administrative Record ESCA-0126).</p>
3	General	<p>Comment:</p> <p>The parcels have not been adequately cleared of Ordnance and Explosives Waste (OEW), Unexploded Ordnance (UXO), or identified the extent of Munitions Constituents (MC) contamination. The extent of contamination is unknown.</p> <p>The Shonstedt models GA-52C and GA-72CV were used for OEW/UXO clearance prior to Oct. 1994. The GA-52CX was used thereafter. This raises several issues and concerns.</p> <p>According to the After Action Report for OEW Sampling and Removal, Sites 4C, 7, 8, 13B, 18 were sampled, and a large portion of the CSU Footprint was cleared of UXO/OEW to a depth of 3 feet. According to the Work Plans (WP), the GA-52C was used for the OEW removal actions.</p> <p>Additionally, ordnance capable of penetrating beyond the old GA-52C and newer GA-52CX detection range has been found in the CSUMB parcel. Because the extent of deep penetration ordnance and deep OEW burial pits are unknown, scanning equipment capable of detecting deeply buried metallic anomalies should be used. The former Fort Ord areas cleared, CSUMB, using the old detection equipment should undergo a full wall to wall removal using the newer GA-52CX magnetometer and deploy deep scanning metallic detection equipment.</p>

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		<p>Thankfully, early in the cleanup process, DOD and the Regulators understood the significant threats from Ammunition and Explosives. A few quotes:</p> <p>"It is necessary to identify and remove ammunition and explosives located from the surface to the applicable depth indicated (Commercial/Residential, Utility Construction Activity: Clearance depth; 10ft. or excavation depth plus 4 feet, whichever is greater)."</p> <p>"Chapter 12, DOD 6055-9 STD (1992), DOD Ammunition and Explosives Safety Standard; DOD real property known to be contaminated with ammunition and explosives that may endanger the general public may not be released from DOD custody until the most stringent efforts have been made to ensure appropriate protection to the public."</p> <p>"The Presidio of Monterey does not intend to transfer by deed any known or suspect ordnance and explosive site on former Fort Ord land, prior to the completion of all required OE related actions, We do, however, intend to transfer by deed areas that may have been identified on training maps, but through the archive search process were not identified as potential ordnance sites, i.e, Machine Gun Proficiency Training Areas, Machine Gun Squares, and Mortar Squares."</p> <p>"Chapter 12 of DOD 6055-9STD requires a cleanup plan be presented to the DDESB for leasing, transferring, or disposing of DOD real property when ammunition and explosives contamination is known or suspected. The DDESB will review the plan for explosives safety considerations. The following matrix is to be used to identify the appropriate clearance depth. The ability to clear to a given depth will depend on the technology and funds available. It is necessary to identify and remove ammunition and explosives located from the surface to the applicable depth indicated.</p> <p>a) UXO/OEW cleanup efficiencies have not advanced as a result of new detection technologies and methods, but rather by changing the rules in order to meet development goals. What happened?</p> <p>Projectiles capable of penetration depths beyond the Shonstedt GA-52CX</p>

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		<p>detection range have been found in the CSUMB and County North parcels. There is good reason to be looking beyond the 4 foot removal depths at Fort Ord.</p> <p>b) To date, what efforts have been made to locate deeply buried ordnance? c) Today, what technology is being deployed to locate deep penetrating ordnance? d) The Schonstedt GA-52CX has been used at Fort Ord for 15 years. Is the RP using the best technologies available? e) Is the GA-52CX the best hand held OE detection technology available? f) Does the EM61-MK2 detect metallic anomaly's as well or better than the GA-52CX? g) Which of the following is the UXO/OEW cleanup goal; to locate and remove Ordnance and Explosive Waste to the greatest extent possible or to the extent it is financially practical? h) If finding all UXO/OEW items is a goal, would using detection equipment capable of deeper detection capabilities be desired? i) Is UXO/OEW in itself, being looked for beyond 4 feet? If not, why not?</p> <p>Response:</p> <p>The adequacy of equipment used during previous investigation and removal actions within the Group 2 MRAs will be evaluated, and the results will be documented in the Group 2 RI/FS Report. Responses to your specific comments are provided below.</p> <p>a) FORA utilizes the best available and appropriate detection technology and methods for munitions response.</p> <p>b) The adequacy of prior removal actions, including the depth of clearance will be evaluated and results will be presented in the Group 2 RI/FS Report.</p> <p>c) The technology used to detect deep penetrating munitions is the same as that used to detect shallow munitions.</p> <p>d) FORA utilizes the best available and appropriate detection technology and methods for munitions response. Determination of the best available and appropriate detection technology is based on geology, topography, munitions characteristics, and resource</p>

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		<p>requirements (DOD 6055.09-STD 2008).</p> <p>e) Determinations of “best” must include an evaluation of site-specific conditions. See response to 3d.</p> <p>f) The EM61-MK2 is a digital geophysical instrument that detects ferrous and non-ferrous metal and records data. The GA-52CX is a ferrous metal detector that does not record data. Determinations of the equipment adequacy must include an evaluation of site-specific conditions. See response to 3d.</p> <p>g) The purpose of the FORA ESCA RP is to complete the munitions response to ensure that the land is suitable for reuse. FORA works with the Army to achieve this goal with the oversight of the regulatory agencies.</p> <p>h) See response to 3d.</p> <p>i) The adequacy of the depths at which previous removal actions within the Group 2 MRAs were conducted will be evaluated as part of the Group 2 RI/FS. The Group 2 RI/FS Work Plan does not include a plan for field data collection as part of the Remedial Investigation.</p>
4	General	<p>Comment:</p> <p>Chemical Warfare Materials (CWM) and their use in training areas have not been adequately addressed. These types of training devices outside their packaging are not detectable with magnetometers.</p> <p>On March 10, 1997, 24 ampoules CAIS Chemical Warfare Materials were discovered 2 ft. below ground near 4500 motor pool during ordnance and removal activities at Site OE-13B (1/3 of which lies in the CSUMB parcel). This area is within the Group 2 County parcel and adjacent to the CSUMB parcel.</p> <p>On April 14, 1994 during the HFA/CSU OE removal, 2 EOD specialists were overcome by a Hazardous Material and required medical attention at the hospital. Their equipment was confiscated due to concerns of HAZ MAT contamination. Hazardous Material monitoring devices were required for all</p>

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		<p>subsequent OEW removal. It should be noted the HAZ MAT incident occurred in a site adjacent to OE-4C a Chemical, Biological, Radiological (CBR) site. The substance was not disclosed. These significant issues have been omitted from the new RP record. Was this a CWM incident?</p> <p>The known CWM were unexpectedly found in a Range/Training area that was not previously identified as a potential CWM training area. It may have been a rare event except it is well documented these CWM are commonly found and buried in training areas. According to Fort Ord records, CAIS Sets were used at Fort Ord until 1974. The K951 ampoules (also called vials) are frequently found in burial sites at old WWII training areas.</p> <ul style="list-style-type: none"> a) How are these incidents resolved? b) Army certainly saw this as significant concern. How will the public be protected from potential exposure to these chemical agents? c) Why haven't these incidents been included in the CSUMB parcel history? d) Due to the common practice of discarding these training devices in the field, what is the justification for allowing the transfer, reuse, and development of training areas and training sites (TS) where these devices have been found or many have been used? e) Is there a technology that can identify individual glass vials below the ground surface? f) These CWM materials are contained in glass vials. Has there been any discussions of how this hazard should or will be addressed? g) How can workers be protected from these types of hazards during excavation activities? h) Are there plans to cap military training areas rather than remediate them of UXO/OEW and military constituents? <p>Response:</p> <p>a - f) The FORA ESCA RP activities include performing remaining necessary munitions explosive hazard responses in specific portions of the former Fort Ord. The scope of this work plan and the Group 2 RI/FS is limited to MEC Explosive Hazard. Investigation of potential contamination issues other than the explosives hazards associated with MEC at the former Fort Ord will continue to be conducted by the Army. The cited incidents were described in the "Final Finding of Suitability for Early Transfer,</p>

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		<p>Former Fort Ord, California, Environmental Services Cooperative Agreement (ESCA) Parcels, and Non-ESCA Parcels Operable Unit Carbon Tetrachloride Plume” (FOSET 5; Administrative Record Number FOSET-004J).</p> <p>g) Should a CAIS or potential CWM item be encountered during the FORA ESCA RP activities, field personnel will follow Standard Operating Procedure (SOP) for Unanticipated Chemical Contamination Conditions to protect personnel and report the incident to appropriate agencies. This SOP is found in Appendix D of Volume 2 of the Group 1 RI/FS Work Plan (Administrative Record No. ESCA-0124).</p> <p>h) The FORA ESCA RP has no current plan to cap a munitions response site.</p>
5	General	<p>Comment:</p> <p>Critical Administrative Record (AR) documents that contain pertinent site specific known or suspected uses, and OEW contamination information have been omitted.</p> <p>a) Known OE sites have disappeared from the FORA ESCA RP parcels historical record.</p> <p>b) UXO/OEW discovered during site sampling and removal actions has disappeared from the FORA ESCA RP parcels historical record.</p> <p>The CSUMB Site has several ordnance and explosive (OE) sites within its boundaries. The Group 2 RI/FS identifies OE sites OE-4C, OE-7, OE-8, OE-18, OE-31. A OE site not included within the CSUMB parcel is a OE Site referred to as Site 13B or OE-13B, a practice mortar range. In the Annex J WP, Site 13B is 63 acres. For unknown and unexplained reasons, Site 13B was expanded to 247 acres. Approximately 80 acres, the northern 1/3 of OE-13B extends into the western portion of the CSUMB parcel. OE-13B has simply vanished from the CSUMB parcel OE record.</p> <p>Documentation that discusses Site 13B, OEW sampling and removal actions, its heavy OEW contamination, and lists of OEW found have been omitted. Omitted cleanup documents contain well documented lists of UXO/OEW discovered.</p>

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		<p>c) Why has the SEDR, MMRP, and FORA ESCA RP databases failed to include all OEW items discovered within the CSUMB parcel? d) Why has OE-13B been omitted from the CSUMB record?</p> <p>The Administrative Record seems to be being manipulated in a way that misrepresents important facts. The public, now and in the future, has a right to know the full extent of the past military training use of individual parcels, and the full historical record of OEW items found within their boundaries. To omit or alter any part of this historical information misleads the reader into believing the parcel is cleaner and safer than it actually is. By keeping the record straight, the public can decide for themselves if they wish to be exposed to the potential remaining OEW hazards. Remediation by data manipulation will have a disastrous outcome and harm someone.</p> <p>e) How has this critical issue slipped by the FORA officials and the regulators? f) Are the officials aware of what's happening? g) Is this acceptable to the officials and the regulators? h) When someone gets blown up or sick, who will be liable? i) Is this in the best interest of the taxpayers? j) California has strict real estate disclosure laws. How will parcel specific OEW information be known and disclosed?</p> <p>Additionally, these critical documents have not been included in the Fort Ord cleanup AR web site until very late in the process. The public has had no reasonable way of viewing site specific information. The FORA ESCA RP is omitting key documentation that tells a very different story of the extent of OEW/UXO contamination in the Training Areas.</p> <p>k) What steps will be taken to inform the public and future residents of the potential health hazards associated with living over former Training Areas?</p> <p>Response:</p> <p>a) As part of the Group 2 MRA RI/FS, the historical boundaries of MRSs and the sampling results from MRS-13B will be considered in the RI analysis. A portion of MRS-13B (formerly referred to as OE-13B) was located within the CSUMB Off-Campus MRA. The northern portion of</p>

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		<p>Site OE-13B (approximately one-third of the site) was subsequently included in the Phase III removal action performed by HFA in the CSU Footprint and became part of Site OE-31 (Administrative Record No. OE-0265C, Page 1-2 and 1-3). Site MRS-13B has not disappeared, but the boundaries have been revised: MRS-13B is now fully contained within the Parker Flats MRA Phase I area to the south (which has a signed ROD prepared by the Army) and the portion that had been located in CSUMB is now considered part of MRS-31.</p> <p>b) A detailed evaluation of the data collected within the Group 2 MRA footprints and the completeness of the dataset will be conducted. The results of this evaluation will be documented in the Group 2 RI/FS Report. Although a more detailed analysis of the dataset will be conducted as part of the RI/FS, the following issues were identified in FOCAG’s analysis of the Administrative Record presented in FOCAG’s comment letter that may account for some of the discrepancies:</p> <ol style="list-style-type: none"> 1. Table 2-5 of the HFA Report (Administrative Record No. OE-0012) covers multiple areas and items found during removal actions conducted by HFA on the former Fort Ord (the title of the table states that it is a “Summary of OEW Located and Disposed of During Delivery Order 015”). The items reported in OE-0002 (at approximately 44% completion) were included in HFA’s Final Report (OE-0012). As a result, FOCAG has double counted the items included in OE-0002. Some of the items included on Table 2-5 were found during the Laguna Seca removal action conducted by HFA. 2. As stated in Attachment 6 of the FOSET 5 (Administrative Record No. FOSET-004J), small arms ammunition (SAA; .50 caliber and smaller) is not considered MEC for the purposes of the Munitions Response Program being conducted for the former Fort Ord. Inert items by definition are not considered MEC. These items will not be included in the listing of MEC for the Group 2 MRAs, but the presence of these items will be considered during the Group 2 RI/FS analysis.

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		<p>3. The current CSUMB Off-Campus MRA boundary and the historical CSU Footprint differ. Some of the previous removal actions were conducted outside of the current CSUMB Off-Campus MRA boundaries. Only items specifically related to the CSUMB Off-Campus MRA are included in the ESCA.</p> <p>c) See response to 5b.</p> <p>d) See response to 5a.</p> <p>e) The Army maintains the Fort Ord Administrative Record. Questions pertaining to operations and maintenance of the Administrative Record should be directed to the Army.</p> <p>f - g) The officials are aware that SAA and inert items were not included on the list of MEC items in the SEDR and the Group 2 RI/FS Work Plan and that a more detailed analysis of the completeness of the dataset and the data quality will be conducted as part of the Group 2 RI/FS.</p> <p>h) As the lead agency under CERCLA, the Army retains ultimate responsibility for the cleanup of the former Fort Ord. The purpose of the FORA ESCA RP is to ensure that the land is suitable for reuse and to minimize the risk of explosive hazard incidents.</p> <p>i) The Army maintains the Fort Ord Administrative Record. Questions pertaining to operations and maintenance of the Administrative Record should be directed to the Army. A more detailed analysis of the completeness of the dataset and the data quality will be conducted as part of the Group 2 RI/FS.</p> <p>j - k) Fort Ord property transfer deeds include deed notices. The environmental condition of the Group 2 MRAs was disclosed in the FOSET 5 (Administrative Record Number FOSET-004J), which was made available to the regulatory agencies, the public, FORA, and the property recipients.</p>

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6	General	<p>Comment:</p> <p>The Fort Ord Military Munitions Response Program (MMRP) database has lost very important AR documentation needed to make accurate and well informed decisions by the Regulators and the Public.</p> <p>Most training/practice ammunition contains highly toxic, hazardous substances. These munitions and their constituents are a significant health hazard that remain relatively unaddressed. Many of these practice/inert ammunitions have been omitted in the new SEDR database. Withholding this information from new cleanup documents deprives the public of significant, and critical information. Early in the OE cleanup process, ordnance and explosive training range areas were first referred to as "Sites," They then were referred to as "OE" areas, and now "MRS' areas. As the changing of acronyms has progressed, so has the omission of old site data of UXO/OEW items discovered. Hence a "new" record has emerged.</p> <p>There's a new FORA ESCA RP concoction of data referred to as the Summary of Existing Data Report (SEDR). The SEDR which evolved from information supplied from the MMRP database is being relied upon to support the Group 2 RI/FS Work Plan. Site Characterizations, Findings, and Determinations of safety are being based on the compilation of the new data resulting from the omission and manipulation of the old data. This new data is resulting in the sites appearing to be relatively benign. This will undoubtedly result in a finding of "no further action".</p> <p>By creating this fictitious new record, RP parcels are being represented as being safer than they really are.</p> <p>The MMRP database is not being properly maintained as is evident by the omission of large quantities of UXO/OEW discovered in the 3300 acres of the FORA ESCA RP documents.</p> <p>a) What Agency or Organization is in charge of the Military Munitions Database, a critical element of the Fort Ord Superfund cleanup? b) Has the administration of the Military Munitions database been</p>

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		<p>privatized?</p> <p>c) Is there oversight of the OE/OEW/MEC data that is entered into and/or omitted from the database?</p> <p>d) What is the protocol for adding, deleting, or changing data in the Military Munitions Database?</p> <p>e) Who is responsible for maintaining the UXO/OEW/MEC AR and ensuring the information is preserved and not tampered with?</p> <p>f) Does the database compile all past discovered Ordnance and Explosives i.e., OE, OEW, UXO, DMM, MEC, MPPEH, MD, etc. into the same OE dataset?</p> <p>g) How could such significant historical information be missed by the FOR A ESCA RP and the Regulators?</p> <p>h) Is there a public notification and input process of how the database will be maintained?</p> <p>i) Acronyms, synonyms, and descriptions of Ordnance and Explosives (OE), Ordnance and Explosive Waste (OEW) have been changed over the years. Valuable and critical information is being lost. Coincidentally, this appears to correspond with the privatization of Fort Ord Superfund cleanup, the FORA ESCA RP, and the new centralized database. Are the Regulators keeping track of the Fort Ord historical Military Munitions Database and taking steps to prevent this potential travesty?</p> <p>j) Significant OE data for the CSUMB parcel has been lost. Which Regulatory Agency is responsible for oversight that will ensure the historical facts of each parcel are preserved?</p> <p>k) Is the ESCA Cleanup program still required to report types, amounts, and locations of all OEW discovered including Small Arms ammunition, 50 cal. Or less, and practice and inert ordnance? If not, why not?</p> <p>Response:</p> <p>a - h) The Fort Ord MMRP Database is maintained by the U.S. Army Corps of Engineers (USACE). The Army responds to questions pertaining to operations and maintenance of the Fort Ord MMRP Database. The Army responded to a similar comment received from FOCAG in a previous letter dated August 12, 2008. Please refer to the Army's November 17, 2008 response letter (Administrative Record ESCA-0126). The MEC-related data generated by the FORA ESCA RP Team will be submitted to the Fort Ord MMRP database.</p> <p>i) Please contact the regulatory agencies for information on how they keep</p>

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		<p>track of historical and current data. The FORA ESCA RP Team is required to share data with the regulatory agencies.</p> <p>j) The Army maintains the Fort Ord Administrative Record. Questions pertaining to operations and maintenance of the Administrative Record should be directed to the Army. A more detailed analysis of the completeness of the dataset and the data quality will be conducted as part of the Group 2 RI/FS.</p> <p>k) ESCA RP data will be categorized in a manner that is consistent with the Army's MMRP database. As stated in Attachment 6 of the FOSET 5 (Administrative Record No. FOSET-004J), small arms ammunition (SAA; .50 caliber and smaller) is not considered MEC for the purposes of the Munitions Response Program being conducted for the former Fort Ord.</p>
7	General	<p>Comment:</p> <p>It is understood non-metallic landmines have been found at Fort Ord. Discovery of these types of munitions raise the same questions as with the CWM issue.</p> <p>a) How is this issue being addressed? b) Is there technology that can identify individual non-metallic ordnance below the ground surface? c) Is it a good idea to develop areas were CWM and non metallic landmines may have been used?</p> <p>Response:</p> <p>a - c) The work plan does not include non-metallic land mine detection technology discussion. The Group 2 RI/FS will evaluate munition types expected in the Group 2 MRAs. The adequacy of the previous removal actions, including the type of detection equipment used and munition types expected will be evaluated and the results will be documented in the Group 2 RI/FS Report and made available for public review.</p>

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8	General	<p>Comment:</p> <p>Additional comments and questions</p> <p>The Group 2 RI/FS Sec 3.1 States OEW found:</p> <p>MRS-04C</p> <ul style="list-style-type: none"> • Training (practice hand grenade fuze) <p>MRS-07</p> <ul style="list-style-type: none"> • Training (practice mines, practice rockets, practice hand grenade fuzes, and practice rifle grenades) illumination (trip flares) • Smoke (smoke hand grenades) • Riot / Crowd Control (riot hand grenades) <p>MRS-08</p> <ul style="list-style-type: none"> • Illumination (illumination signals and trip flares) <p>MRS-13C</p> <ul style="list-style-type: none"> • Training (practice projectiles, practice mines, simulators, and practice hand grenade fuzes) • Illumination (illumination signals, illumination hand grenades, trip flares, and parachute projectiles) • Smoke (smoke rifle grenades and smoke hand grenades) • Demolition (blasting caps and demolition charges) • Igniters (electric squibs and hand grenade fuzes) • Riot / Crowd Control (riot hand grenade) <p>MRS-18</p> <ul style="list-style-type: none"> • Training (recoilless training round) • Igniters (trip flares and firing devices) <p>MRS-31</p> <ul style="list-style-type: none"> • Direct and Indirect Firing (antitank rockets, armor-piercing tracer projectiles, and fragmentation hand grenades) • Training (practice hand grenade fuzes, practice hand grenades, practice rifle grenades, practice mine fuzes, practice mines, practice rockets, and simulators) • Illumination (illumination signals, illumination hand grenades, trip

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		<p>flares, parachute illumination projectiles, and pyrotechnic mixtures)</p> <ul style="list-style-type: none"> • Smoke (smoke rifle grenades, smoke hand grenades, smoke signals, smoke pots, and pyrotechnic smoke mixtures) • Demolition (blasting caps and demolition charges) • Igniters (firing devices, electric squibs, hand grenade fuzes, practice mine activators, mine fuzes, and time fuse igniters) • Riot / Crowd Control (riot hand grenades) <p>Sampling and Removal docs. tell a different story.</p> <p>a) Is the AR record different than the MMRP record? b) Why such a discrepancy between what the FORA ESCA RP shows and what the AR found?</p> <p>Sec, 3.1 states:</p> <p><u>Only the MEC items from MRS-13C were recovered from depths below ground surface (ranging from 1 to 48 inches). The MEC items from MRS-04C, MRS-07, MRS-08, MRS-18, and MRS-31 were reportedly recovered from the ground surface according to the Fort Ord Military Munitions Response Program (MMRP) database; however, the depth information may be inaccurately represented in the database and will be evaluated during the RI as described in Section 4.0 of this work plan.</u></p> <p>Sampling and Removal docs. tell a different story.</p> <p>Note: To date, the 1940's-1950's mortar range Site 13B has not been located. What lesson should be learned from this story? Range uses and locations are unknown.</p> <p>Sec. 3.1 states:</p> <p><u>There was no evidence of a mortar impact area associated with the practice mortar ranges (MRS-31 and MRS-13C) and no evidence of tear gas or chemical agents associated with the CBR training area (MRS-04C) identified on historical maps.</u></p>

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		<p>Sampling and Removal and WP docs tell a different story.</p> <p>Note: The HAZ MAT incident that occurred very near the OE-4C site remains unresolved. The precautionary approach would be to assume it was a CWM incident related to 4C training. Under no circumstance should the incident be omitted from the record. Taking into account the 13B CWM incident along with the HFA/CSU HAZ MAT incident, the Group 2 RI/FS training areas and others are potentially contaminated with CWM training devices.</p> <p>c) Why has the HAZ MAT incident been omitted from the record?</p> <p>The initial evaluation of previous munitions response actions within the CSUMB Off-Campus MRA indicated that the existing data is of sufficient quantity to characterize the MRA. However, these removal actions were conducted using analog magnetometers, and requirements for data collection were not as detailed at the time of the removal actions as the current requirements. Therefore, data quality has been identified as an issue that needs to be evaluated as part of the RI.</p> <p>Removal action docs show record keeping requirements.</p> <p>d) Are the FORA ESCA RP record keeping requirements more stringent the SOW phase 1? If so, why aren't all the OEW items in the SEDR database?</p> <p>e) Not all records are in the AR. Where did the missing records go?</p> <p>Response:</p> <p>a) A more detailed analysis of the completeness of the dataset and the data quality will be conducted as part of the Group 2 RI/FS.</p> <p>b) See response to FOCAG Comment 5b.</p> <p>c) The Army maintains the Fort Ord Administrative Record. Questions pertaining to operations and maintenance of the Administrative Record should be directed to the Army.</p>

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No.	Comment Type / Report Section	Comment/Response
		d) See response to FOCAG Comment 5b. e) The Army maintains the Fort Ord Administrative Record. Questions pertaining to operations and maintenance of the Administrative Record should be directed to the Army.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

October 3, 2008

Mr. Stan Cook
Fort Ord Reuse Authority
100 12th Street, Building 2880
Marina, CA 93933

Re: EPA Comments on the Draft Group 2 Remedial Investigation / Feasibility Study Work Plan, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas, Former Fort Ord, Monterey County, California Dated August 1, 2008

Dear Stan:

Attached are EPA's comments on the Draft Group 2 Remedial Investigation / Feasibility Study Work Plan, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas, Former Fort Ord, Monterey County, California Dated August 1, 2008.

If you have any questions, please do not hesitate to call me at (415) 972-3681 or e-mail me at huang.judy@epa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Judy C. Huang".

Judy C. Huang, P.E.
Remedial Project Manager

cc:

Roman Racca (DTSC)
Site Mitigation/Office of Military Facilities
8800 Cal Center Drive
Sacramento, CA 95826

Kristie Reimer, AICP
Principal Planner
BRAC / Federal Programs
LFR Inc.
1900 Powell Street, 12th Floor
Emeryville, CA 94608

Ms. Gail Youngblood
Fort Ord Base Realignment and Closure Office
P.O. Box 5008
Monterey, CA 93944-5004

Mr. Thomas Hall (via E-mail)

**REVIEW OF THE
FORT ORD REUSE AUTHORITY
ENVIRONMENTAL SERVICES COOPERATIVE AGREEMENT
REMEDATION PROGRAM
DRAFT GROUP 2
REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN
CALIFORNIA STATE UNIVERSITY AT MONTEREY BAY OFF-CAMPUS
AND
COUNTY NORTH MUNITIONS RESPONSE AREAS
FORMER FORT ORD, MONTEREY COUNTY, CALIFORNIA
AUGUST 1, 2008**

GENERAL COMMENTS

1. The Draft Group 2 Remedial Investigation/Feasibility Study Work Plan, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas, Former Fort Ord, Monterey, California, dated August 1, 2008 (hereinafter referred to as the Draft Group 2 RI/FS WP), contains Appendix A, CSUMB Off-Campus MRA Conceptual Site Model (CSM). This CSM contains a Table 6.3-2, which lists the types of munitions and explosives of concern (MEC) previously recovered from what is now identified as the "CSUMB Off-Campus Munitions Response Area (MRA)." The table lists a number of items with a hazard classification value of zero (0). The definition of this classification is "inert MEC," which was extracted from the Final Fort Ord Ordnance and Explosives Risk Assessment Protocol and the August 22, 2005, update thereof. There is a nomenclature disclaimer found in Table 6.3-2 that notes that any errors in terminology and other listed data are a result of misinformation from the data sources.

While it is understood that the nomenclature used by the Military Munitions Response Program over the years has changed dramatically, the term "inert MEC" is an oxymoron. If an item is inert it cannot be classed as MEC. As a result, the potential exists that a significant number of the items listed in Table 6.3-2 as MEC are actually munitions debris (MD) instead and represent no explosives hazard. The table lists a total of 1,553 items identified as MEC recovered from the MRS. However, if the 617 items listed with a hazard classification of zero (0) (MD) are subtracted, the total quantity of MEC found on the site is lowered to 936, which is a significant reduction (approximately 40 percent) in the items representing an explosives hazard recovered from the site.

Please review the Draft Group 2 RI/FS WP and ensure that this information is presented at an appropriate location therein. In addition, please remove the term "inert MEC" from the narrative portion of the document wherever it occurs.

2. There are a number of instances where demolition activities are described and the only type of blasting caps listed as being used on the site is "electric blasting caps." However, the table cited in General Comment 1 above lists a nonelectric blasting cap as having been discovered as MEC on the CSUMB Off-Campus MRA. As both types are normally used on sites where demolition of explosives is conducted during training, these

descriptions should omit the term “electric” from the statement unless there is definitive evidence that only electric blasting caps were used on the site. Please make this change.

SPECIFIC COMMENTS

- 1. Section 1.3.1, Cleanup Program Under the Army, Page 1-2:** This section incorrectly refers to the Central Coast Regional Water Quality Control Board as the Monterey Bay Regional Water Quality Control Board. Please correct the reference.
- 2. Section 4.9 Community Involvement, First Paragraph, Page 4-9:** Please add an additional sentence to state that the Community Involvement and Outreach Plan has been approved by EPA in consultation with DTSC.
- 3. Section 4.9.4 Roles of State and Local Authorities, Page 4-11:** This section states that “State and local government cooperation has included regulatory agency involvement through out the ESCA RP. FORA and its contractors continue to meet regularly with the regulatory agencies and local jurisdictions with respect to the ongoing munitions response activities.” In addition to State and local agencies, several Federal government agencies are also involved in the ESCA remediation program. Please revise the heading of the section and the text to reflect this.
- 4. Section 5.6, Risk Assessment, Page 5-2:** This section states that, “Risk assessment will be performed for areas of the MRAs where MEC hazard is identified. In areas where there is no history of military munitions use or where remedial investigation supports the absence of unacceptable levels of explosive hazard, risk assessment is not required to be performed.” It is unclear as to exactly what is meant by the term “unacceptable levels of explosive hazard” (i.e., what is deemed to constitute an acceptable level of explosive hazard [other than zero]?). Please review Section 5.6 and expand it to better explain the intent of the cited statement.
- 5. Section 5.9.1, Task 9 Remedial Alternatives Screening, Page 5-3:** The third paragraph of this section states that, “Numerical cleanup standards are not available for munitions response actions. Therefore, the PRGs for MEC on the surface and in subsurface soil are developed to address MEC using the most appropriate technologies, to ensure protection of the public consistent with the proposed end use of the property.” It is unclear as to exactly what is intended by the phrase “developed to address MEC using the most appropriate technologies, to ensure protection of the public consistent with the proposed end use of the property.” Please expand the cited section to better explain what is intended by the quoted phrase.
- 6. Table 1, Potential Applicable or Relevant and Appropriate Requirements (ARARs), Page 1:** Since there are wetlands adjacent to this RI/FS Work Plan investigation area, there is a potential for on site soil disturbance activity to impact these wetlands and the

associated upland habitats that are necessary to support the function of these wetlands. Please include surface water discharge related ARARs such as the Porter-Cologne Water Quality Control Act, and 40 CFR Parts 122, 123, and 123, as implemented by State Water Resources Control Board Order No. 92-08DWQ.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
FORT ORD OFFICE, ARMY BASE REALIGNMENT AND CLOSURE
P.O. BOX 5008, BUILDING #4463 GIGLING ROAD
MONTEREY, CALIFORNIA 93944-5008

AUG 27 2008

Base Realignment and Closure

Stan Cook
ESCA Remediation Program Manager
Fort Ord Reuse Authority
100 12th Street
Marina, CA 93933

Subject: *Draft Group 2 Remedial Investigation/Feasibility Study (RI/FS) Work Plan, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas*, dated August 1, 2008, received on August 6, 2008.

Dear Mr. Cook:

Thank you for an opportunity to review and comment on the subject document. The Army's comments are enclosed. Please note our comments are focused on "big picture" issues such as the consistency with documents previously produced under the Army's cleanup program. A copy of this letter will be furnished to U.S. Environmental Protection Agency (Judy Huang) and California Department of Toxic Substances Control (Roman Racca).

Sincerely,

Gail Youngblood
BRAC Environmental Coordinator
Fort Ord Field Office

Enclosure

DRAFT Group 2 Remedial Investigation/Feasibility Study (RI/FS) Work Plan, California State University at Monterey Bay (CSUMB) Off-Campus and County North Munitions Response Areas (MRAs)
August 1, 2008

Army Comments:

1. p.2-5, Section 2.3.2 Future Land Use. The paragraph cites equestrian facilities and open space as examples of "habitat reserve" land use. Equestrian facilities would not be considered consistent with habitat reserve uses. Table 7.4-1 indicates that the horse park would be located within parcel E19a.3 which is a future development parcel. Please review this information and reclassify equestrian use as other than habitat reserve.
2. p.3-2, Section 3.1 CSUMB Off-Campus MR Evaluation. The section discusses the munitions items that have been removed from the CSUMB Off-Campus MRA. The Fort Ord Military Munitions Response Program (MMRP) database is reviewed and updated periodically. Please continue to check the latest version of the database for any updates that might have been made.
3. p.3-3, Section 3.2 County North MRA Evaluation. The section discusses the munitions items that have been removed from the County North MRA. The Fort Ord MMRP database is reviewed and updated periodically. Please continue to check the latest version of the database for any updates that might have been made.
4. p.4-10, Section 4.9.3.
 - a. Bullet 1. It is indicated "all CSUMB faculty, staff, and students residing in campus housing will receive a copy of the newsletter while school is in session." should be re-evaluated. Suggestion to instead describe the actions that FORA and/or the ESCA RP Team will take to reach out to the CSUMB.
 - b. Bullet 5. It is indicated that FORA factsheets will be posted on the Army's Fort Ord Cleanup website. Please revise the text to state that a hyperlink to factsheets posted on the FOR A ESCA website is available on the Army's Fort Ord Cleanup web site www.fortordcleanup.com.
5. Table 1 Potential Applicable or Relevant and Appropriate Requirements (ARARs). Please review the "remarks" column so that they address the planned/anticipated CERCLA actions for the Group 2 MRAs.
6. Please coordinate any outreach activities targeting the Department of Defense (DoD) communities that may be affected by the planned field investigation (facilities along Joe Lloyd Way). Our Point of Contact for this matter is Melissa Broadston at 831-393-1284.

Detail/minor comments:

7. p.1-2, Section 1.3.1. Please see the Army's comments to similar text that appeared in Draft Summary of Existing Data Report (SEDR), Section 2.2. Suggest updating the paragraph to be consistent with the text that is included in the draft final version of SEDR.

Marina Equestrian Association
P.O. Box 1320
Marina CA 93933



**Marina
Equestrian
Association**

20 September 2008

FORA
Attn: Mr. Stan Cook
100 12th Street
Building 2880
Marina, CA 93933

Ref: Requests relating to Remediation Program for CSUMB Off-Campus and North County MRAs (Group 2)

Dear Mr. Cook

The Marina Equestrian Association (MEA), which operates the Marina Equestrian Center (MEC), would like to address aspects of the FORA ESCA Remediation Program contained in the Draft of "Group 2, Remedial Investigation / Feasibility Study Work Plan" relating to CSUMB Off-Campus and North County Munitions Response Areas. Certain aspects of this plan impact the operation of our organization, the facility we run and visitor-users of our facility.

We fully support remediation of these areas. However, as a public access equestrian facility, the MEC needs to be supported in having safe access to the BLM during this time of fieldwork and in gaining access to the Off-Campus and County North areas as soon as possible to continue our recreational and public access use of those areas.

Our specific comments for FORA's consideration are:

- a. We ask that FORA consider opening CSUMB Off-Campus and County North MRAs for public access as soon as field work is completed and dangers have been removed. Opening the sites while paperwork is completed would reduce the time and burden of lost access and allow MEA and other users to resume our present public uses more quickly.
- b. We ask that FORA consider designating the PG&E pipeline as a third BLM access corridor where it travels across CSUMB Off-Campus and County North areas. This would avoid a potentially dangerous mixing of horses and other users with vehicle traffic on Inter-Garrison Road. The pipeline is an ideal choice because of over 40 years of being excavated, traveled by heavy equipment and regularly maintained. It also has a wide set-back from vegetation and would eliminate the need for users to travel on Inter-Garrison Rd pavement.
- c. Equestrian use should be added to paragraph 2.3.1 as a daily recreational user.
- d. Equestrian use should be included, in paragraphs 2.3.1 and 2.3.2. for past, current and future land use
- e. We wish to provide testimony that current recreational uses of the Parker Flats MRA are not conflicting and all should be accommodated after remediation.

These daily recreational users are hikers, joggers, bikers, dog walkers and horse riders.

- f. We ask to have the Marina Equestrian Center acknowledged, where appropriate, as an historic and future source of users to this area due to its close proximity to Parker Flats and its unique connection to the National Park Service.

Background and the specific impact these closures have on our operations are detailed in the following pages. Our suggestions are also discussed there. Lynne Gose, at 831-883-8644 or jrgose@comcast.net, is our point of contact on this issue.

We appreciate the care with which the public is kept informed of FORA and ESCA activities in the former Fort Ord lands and the opportunity to provide input in these important processes.

Sincerely,

The 2008 MEA Board of Directors

1. Introduction

The Marina Equestrian Association (MEA) would like to address aspects of the FORA ESCA Remediation Program contained in the Draft of “Group 2, Remedial Investigation / Feasibility Study Work Plan” relating to CSUMB Off-Campus and North County Munitions Response Areas. Certain aspects of this plan impact the operation of our organization, the facility we run and visitor-users of our facility.

2. Background and History

The Marina Equestrian Association operates the 15 acre Marina Equestrian Center (MEC) at the corner of 5th Street and 9th Avenue in Marina. Equestrian activities have operated in this portion of Fort Ord since about 1905 when the first US Army cavalry units occupied this site and used what is now FORA and BLM land for maneuvers. The renowned 11th Cavalry “Blackhorse” unit was the last military unit to occupy the site before the cavalry was disbanded in 1965. Many of the trails we ride today are those created and traveled by cavalry troupers throughout the last century.

In 1965 the military stables was given a recreational use. Military and civil service employees assigned to Military stations on the Monterey Peninsula created a cooperative organization to run the site as a riding club for military family recreation. Trail use continued with this organization. With the closure of Fort Ord in the 1990s, the survival of the facility was in doubt.

Faced with the loss of their Army sponsor for the land, and the potential loss of the facility for use by military families assigned to the Monterey peninsula, the Marina Equestrian Association (MEA) was founded as a non profit organization to explore the possibility of preserving the facility for public use. MEA approached the City of Marina in April of 1994 to sponsor their application to continue the equestrian activity on the (then) 34 acre property.

At the urging of citizens of the community, The City of Marina requested, under the Federal Lands to Parks Program and FORA, to keep the stables open to provide public recreation and take advantage of the extensive trail systems. The land was transferred to The City of Marina as an Equestrian Center with oversight by the National Parks Service. MEA operated the facility and provided boarding of horses and other programs to citizens of Marina and the Monterey Peninsula.

MEA has operated a successful stable for horse-owning members of the community willing to provide their own labor and skills to offset the normal payroll and commercial costs of operating a stable. This creates a unique recreational opportunity for working-class families to experience horse ownership and make use of easy access to the extensive Fort Ord and BLM Trails.

Over time, MEA provided a variety of public access programs in the community. Most recently, MEA has offered riding lessons, quarterly Kids Days, a community open house, BLM orientation rides for area trailriders, the Marina School Break Riding Camp Programs. Always, the center is available for visits, as a picnic site, for arena rental, for travelers visiting the area with horses (a hotel

for horses), riding lessons, or for safe access to BLM trails for area horse owners. CSUMB students also volunteer for public service, ride, or board horses at the MEC.

The Center is active as an emergency evacuation site for livestock and members are registered with local rescue missions to assist with transportation of horses from endangered locations during fire season or other disasters. During the 2008 fire season, the Center hosted eight horses evacuated from Big Sur fire, at no cost to their owners. Members also participate in the Monterey Bay Bicycle and Equestrian Assistance Team (BETA) to provide visitor assistance, emergency response and patrol on the trails of the BLM and MEA participates monthly in the FORA User's Working Group. Other MEC riders provide a service to the governing jurisdictions of FORA and BLM public lands by reporting dangers, illegal use and trail assistance while riding these areas.

3. Location of the Equestrian Center.

The center is located less than one mile from the Northwest corner of the CSUMB Off-Campus and County North areas (USACE parcel s1.3.2). By our system of trails we are about 3 miles from the nearest access point to the BLM, where it is bordered by Watkins Gate Road. These trails are fairly straight and horses cross Inter-Garrison Road at numerous points between 8th Avenue and Abrahms Parkway to gain access to the trails of the CSUMB Off-Campus area, or to reach the more distant BLM access points. See map at Figures 3, 4 and 5 for details.

Approximately 1.5 miles of our trails follow or parallel the PG&E buried pipeline to get from the MEA facility to the Inter-Garrison Road crossings. This route has been used continuously since at least 1967 and the pipeline can easily be seen on the 1967 Monterey County Soils Map (Figure 2) with its adjacent horse trails.

4. Land Use by MEA and other equestrians (ref paras 2.3.1 and 2.3.2)

Our organization and its membership is the latest in a long line of equestrian, hiker and dog-walking users of the CSUMB Off-Campus and County North MRAs. We view these uses as compatible and desirable. Although members occasionally hike, bike and dog-walk the area, our primary concern for these comments is the use of these trails by horseback. Our members and guests use these areas DAILY for equestrian recreation and to gain access to the adjacent and more extensive BLM lands. Most riders explore the BLM, CSUMB Off-Campus and North County trail areas with rides of 2-6 hours duration.

There are two other locations where riders can park trailers near these areas, but neither have amenities. Many view the MEC as a safer, more suitable option for unloading horses in spite of longer distances to the BLM. See Figure 1.

5. General Comments

MEA fully supports munitions cleanup and has worked to educate our membership and visiting riders of the importance of this remediation. We have worked diligently with the FORA user's Group to stay abreast of the remediation plans and requirements and to educate other users with whom we have contact. This summer we hosted two equestrian trailride events informing area riders of the impending Off-Campus and County North trail closures and orienting them with the authorized access corridors to the BLM. We also provide modified maps to the trail riding public showing the new access corridors and parking areas.

However, as a public access facility, the MEC needs to be supported in having SAFE access to the BLM during this time of fieldwork and in gaining access to the Off-Campus and County North areas as soon as possible to continue our recreational and public access use of those areas.

6. Impact and Specific comments

MEA and the Marina Equestrian Center are impacted in two ways by remediation required closure of the Off-Campus and County North areas. The first relates to our public outreach mission activities and the second to safe access to the BLM for riders.

6. a. Discussion and comment relating to public access impact.

Closure for longer than absolutely necessary to make the area safe severely limits our ability to perform our BLM access and public equestrian recreation missions. For the past year, MEA has been negotiating with a concessionaire to provide trail rides onto public lands to members of the public who do not own their own horses. This was a use of our facility and equestrian trails that was envisioned and mapped out in original FORA planning. Delays of longer than absolutely necessary after fieldwork and remediation have occurred will significantly impact the economics of public trail rides and the viability of this and other public access programs.

Closure to public use of these highly desirable Off-Campus and County North areas is a frustration to regular users and severely undercuts the access to public recreation our organization provides. Such delays could even threaten the very existence of the Marina Equestrian Center if public use declines while trails are closed or as equestrian access route become viewed as abandoned. In these times when land has become so valuable, there is enormous pressure on the MEC continue public access activities or face the possibility the City of Marina can justify other uses for the equestrian site.

FORA can lessen the impact of years of lost access to Off-Campus and County North areas by allowing public access to resume as soon as field work is completed and the dangers have been removed. We understand that paperwork for site closure can take one-and-a-half to two years to complete once field work has been completed. These extra years with no access are an unnecessary burden in the users of these areas, particularly when there has been a long history of uneventful use. It would be a particularly galling burden to be excluded from using these areas while paperwork is

processed after they have been made safe. Delays to process paperwork could threaten our critical public access programs and the very existence of the Equestrian Center.

Opening these areas to public use after field work is also critical for accessing the BLM in the most safe and aesthetically pleasing way – through Off-Campus and County North areas. Equestrian users of the MEC and public trail riders will also be able to enjoy closer and more varied recreational alternatives.

6. b. Discussion and comment relating to safe access to the BLM

The closure of the Off-Campus and County North areas will create a distance of about 1 mile along Inter-Garrison Road where horses must walk on the pavement and alongside traffic rather than migrate onto safer dirt trails that parallel Inter-Garrison. This segment where horses will be forced onto the road is between the intersection of the PG&E pipeline and Inter-Garrison Road, eastward to the trail parking area near Abrahms Rd, where the County North BLM access corridor starts. This would be the only route possible for riders using the MEC as their trailhead, or for riders who stable at the MEC to access the BLM. See the map showing problem routing caused by Off-Campus and County North area closure at Figure 5.

This creates a dangerous situation for horses, riders and cars. Horses can be easily startled by traffic. They can be frightened into traffic lanes by dogs, trash, children, flags and a host of other unexpected activities near roads and along the Abrahms housing area. They can also slip on asphalt pavements. Drivers often do not respect their space or slow down. They often honk at horses, either as a misguided friendly gesture or in anger. Most drivers are not aware that, unlike a bicycle, horses have brains of their own and can suddenly change direction.

This segment of road will become even more active and congested since students traveling to and from college housing by bike or on foot will also be forced onto the road. Nearby residents walking dogs and recreational bikers will also be funneled into this segment of road rather than being able to use the quieter Off-Campus and County North trails paralleling Inter-Garrison.

We ask that FORA consider a third access corridor be added to the plan in the form of the PG&E pipeline. This corridor would extend from where the PG&E pipeline crosses Inter-Garrison Rd and travels east through the Off-Campus MRA (USACE parcel S1.32) and County North MRA (USACE parcels L5.7 and L20.21). Use of the PG&E pipeline as an access corridor would bypass this dangerous segment of Inter-Garrison, where all user's would be forced to "share the road" in an unsafe way. At its most eastward end, the PG&E pipeline corridor would enter the BLM, providing a 3rd access point for users during remediation. Please see maps at Figures 3, 4 &5.

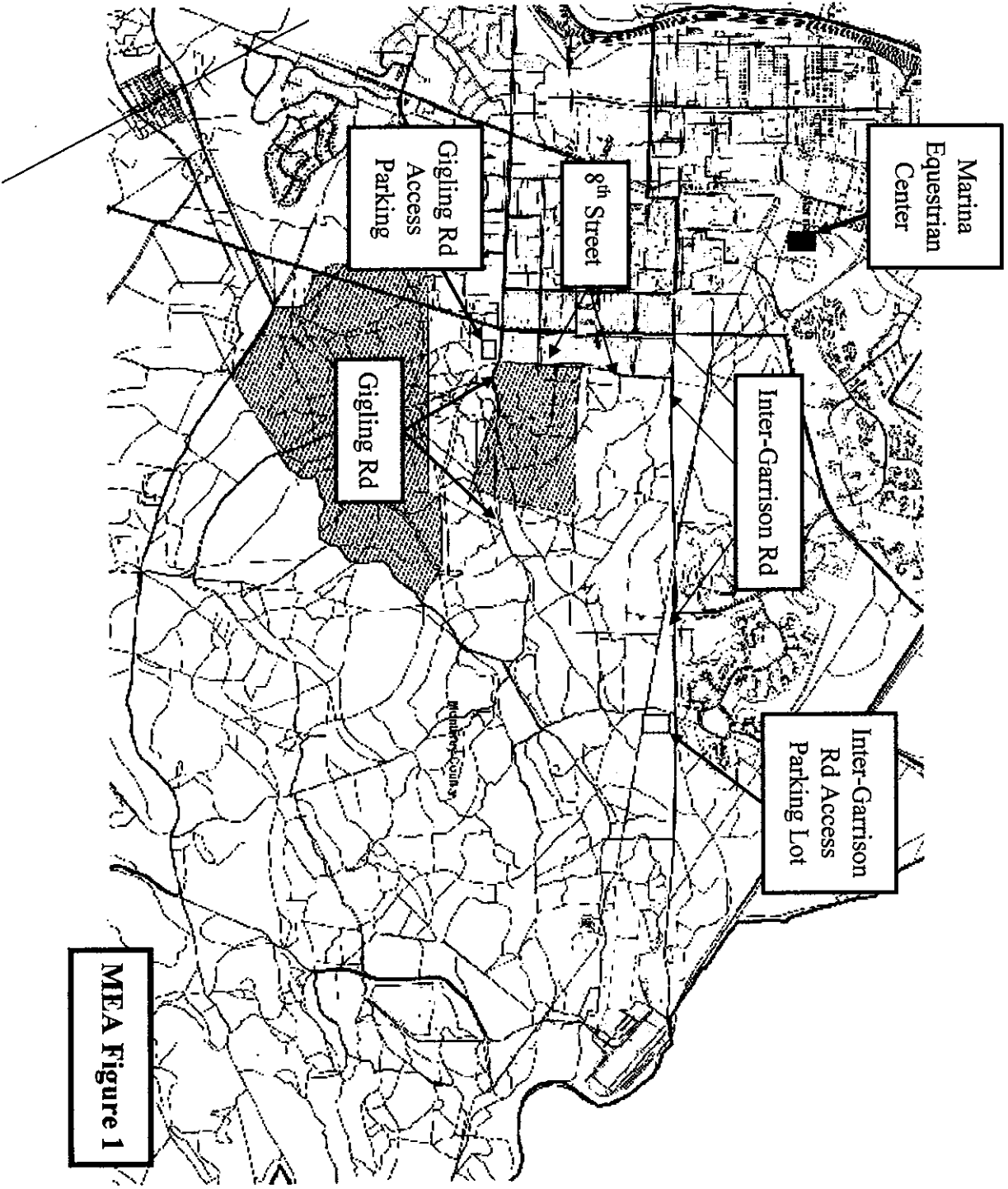
The pipeline would seem to provide the perfect corridor. As seen on Figure 2, the pipeline has been in place at least 40 years, since this 1967 photo. It has a broad right-of-way with a service road, has been traveled by heavy equipment regularly and has been maintained over its lifetime. The ground along the route was dug up to bury the original pipeline and in subsequent maintenance efforts. About 1 mile from the Inter-Garrison Rd crossing, the pipeline crosses the North County BLM access

corridor at right angles and provides recreational users parking at the Trail access Parking lot at Inter-Garrison an alternate, more eastward route for entering the BLM. It's broad, cleared right-of-way would preclude ESCA remediation teams and users from the possible collision inherent on single-track trails in vegetated areas.

Most importantly for equestrian users originating at the MEC, using the pipeline would completely avoid the need to travel in traffic on the unsafe road pavement for even a short distance when traveling to the BLM. Needless to say, it would also be welcomed and used by hikers, dog walkers and bike riders seeking the same advantage.

7. In summary, these are our specific comments relating to the Group 2 Work Plan:

- a. We ask that FORA consider opening the CSUMB Off-Campus and County North MRAs as soon as field work is completed and dangers have been removed. Opening the sites while paperwork is completed would reduce the time and burden of lost access and allow MEA and other users to resume our present public access mission more quickly.
- b. We ask that FORA consider designating the PG&E pipeline as a third BLM access corridor where it travels across CSUMB Off-Campus and County North areas. This would avoid a potentially dangerous mixing of horses and other users with vehicle traffic on Inter-Garrison Road.
- c. Equestrian use should be added to paragraph 2.3.1 as a daily recreational user.
- d. Equestrian use should be included, in paragraphs 2.3.1 and 2.3.2. for past, current and future land use
- e. We wish to provide testimony that current recreational uses of the Parker Flats MRA are not conflicting and all should be accommodated after remediation. These daily recreational users are hikers, joggers, bikers, dog walkers and horse riders.
- f. We ask to have the Marina Equestrian Center be acknowledged, where appropriate, as an historic and future source of users to this area due to its close proximity to Parker Flats and its unique connection to the National Park Service.



MEA Figure 1

MEA Figure 1






MEA Figure 2

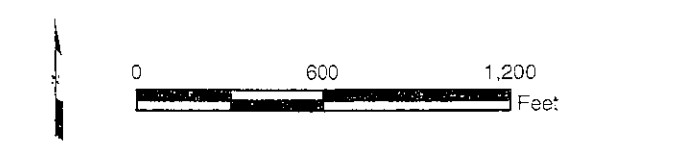
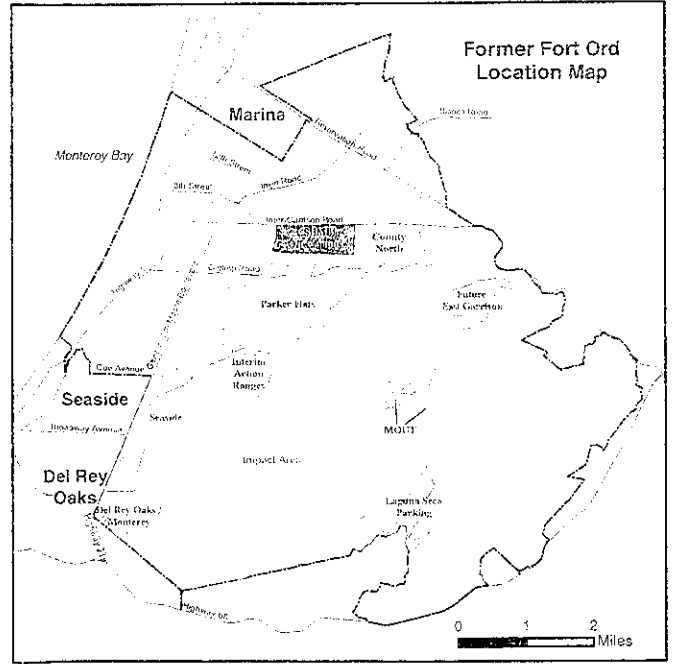
- PG&E Pipeline highlighted in yellow
- Marina Equestrian Center highlighted in blue
- Inter-Garrison Rd highlighted in green

MEA Figure 2



Legend

-  Munitions Response Area
-  Major Road
-  S1.3.2 USACE Parcel



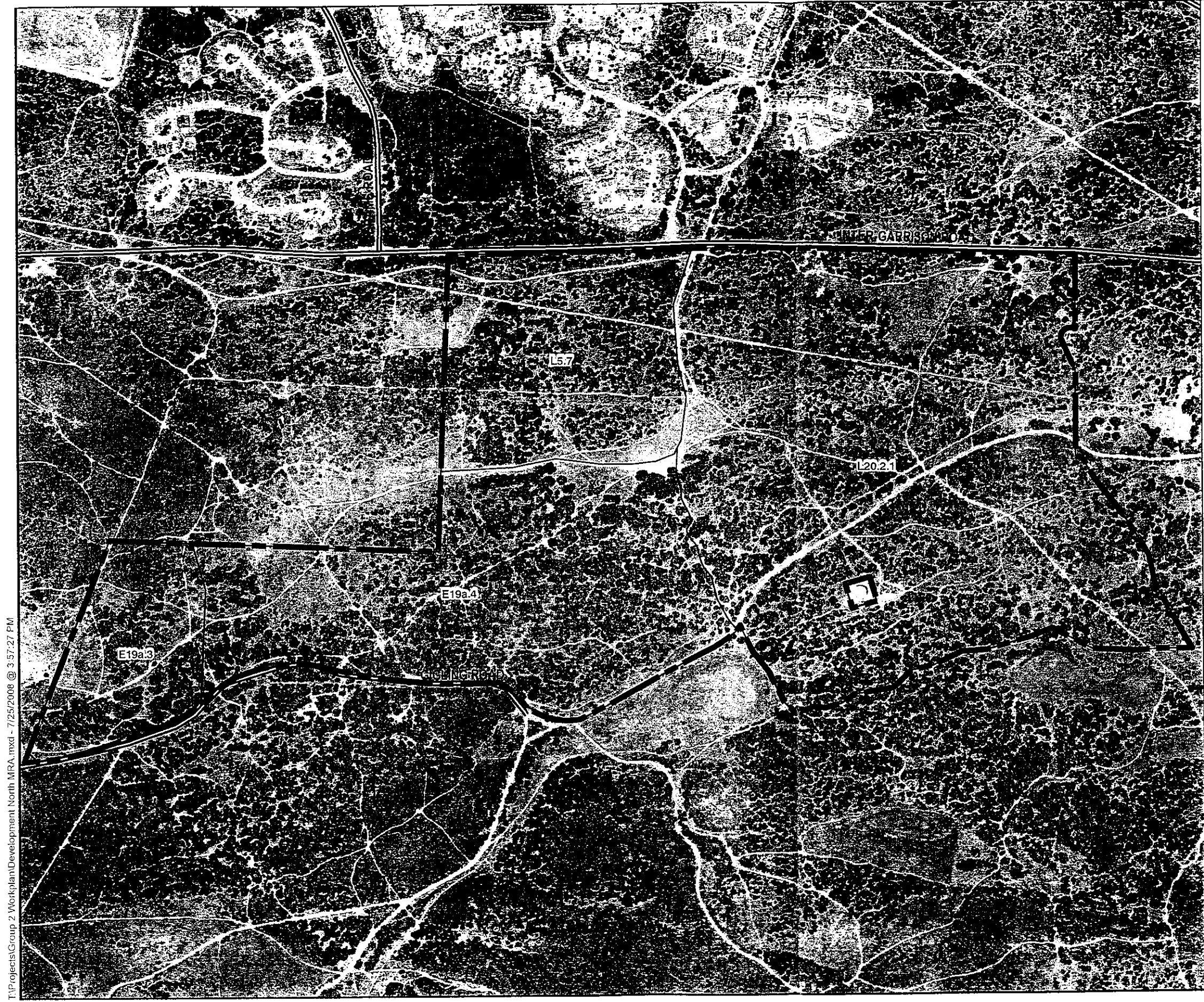
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
CSUMB Off-Campus MRA
 FORA ESCA RP
 Monterey County, California

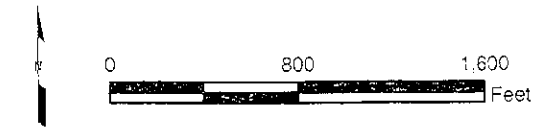
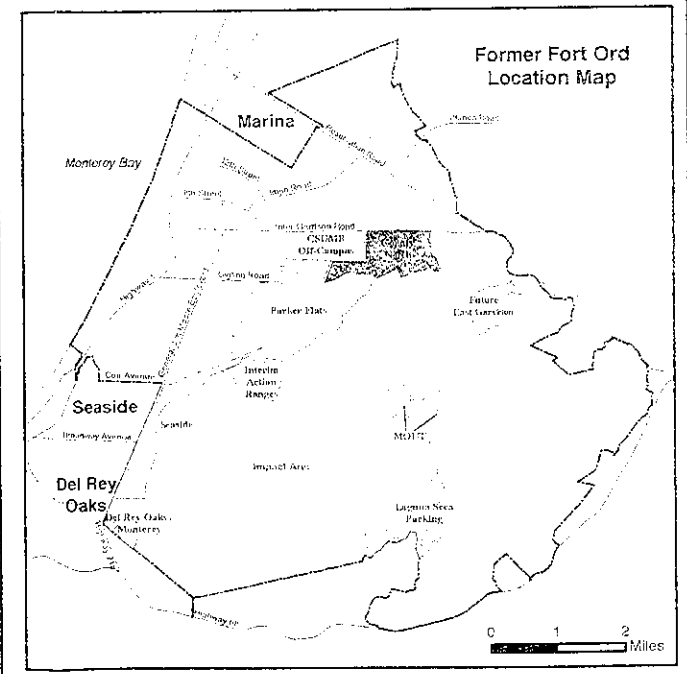
DRAFT Figure 3

MEA Figure 3



Legend

-  Munitions Response Area
-  Major Road
-  USACE Parcel



Westcliffe
Engineers, Inc.

County North MRA

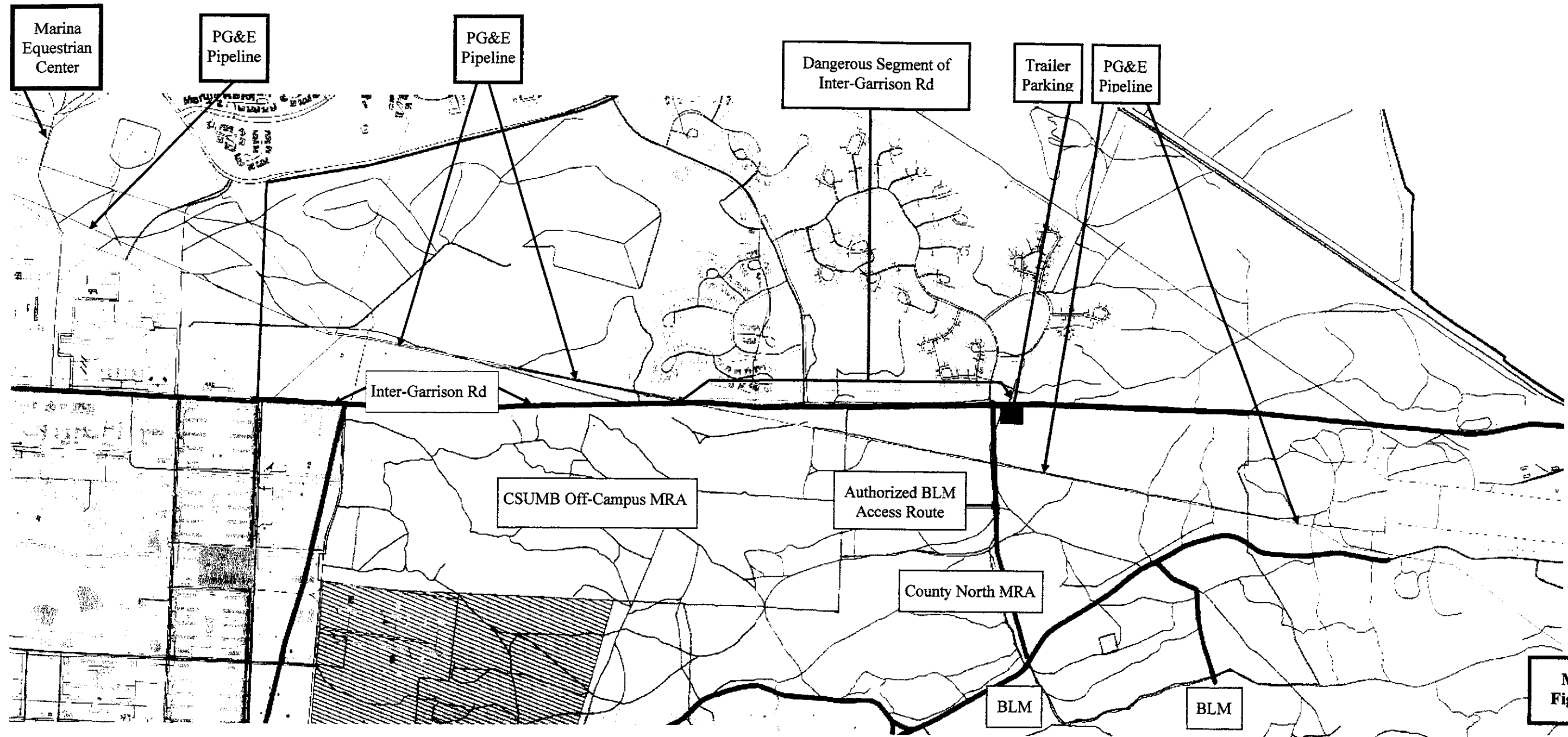
FORA ESCA RP
Monterey County, California

DRAFT

Figure 4

MEA Figure 4

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MEA
Figure 5



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

March 13, 2009

Mr. Stan Cook
Fort Ord Reuse Authority
100 12th Street, Building 2880
Marina, CA 93933

Re: EPA Comments on the Draft Final Group 2 Remedial Investigation / Feasibility Study Work Plan, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas, Former Fort Ord, Monterey County, California Dated February 16, 2009

Dear Stan:

EPA reviewed the Draft Final Group 2 Remedial Investigation / Feasibility Study Work Plan, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas, Former Fort Ord, Monterey County, California Dated February 16, 2009 and has the following comments:

1. Table 1, Potential Applicable or Relevant and Appropriate Requirements (ARARs), NPDES, Page 1: Due to a typographical error in EPA's original comment, wrong section of the 40 CFR was cited. The correct citation should be 40 CFR Parts 122, 123, and 124. In addition, this particular ARAR should be Location specific not Action specific.
2. Page 6-4 and Page 7-4, Sections 6.3.2 and 7.3.2, Hazard Classification Score Tables: Please replace the term "Inert MEC" with "Inert munitions item" per Response to EPA Comments (Appendix E).

If you have any questions, please do not hesitate to call me at (415) 972-3681 or e-mail me at huang.judy@epa.gov.

Sincerely,

A handwritten signature in black ink that reads "Judy C. Huang".

Judy C. Huang, P.E.
Remedial Project Manager

cc:

Roman Racca (DTSC)
Site Mitigation/Office of Military Facilities
8800 Cal Center Drive
Sacramento, CA 95826

Kristie Reimer, AICP
Principal Planner
BRAC / Federal Programs
LFR Inc.
1900 Powell Street, 12th Floor
Emeryville, CA 94608

Ms. Gail Youngblood
Fort Ord Base Realignment and Closure Office
P.O. Box 5008
Monterey, CA 93944-5004

Mr. Thomas Hall (via E-mail)



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
FORT ORD OFFICE, ARMY BASE REALIGNMENT AND CLOSURE
P.O. BOX 5008, BUILDING #4463 GIGLING ROAD
MONTEREY, CALIFORNIA 93944-5008

MAR 06 2009

Base Realignment and Closure

Stan Cook
ESCA Remediation Program Manager
Fort Ord Reuse Authority
100 12th Street
Marina, CA 93933

Subject: *Draft Final Group 2 Remedial Investigation/Feasibility Study (RI/FS) Work Plan, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas*, dated February 16, 2009, received on February 17, 2009.

Dear Mr. Cook:

Thank you for an opportunity to review and comment on the subject document. The Army's comments are enclosed. Please note our comments are focused on "big picture" issues such as the consistency with documents previously produced under the Army's cleanup program. A copy of this letter will be furnished to U.S. Environmental Protection Agency (Judy Huang) and California Department of Toxic Substances Control (Roman Racca).

Sincerely,

A handwritten signature in cursive script that reads "Gail Youngblood".

Gail Youngblood
BRAC Environmental Coordinator
Fort Ord Field Office

Enclosure

DRAFT FINAL Group 2 Remedial Investigation/Feasibility Study (RI/FS)
Work Plan, California State University at Monterey Bay (CSUMB) Off-
Campus and County North Munitions Response Areas (MRAs)
February 16, 2009

Army Comments:

1. p.3-2, Section 3.1 CSUMB Off-Campus MRA Evaluation. The section discusses the munitions items that have been removed from the CSUMB Off-Campus MRA. In the large paragraph on p.3-2 it states that 506 MEC items and five pyrotechnic mixtures “were not assigned a hazard classification value because of insufficient information.” While we understand this to be correct, it creates an apparent conflict with Table 6.3-2 in Appendix A of this work plan. That table shows almost all of the 1,553 listed MEC items have corresponding hazard classification codes. Please provide an explanation in Section 3.2 to clarify that the hazard classification codes shown in Appendix A, Table 6.3-2, may not be consistent with the information in the Fort Ord Military Munitions Response Program (MMRP) database and that the information provided in Section 3.2 of the work plan is consistent with the database.
2. p.3-3, Section 3.2 County North MRA Evaluation. The section discusses the munitions items that have been removed from the County North MRA. Similar to the previous comment, please provide an explanation to clarify that the hazard classification codes shown in Appendix B, Table 7.3-2, may not be consistent with the information in the MMRP database and that the information provided in Section 3.3 of the work plan is consistent with the database.
3. p.5-1, Section 5.4 Sample Analysis/Validation. Please note that, in addition to the literature review and removal checklists included in Appendix C, reconnaissance and sampling checklists are also available to guide an evaluation of a site where reconnaissance and/or sampling was conducted. This information is available in *Draft Final Plan for Evaluation of Previous Work, Ordnance and Explosives RI/FS* dated September 8, 2000 (OE-283G) (checklists were updated, see OE-0466).
4. Table 1 Potential Applicable or Relevant and Appropriate Requirements (ARARs).
 - a. p.1, National Pollutant Discharge Elimination System (NPDES), 40CFR Parts 122, 123 and 125 and p.3 Porter Cologne Water Quality Control Act, California Water Code, Division 7, Section 13200. These items have been added to the table in response to a comment by U.S. Environmental Protection Agency (EPA). We understand the intent to be to identify potential ARARs that relate to the protection of wetlands from possible remedial alternative(s) for the CSUMB Off-Campus and the County North MRAs. Although the Army does not necessarily disagree with the intent, the identification of these specific sections of the Clean Water Act and California Water Quality Control Act compel further evaluation. The Army will further discuss this item with EPA and the State of California. Additionally, the “Remarks” indicate that obtaining NPDES and/or state Waste Discharge Requirements (permits) may be required. Please delete the remarks since procedural requirements such as obtaining permits do not become ARARs for onsite remedial actions.
 - b. p.2, California Fish and Game Code Section 4800 et seq. The “Remarks” include a statement: “In fact, the use of fire to set back plant community succession will result in an improvement to wildlife habitat that will benefit mountain lions.” This statement

implies that prescribed burning is being considered as part of possible remedial alternative(s) for the CSUMB Off-Campus and the County North MRAs. If this is the case, evaluation of vegetation clearance alternatives would be required, and the work plan should then address the procedures for such an evaluation. If prescribed burning is not being considered to be evaluated as a part of any of the possible remedial alternative for these MRAs, please revise the remarks. Please re-examine the remarks and make appropriate updates to the document.

- c. p.4, California Clean Air Act, Health and Safety Code Section 41701. The “Remarks” include statements that imply that prescribed burning is being considered as part of possible remedial alternative(s) for the CSUMB Off-Campus and the County North MRAs. If this is the case, evaluation of vegetation clearance alternatives would be required, and the work plan should then address the procedures for such an evaluation. If prescribed burning is not being considered to be evaluated as a part of any of the possible remedial alternative for these MRAs, please revise the remarks. Please re-examine the remarks and make appropriate updates to the document.
 - d. p.4, California Fish and Game Code Section 3005, Section 4000 et seq., and Title 14, CCR Section 460. The “Remarks” include statements that imply that specific remedial alternatives were evaluated as to whether or not these regulations were applicable or relevant and appropriate. However, no specific remedial alternatives were described in this document. Please re-examine and make appropriate revisions to the remarks.
5. Appendix D Anticipated Project Schedule. This schedule appears outdated. Please provide an updated schedule in the final version of this document.

Detail/minor comments:

6. p.2-5, Section 2.3.2 Future Land Use. Based on a previous Army comment the paragraph was modified to reclassify equestrian use as a “nonresidential use” other than habitat reserve. Although the updated text is acceptable, please note that it is not exactly the same as the text noted in Appendix E in the response to Army comment 1.
7. p.4-1, Section 4.1 Summary of the Approach for Group 2. The second paragraph states that the Residential Quality Assurance (RQA) Pilot Study will be conducted in the Seaside and Parker Flats MRAs. Please update this section to reflect that a test area within the CSUMB Off-Campus MRA was selected in place of the previously proposed test area in the Parker Flats MRA. This update would make the section consistent with the cited Final Group 1 RI/FS Work Plan, and would reduce the potential for confusion by the public.
8. p.4-10, Section 4.9.3 Implementation of Community Relations Activities, Bullet 1. In response to previous Army comment, this bullet has been revised. However, the updated text is not exactly the same as the text noted in Appendix E: the third sentence was modified to read “~~all~~ CSUMB faculty, staff, and students residing in campus housing will receive a copy of the newsletter while school is in session” rather than being deleted as indicated in Appendix E.

Fort Ord Community Advisory Group (FOCAG)
PO Box 1139
Marina, CA 93933
Email: focagemail@yahoo.com
Website: www.fortordcag.org

SC
LB



FOR THE ADMINISTRATIVE RECORD

Please distribute to all FORA Board Members
Letter 15 Pages Attachments and Maps 143 Pages

March 17, 2009

Fort Ord Reuse Authority (FORA)
100 12th St., Building 2880
Marina, CA 93933
FORA ESCA Program Manager
c/o Stan Cook

RE: Fort Ord CAG Comments: FORA ESCA Remediation Program Draft Final Group 2 RI/FS Study Work Plan; California State University Monterey Bay (CSUMB) and County North parcels, Doc. Control Number: 09595-08-079-006

Concerns: Military Munitions Residual Contamination, OE/UXO/OEW/MEC Detection, OE/UXO/OEW/MEC Clearance Depths, Administrative Record Keeping, Military Munitions Database, Omissions of Pertinent Historical Site Documentation and Information, Compliance with Cleanup Standards

The "Fort Ord Community Advisory Group is a public interest group formed to review, comment and advise on the remediation (cleanup) of the Fort Ord Army Base, Superfund Site, to ensure that human health, safety and the environment are protected to the greatest extent possible." - Mission Statement.

Foreword: The FOCAG has been looking over Parker Flats and CSUMB cleanup records, early 1994 to present.

Early reports show a 247 acre practice mortar range, 1/3 of which is within the CSUMB Footprint.

In 1994 sampling occurred at Site 4C, Site 7, Site 8, site 13B, and Site 18 within the CSU Footprint. Most of these Sites were declared OE contaminated and all operations were halted. These sites were/are highly contaminated with UXO/OEW.

As of post 1998 documents, Site OE-13B has disappeared completely from the CSU Footprint. The 2008 FOSET 5 for the CSUMB parcel includes OE Sites; Site 4C, Site 7, Site 8, Site 18, Site CSU, Site HFA/CSU, but omits the 1/3 of Site 13B. 13B has simply disappeared.

OE-13B has morphed into MRS-13B Horse Park, a portion of OE-13B about a 1/4 of its original size. Regarding OE cleanup for a portion of the CSUMB Footprint, the FOSET 5 states, "no data available." At this point it appears a

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significant portion of the CSUMB site may not have been cleared of OE despite claims that it was. The FOCAG has come across a partial list of OE discovered in the area where there's "no data available". This area is highly contaminated with a wide range of ordnance, but was only partially cleared.

Dear Mr. Cook;

There are a wide range of concerns and issues that have been raised by the Fort Ord CAG over the years, most of which remain unaddressed and unanswered.¹ In a recent CAG letter sent to FORA and the Regulators raising old and new concerns, the Army responded instead, on behalf of FORA and the Regulators. The public has often not been privy to the decision making process.² A great deal of time and taxpayer money is being spent to avoid answering our questions by referring us to documents that do not answer our specific questions and concerns. It would be helpful in the future to 1) answer the questions, 2) give the name and AR number of the document the answer is found in, and 3) give the page or section number and paragraph that the answer came from.

As is evident from OE Sampling and Removal Actions in the CSUMB/County North areas and elsewhere, extensive Troop Training and Munitions use occurred throughout areas that were not previously identified as Training Areas. This drives home the point that Fort Ord trained several million troops over a period of 77 years, kept extremely poor records, used unknown millions of pounds/tons of munitions, and that these are found in unexpected places. Areas East of General Jim Moore Blvd. and Eighth St. are highly contaminated with military munitions the extent of which is unknown.^{3 4 5}

The Military Munitions Response Program (MMRP) database shows 1,552 UXO/ISD⁶ items were found on the CSUMB parcel. The historical record shows 274,585 UXO/OEW⁷ items were found on the CSUMB parcel. Information the FORA ESCA RP is relying on is a far cry from what the historical record shows. The MMRP is arbitrarily omitting significant information from the Group 2 RI/FS. In doing so, a new record is being created that gives the appearance the land is cleaner than it really is.⁸

A UXO/OEW contaminated Site referred to as Site 13B, a Practice Mortar Range, has been omitted from the CSUMB MRA record.⁹ This area turned out to be highly contaminated with UXO/OEW of all types.¹⁰

¹ Attachment 1: FOCAG 8-12-08 letter to FORA, DTSC, US EPA

² Attachment 15: email; Regulators and Developer discussing Superfund UXO/OEW cleanup policy

³ Map 4: Site 13B 63 acres, West end of County North parcel, expanded to 247 acres

⁴ Attachment 5: Training areas and range configurations are unknown: OE-0005A: "Site 16 Rocket moving target range... only discovered 18 months ago, this area was saturated with 2.36" rockets both HEAT and practice.... 400-500 were HEAT warheads."

⁵ Attachment 2: CSU Footprint, previously unidentified Training Area highly contaminated Ordnance and Explosive Waste (OEW) Live and inert ammunition.

⁶ Attachment 16: Summary of Existing Data Report (SEDR) CSUMB MRA Types of MEC Removed

⁷ Map 2: historical record of OE Sites and military munitions found on CSUMB parcel

⁸ Attachment 4: California Real Estate Disclosure Law; requires full disclosure of hazardous waste

⁹ Map 3: SEDR Figure 6.1-3 map shows no sign of Site 13B on the CSUMB parcel

¹⁰ Attachment 18: OE-0012 SOW Phase 1, Feb. 94, Sec. 1.3 Sites 4C, 7, 13B, 18, all Sites live UXO items

Critical documents (The Fort Ord Projectile Penetration Study) used for assessing potential explosive hazards associated with excavation activities and required remediation depths contains erroneous Site specific ordnance discovered information.^{11 12}

A new scheme is unfolding. The Insufficient Data category (ISD) is a scary one. Has money spent on past contractors been for nothing because they didn't know how to identify the ordnance they were finding? ¹³ The FORA ESCA RP is arbitrarily throwing whatever munitions they want into the ISD category. There is no supporting documentation or explanation other than, because they say so.

Critical Administrative Record (AR) documents that contain pertinent Site specific information of known or suspected OE uses and OEW contamination have been omitted from the Group 2 RI/FS Work Plan. By doing so, bogus claims of site specific conditions found in the "new" SEDR database cannot be refuted. Findings for suitability to transfer the parcels are being made based on this manipulation of data rather than data reflecting the actual site specific conditions, and potential remaining health hazards. The FORA ESCA RP is becoming what many of us feared, a dumbing-down of the extent of, and the danger of conditions existing on this former Army base. FORA political decisions based on real estate desires are not effective in protecting the community and future residents health and safety.

In addition, a great hazard remains largely unaddressed. Residual contamination from military Munitions Constituents (MC) exists. The Fort ORD ESCA Cleanup Program has failed to initiate a comprehensive MC sampling plan. To date, we are unaware of a list of MC for **all** military munitions and Training Devices used at former Fort Ord. If the list exists, please forward a copy to the CAG. Some 3300 acres are slated for turnover to the public without addressing this significant threat to human health.¹⁴

Detailed Issues, Concerns, and Questions:

1) In order to better understand the extent of military training at former Fort Ord, and the potential contamination from training activities, fundamental questions need to be answered or at least estimated.

A story told by a retired sergeant that trained Fort Ord troops:

A retired sergeant said he trained soldiers to fire 60mm and 81mm mortars in the northern and northeastern portions of Site 39. He would take out 400 soldiers for bivouac maneuvers (multi day outings in the field). When asked how many rounds each soldier fired in a day, he estimated each man would fire 30 to 60 Mortar rounds. He indicated they were practice mortars. Using a median number of 45 mortars multiplied by 400 soldiers, 18,000 mortars were fired in a day by a single

¹¹ Attachment 14: penetrating ordnance found CSUMB parcel; 25mm, 37mm, 60mm, 81mm, 105mm

¹² Map 2: historical record of OE Sites and military munitions found on CSUMB parcel

¹³ Attachment 11: EOD Specialist Résumé, 27 years experience UXO identification and removal

¹⁴ Attachment 10: DOD to identify contamination from over 200 military Munitions Constituents (MC)

group of trainees. It is understood practice munitions unlike High Explosive (HE) munitions use pyrotechnics for identifying where the rounds hit (spotting).^{15 16}

Note: at the height of training there were 50,000 soldiers at Fort Ord. Estimates are, from 1940-1974 1.5 million troops trained at Fort Ord.¹⁷

a) 1.5 million or more troops trained at Fort Ord. How many millions or billions of pounds of military munitions were used in the training of troops? Any estimates? If not, why not?

2) Most military munitions constituents are known or suspected endocrine disruptors, carcinogens, mutagens, toxicants, etc.. The CAG has compiled a list of military munitions constituents found in the types of munitions used at Fort Ord. The list includes the potential negative human health impacts that may result from exposure to each of the constituents. Former Military Training Areas are highly contaminated with hazardous chemicals.¹⁸ If you knew of the potential risk, would you want or allow your children to live on and play in soil possibly contaminated with the Table 1 and Table 2 constituents?

- a) Has the Fort Ord Cleanup Program prepared a list of Munitions Constituents (MC) for **all** Military Munitions and Training Devices used at former Fort Ord. If not, Why not?
- b) Of the millions or billions of pounds of military munitions used, how many pounds of their constituents were released into the environment? Any estimates? If not, why not?
- c) Where did the residual contaminants go?
- d) Could all the contaminants simply disappear?
- e) Does soil analysis of ranges include every known or suspected OEW/UXO constituent used at Fort Ord? If not, why not?
- f) Babies and toddlers commonly eat soil and other substances off the ground. Has this risk been analyzed? If not, why not?
- g) Have Maximum Residual Levels (MRL's) been established for the constituents in the attached Military Munitions Chemicals Of Concern Table 1 and 2? If not, why not?

¹⁵ Attachment 9: Practice Bombs, toxic hazards of practice ammunition

¹⁶ Attachment 6: Pyrotechnic Devices, Military Munitions (Chemistry) Chapter 10

¹⁷ Attachment 19: Fort Ord History

¹⁸ Attachment 7: military munitions constituents and health hazards Table 1 and Table 2 constituents

- h) If the extent of residual contamination and MRL's have not been established, how can an acceptable level of cleanup be known for residential or commercial use?
 - i) Is there a screening program in place to monitor for hazardous substances at Fort Ord? If not, why not? Will there be a program to monitor potential negative health impacts of residents living in homes built on former training areas and ranges? If not, why not?
 - j) Perchlorate is known to be a widely used constituent in military munitions used at Fort Ord . Is there testing being conducted to identify the extent of Perchlorate contamination in former training areas and ranges? If not, why not? If yes, the remediation documents don't appear to include any discussion or analysis.¹⁹
 - k) Synergism and synergistic effects of chemicals are a significant part of Risk Assessment. I don't recall seeing any analysis in the Fort Ord Base Wide RI/FS addressing synergism. Is synergism covered in any Fort Ord Human Health Risk or Environmental Assessments? If not, why not?
- 3) The parcels have not been adequately cleared of Ordnance and Explosives Waste (OEW), Unexploded Ordnance (UXO), or identified the extent of Munitions Constituents (MC) contamination. The extent of contamination is unknown.

The Shonstedt models GA-52C and GA-72CV were used for OEW/UXO clearance prior to Oct.1994. The GA-52CX was used thereafter.²⁰ This raises several issues and concerns.

According to the After Action Report for OEW Sampling and Removal, Sites 4C, 7, 8, 13B, 18 were sampled, and a large portion of the CSU Footprint was cleared of UXO/OEW to a depth of 3 feet. According to the Work Plans (WP), the GA-52C was used for the OEW removal actions.²¹

Additionally, ordnance capable of penetrating beyond the old GA-52C and newer GA-52CX detection range has been found in the CSUMB parcel. Because the extent of deep penetration ordnance and deep OEW burial pits are unknown, scanning equipment capable of detecting deeply buried metallic anomalies should be used. The former Fort Ord areas cleared, CSUMB, using the old detection equipment should undergo a full wall to wall removal using the newer GA-52CX magnetometer and deploy deep scanning metallic detection equipment.²²

Thankfully, early in the cleanup process, DOD and the Regulators understood the significant threats from Ammunition and Explosives. A few quotes:

¹⁹ Attachment 17: Perclorate summary DOD 16-106 ppb Fort Ord Site 39

²⁰ Attachment 5: OE-0029 EE/CA I Sec. 4.2.1.4

²¹ Attachment 5: CSU footprint OEW removal, Phase III Work Plan, Sec. 6.3

²² Attachment 14: Fort Ord Ordnance Penetration Table and Range Penetration Analysis

“It is necessary to identify and remove ammunition and explosives located from the surface to the applicable depth indicated (Commercial/Residential, Utility Construction Activity: Clearance depth; 10 ft. or excavation depth plus 4 feet, whichever is greater)”²³

“Chapter 12, DOD 6055-9 STD (1992), DOD Ammunition and Explosives Safety Standard; DOD real property known to be contaminated with ammunition and explosives that may endanger the general public may not be released from DOD custody until the most stringent efforts have been made to ensure appropriate protection to the public.”²⁴

“ The Presidio of Monterey does not intend to transfer by deed any known or suspect ordnance and explosive site on former Fort Ord land, prior to the completion of all required OE related actions. We do, however, intend to transfer by deed areas that may have been identified on training maps , but through the archive search process were not identified as potential ordnance sites, i.e. Machine Gun Proficiency Training Areas, Machine Gun Squares, and Mortar Squares.” ²⁵

“Chapter 12 of DOD 6055-9STD requires a cleanup plan be presented to the DDESB for leasing, transferring, or disposing of DOD real property when ammunition and explosives contamination is known or suspected. The DDESB will review the plan for explosives safety considerations. The following matrix is to be used to identify the appropriate clearance depth. The ability to clear to a given depth will depend on the technology and funds available. It is necessary to identify and remove ammunition and explosives located from the surface to the applicable depth indicated.”²⁶

- a) UXO/OEW cleanup efficiencies have not advanced as a result of new detection technologies and methods, but rather by changing of the rules in order to meet development goals. What happened?

Projectiles capable of penetration depths beyond the Shonstedt GA-52CX detection range have been found in the CSUMB and County North parcels. There is good reason to be looking beyond the 4 foot removal depths at Fort Ord.²⁷

- b) To date, what efforts have been made to locate deeply buried ordnance?
- c) Today, what technology is being deployed to locate deep penetrating ordnance?

²³ Attachment 12: DDESB OEW site remediation depth for intended use

²⁴ OE-0122: found in HFA/CSU After Action Report

²⁵ Attachment 5: DOD letter; no known or suspect OE land to transfer by deed prior to completion of all required OE related actions.

²⁶ Attachment 14: Penetration Analysis Table; Range/site design UXO wrong. Deep penetrating ordnance found CSUMB footprint and 13B

²⁷ Attachment 14: Ordnance penetration Table and Penetration Analysis Table

- d) The Shonstedt GA-52CX has been used at Fort Ord for 15 years. Is the RP using the best technologies available?
- e) Is the GA-52CX the best hand held OE detection technology available?²⁸
- f) Does the EM61-MK2 detect metallic anomaly's as well or better than the GA-52CX?
- g) Which of the following is the UXO/OEW cleanup goal; to locate and remove Ordnance and Explosive Waste to the greatest extent possible or to the extent it is financially practical?
- h) If finding all UXO/OEW items is a goal, would using detection equipment capable of deeper detection capabilities be desired?
- i) Is UXO/OEW in itself , being looked for beyond 4 feet ? If not, why not?

The practice of characterizing former Fort Ord land through the archive search process and visually looking around while walking down bunny trails to identify potential training areas should be abolished. It is abundantly clear, areas not suspected of training activities have turned out to be highly contaminated with dangerous training items, and that dangerous training items show up in the most unexpected places.²⁹

4) Chemical Warfare Materials (CWM) and their use in training areas have not been adequately addressed. These types of training devices outside their packaging are not detectable with magnetometers.

On March 10, 1997, 24 ampoules CAIS Chemical Warfare Materials were discovered 2 ft. below ground near 4500 motor pool during ordnance and removal activities at Site OE-13B (1/3 of which lies in the CSUMB parcel). This area is within the Group 2 County parcel and adjacent to the CSUMB parcel.³⁰

On April 14, 1994 during the HFA/CSU OE removal, 2 EOD specialists were overcome by a Hazardous Material and required medical attention at the hospital. Their equipment was confiscated due to concerns of HAZ MAT contamination. Hazardous Material monitoring devices were required for all subsequent OEW removal. It should be noted the HAZ MAT incident occurred in a site adjacent to OE-4C a Chemical, Biological, Radiological (CBR) site. The substance was not disclosed.³¹ These significant issues have been omitted from the new RP record. Was this a CWM incident?

²⁸ Attachment 5: OE-0036 1996 Evaluation and Comparison of UXO Detectors. Better overall detector

²⁹ Attachment 13: DTSC letter to Army raising cleanup issues

³⁰ Attachment 5: OE-0265D, OE-0265E; CAIS CWM found during OEW clearance activities 13B

³¹ Attachment 3: Excerpts OE-0011 Operational Daily Journals

The known CWM were unexpectedly found in a Range/Training area that was not previously identified as a potential CWM training area. It may have been a rare event except it is well documented these CWM are commonly found and buried in training areas. According to Fort Ord records, CAIS Sets were used at Fort Ord until 1974. The K951 ampoules (also called vials) are frequently found in burial sites at old WWII training areas.³²

- a) How were these incidents resolved?
- b) Army certainly saw this as significant concern. How will the public be protected from potential exposure to these chemical agents?
- c) Why haven't these incidents been included in the CSUMB parcel history?
- d) Due to the common practice of discarding these training devices in the field, what is the justification for allowing the transfer, reuse, and development of training areas and training sites (TS) where these devices have been found or may have been used?
- e) Is there technology that can identify individual glass vials below the ground surface?
- f) These CWM materials are contained in glass vials. Has there been any discussions of how this hazard should or will be addressed?
- g) How can workers be protected from these types of hazards during excavation activities?
- h) Are there plans to cap military training areas rather than remediate them of UXO/OEW and military constituents?

5) Critical Administrative Record (AR) documents that contain pertinent site specific known or suspected uses, and OEW contamination information have been omitted.³³

- a) Known OE sites have disappeared from the FORA ESCA RP parcels historical record.³⁴
- b) UXO/OEW discovered during site sampling and removal actions has disappeared from the FORA ESCA RP parcels historical record.³⁵

The CSUMB Site has several ordnance and explosive (OE) sites within its boundaries. The Group 2 RI/FS identifies OE sites OE-4C, OE-7, OE-8, OE-18, OE-31. A OE site not included within the CSUMB parcel is a OE Site referred to

³² Attachment 3: Excerpts OE-0202, OE-0265D, OE-0265E

³³ Attachment 5: Omitted AR documents and dates made available on Fort Ord Cleanup web site

³⁴ Map 3: SEDR Fig. 6.1-3 new map of CSUMB parcel, Site 13B omitted

³⁵ Attachment 2: Lists of OEW items found Site 13B and CSUMB footprint

as Site 13B or OE-13B, a practice mortar range. In the Annex J WP, Site 13B is 63 acres. For unknown and unexplained reasons, Site 13B was expanded to 247 acres. Approximately 80 acres, the northern 1/3 of OE-13B extends into the western portion of the CSUMB parcel. OE-13B has simply vanished from the CSUMB parcel OE record.³⁶

Documentation that discusses Site 13B, OEW sampling and removal actions, its heavy OEW contamination, and lists of OEW found have been omitted. Omitted cleanup documents contain well documented lists of UXO/OEW discovered.

- c) Why has the SEDR, MMRP, and FORA ESCA RP databases failed to include **all** OEW items discovered within the CSUMB parcel?
- d) Why has OE-13B been omitted from the CSUMB record?

The Administrative Record seems to be being manipulated in a way that misrepresents important facts. The public, now and in the future, has a right to know the full extent of the past military training use of individual parcels, and the full historical record of OEW items found within their boundaries. To omit or alter any part of this historical information misleads the reader into believing the parcel is cleaner and safer than it actually is. By keeping the record straight, the public can decide for themselves if they wish to be exposed to the potential remaining OEW hazards. Remediation by data manipulation will have a disastrous outcome and harm someone.³⁷

- e) How has this critical issue slipped by the FORA officials and the regulators?
- f) Are the officials aware of what's happening?
- g) Is this acceptable to the officials and the regulators?
- h) When someone gets blown up or sick, who will be liable?
- i) Is this in the best interest of the taxpayers?
- j) California has strict real estate disclosure laws. How will parcel specific OEW information be known and disclosed?³⁸

Additionally, these critical documents have not been included in the Fort Ord cleanup AR web site until very late in the process. The public has had no reasonable way of viewing site specific information. The FORA ESCA RP is omitting key documentation that tells a very different story of the extent of

³⁶ Attachment 5: Excerpts; sinkhole practice mortar range Site 13B, area backfilled with up to 30' feet of soil during 4400/4500 Block Motor pool construction . Range covered over?

³⁷ Maps 2: historical record of OE Sites and military munitions found on CSUMB parcel

³⁸ Attachment 4: California Real Estate Disclosure Law; requires full disclosure of hazardous waste

OEW/UXO contamination in the Training Areas.³⁹

k) What steps will be taken to inform the public and future residents of the potential health hazards associated with living over former Training Areas?

6) The Fort Ord Military Munitions Response Program (MMRP) database has lost very important AR documentation needed to make accurate and well informed decisions by the Regulators and the Public.

Most training/practice ammunition contains highly toxic, hazardous substances. These munitions, and their constituents are a significant health hazard that remain relatively unaddressed. Many of these practice/inert ammunitions have been omitted in the new SEDR database. Withholding this information from new cleanup documents deprives the public of significant, and critical information.^{40 41}

Early in the OE cleanup process, ordnance and explosive training range areas were first referred to as "Sites". They then were referred to as "OE" areas, and now "MRS" areas. As the changing of acronyms has progressed, so has the omission of old site data of UXO/OEW items discovered. Hence a "new" record has emerged.

There's a new FORA ESCA RP concoction of data referred to as the Summary of Existing Data Report (SEDR). The SEDR which evolved from information supplied from the MMRP database is being relied upon to support the Group 2 RI/FS Work Plan. Site Characterizations, Findings, and Determinations of safety are being based on the compilation of the new data resulting from the omission and manipulation of the old data. This new data is resulting in the sites appearing to be relatively benign. This will undoubtedly result in a finding of "no further action". By creating this fictitious new record, RP parcels are being represented as being safer than they really are.

The MMRP database is not being properly maintained as is evident by the omission of large quantities of UXO/OEW discovered in the 3300 acres of the FORA ESCA RP documents.^{42 43}

- a) What Agency or Organization is in charge of the Military Munitions Database, a critical element of the Fort Ord Superfund cleanup?
- b) Has the administration of the Military Munitions Database been privatized?
- c) Is there oversight of the OE/OEW/MEC data that is entered into and/or omitted from the database?

³⁹ Attachment 5: Omitted AR documents and dates made available on Fort Ord Cleanup web site

⁴⁰ Attachment 2: Lists of OEW items found Site 13B and CSUMB footprint

⁴¹ Attachment 9: Practice Bombs, toxic hazards of practice ammunition

⁴² Attachment 16: SEDR Table 6.3-2 CSUMB MEC found

⁴³ Attachment 2: Lists of OEW items found Site 13B and CSUMB footprint

- d) What is the protocol for adding, deleting, or changing data in the Military Munitions Database?
 - e) Who is responsible for maintaining the UXO/OEW/MEC AR and ensuring the information is preserved and not tampered with.
 - f) Does the database compile all past discovered Ordnance and Explosives i.e., OE, OEW, UXO, DMM, MEC, MPPEH, MD etc. into the same OE dataset?
 - g) How could such significant historical site information be missed by the FORA ESCA RP and the Regulators?
 - h) Is there a public notification and input process of how the database will be maintained?
 - i) Acronyms, synonyms and descriptions of Ordnance and Explosives (OE), Ordnance and Explosives Waste (OEW) have been changed over the years, Valuable and critical information is being lost. Coincidentally, this appears to corresponded with the privatization of Fort Ord Superfund cleanup, the FORA ESCA RP, and the new centralized database. Are the Regulators keeping track of the Fort Ord historical Military Munitions Database and taking steps to prevent this potential travesty?
 - j) Significant OE data for the CSUMB parcel has been lost . Which regulatory Agency is responsible for oversight that will ensure the historical facts of each parcel are preserved?
 - k) Is the ESCA Cleanup Program still required to report types, amounts, and locations of **all** OEW discovered including Small Arms ammunition, 50 cal. or less, and practice and inert ordnance? If not, why not?
- 7) It is understood non-metallic landmines have been found at Fort Ord. Discovery of these types of munitions raise the same questions as with the CWM issue.
- a) How is this issue being addressed?
 - b) Is there technology that can identify individual non-metallic ordnance below the ground surface?
 - c) Is it a good idea to develop areas were CWM and non metallic landmines may have been used?

8) Additional comments and questions

The Group 2 RI/FS Sec 3.1 States OEW found:

MRS-04C

- Training (practice hand grenade fuze)

MRS-07

- Training (practice mines, practice rockets, practice hand grenade fuzes, and practice rifle grenades)
- Illumination (trip flares)
- Smoke (smoke hand grenades)
- Riot / Crowd Control (riot hand grenades)

MRS-08

- Illumination (illumination signals and trip flares)

MRS-13C

- Training (practice projectiles, practice mines, simulators, and practice hand grenade fuzes)
- Illumination (illumination signals, illumination hand grenades, trip flares, and parachute projectiles)
- Smoke (smoke rifle grenades and smoke hand grenades)
- Demolition (blasting caps and demolition charges)
- Igniters (electric squibs and hand grenade fuzes)
- Riot / Crowd Control (riot hand grenade)

MRS-18

- Training (recoilless training round)
- Igniters (trip flares and firing devices)

MRS-31

- Direct and Indirect Firing (antitank rockets, armor-piercing tracer projectiles, and fragmentation hand grenades)
- Training (practice hand grenade fuzes, practice hand grenades, practice rifle grenades, practice mine fuzes, practice mines, practice rockets, and simulators)
- Illumination (illumination signals, illumination hand grenades, trip flares, parachute illumination projectiles, and pyrotechnic mixtures)
- Smoke (smoke rifle grenades, smoke hand grenades, smoke signals, smoke pots, and pyrotechnic smoke mixtures)
- Demolition (blasting caps and demolition charges)
- Igniters (firing devices, electric squibs, hand grenade fuzes, practice mine activators, mine fuzes, and time fuse igniters)
- Riot / Crowd Control (riot hand grenades)

Sampling and Removal docs. tell a different story ⁴⁴

- a) Is the AR record different than the MMRP record?
- b) Why such a discrepancy between what the FORA ESCA RP shows and what the AR found?

Sec. 3.1 states:

Only the MEC items from MRS-13C were recovered from depths below ground surface

⁴⁴ Attachment 2: Lists of OEW items found Site 13B and CSUMB footprint

(ranging from 1 to 48 inches). The MEC items from MRS-04C, MRS-07, MRS-08, MRS-18, and MRS-31 were reportedly recovered from the ground surface according to the Fort Ord Military Munitions Response Program (MMRP) database; however, the depth information may be inaccurately represented in the database and will be evaluated during the RI as described in Section 4.0 of this work plan.

Sampling and Removal docs. tell a different story⁴⁵

Note: To date, the 1940's-1950's mortar range Site 13B has not been located. What lesson should be learned from this story? Range uses and locations are unknown.

Sec. 3.1 states:

There was no evidence of a mortar impact area associated with the practice mortar ranges (MRS-31 and MRS-13C) and no evidence of tear gas or chemical agents associated with the CBR training area (MRS-04C) identified on historical maps.

Sampling and Removal and WP docs.^{46 47} tell a different story

Note: The HAZ MAT incident that occurred very near the OE-4C site remains unresolved. The precautionary approach would be to assume it was a CWM incident related to 4C training. Under no circumstance should the incident be omitted from the record. Taking into account the 13B CWM incident along with the HFA/CSU HAZ MAT incident, the Group 2 RI/FS training areas and others are potentially contaminated with CWM training devices.

c) Why has the HAZ MAT incident been omitted from the record?

Sec. 3.1 states:

The initial evaluation of previous munitions response actions within the CSUMB Off-Campus MRA indicated that the existing data is of sufficient quantity to characterize the MRA. However, these removal actions were conducted using analog magnetometers, and requirements for data collection were not as detailed at the time of the removal actions as the current requirements. Therefore, data quality has been identified as an issue that needs to be evaluated as part of the RI.

Removal Action docs. show record keeping requirements⁴⁸

d) Are the FORA ESCA RP record keeping requirements more stringent than the SOW phase 1? If so, why aren't all the OEW items in the SEDR database?

e) Not all records are in the AR. Where did the missing records go?

⁴⁵ Attachment 5: OE-0011 Journals refer to thousands of digs and backhoe excavations of UXO/OEW

⁴⁶ Attachment 3: Excerpts CSUMB 2 EOD specialists were overcome by a Hazardous Material, unresolved

⁴⁷ Map 4: map shows the old 63 acre 13B location. This would be a good area to look deep and test soil.

⁴⁸ Attachment 18: SOW Phase 1 Sec 3.4.5, extensive record keeping requirements.

We look forward to your substantive response to these serious issues and questions. Please include the entirety of this letter and attachments in the final document.

Sincerely,

A handwritten signature in cursive script that reads "Lance Houston". The signature is written in black ink and is positioned above the typed name.

Lance Houston, for the FOCAG

Cc.
California DTSC
U.S. EPA
Monterey County Planning Department
California State University Monterey Bay

ATTACHMENTS:

- 1 FOCAG 8-12-09 Position Paper; Environmental Contamination Fort Ord, CA
- 2 UXO/OEW items found CSUMB Parcel
- 3 Excerpts Fort Ord UXO/OEW cleanup documents
- 4 California Real Estate Disclosure
- 5 Omitted Documentation and dates posted to Fort Ord Cleanup web site
- 6 Pyrotechnic Devices: uses and constituents
- 7 Military Munitions Constituents (MC) Table 1 and Table 2
- 8 Explosives and Propellants: uses and constituents
- 9 Toxic Hazards of Practice Ammunition
- 10 GAO: DOD to identify contamination from over 200 military Munitions Constituents
- 11 EOD Specialist résumé; 27 years experience OE detection and removal

- 12 UXO Site Remediation Depths
- 13 DTSC letter to Army OEW cleanup concerns
- 14 Fort Ord Ordnance Penetration Table and Range Penetration Analysis
- 15 email, regulators and developer discussing cleanup policy
- 16 SEDR Table 6.3-2 CSUMB MRA MEC found
- 17 Perchlorate summary Fort Ord, CA DOD 16-106 ppb Site 39
- 18 Scope Of Work (SOW) Phase 1 Removal, CSU footprint
- 19 Fort Ord History

MAPS

- 1 Historical maps CSUMB boundary and OE Sites
- 2 Historical map CSUMB Parcel and UXO/OEW items found
- 3 SEDR Fig. 6.1-3 new map of CSUMB parcel
- 4 Historical map shows Site 13B 63 acres

SL
LB



ATTACHMENT 1

**FOCAG 8-12-08 Position Paper; Environmental
Contamination Fort Ord, CA**

S

Fort Ord Community Advisory Group (FOCAG)
PO Box 2173
Monterey, CA 93942
Email: focag@fortordcag.org
Website: www.fortordcag.org

August 12, 2008

Fort Ord Reuse Authority (FORA)
100 12th St., Building 2880
Marina, CA 93933
c/o FORA Board Members

FINAL
FOR THE ADMINISTRATIVE RECORD
Please distribute to all FORA Board Members
Position Paper 6 pp. Attachments 75 pp.

RE: FOCAG Position Paper; Environmental Contamination; Remediation and Development of Military Munitions Training Areas at Former Fort Ord: Request for a revised Base Wide EIR

To whom it may concern;

The "Fort Ord Community Advisory Group is a public interest group formed to review, comment and advise on the remediation (cleanup) of the Fort Ord Army Base, Superfund Site, to ensure that human health, safety and the environment are protected to the greatest extent possible." - Mission Statement.

The intent of this document is to inform the public and the decision makers of the potential danger of hazardous waste to human health. The FOCAG simply does not want to see anyone harmed. FORA has approved plans to allow local jurisdictions to develop residential housing and commercial space on many former military munitions training areas including Site 39 despite the clear history of people being harmed by such activities. Allowing people to live on top of former Military Munitions Training Areas is a recipe for disaster. There is new and significant information that justifies a new EIR.

Many environmental contaminants at levels of a few parts per billion can have lifelong adverse human health effects. Most military munitions constituents are known or *suspected* endocrine disruptors, carcinogens, mutagens, toxicants, ect.. Attached is a list of military munitions constituents found in the types of munitions used at Fort Ord and Site 39. The list includes the potential negative human health impacts that may result from exposure to each of the constituents. Former Military Training Areas are highly contaminated with hazardous chemicals.(1) If you knew of the potential risk, would you allow your children to live on and play in soil contaminated with the Table 1 constituents?

The extent of contamination at former Fort Ord from military munitions training and disposal is unknown. Fort Ord was used by the U.S. Army for weapons testing. Site 39 has been described as the grand dad of all U.S. Military Munitions Training Sites.

Contamination is likely worse than suspected. Historically, dangerous military munitions and constituents show up in the most unlikely places. No square inch of Fort Ord can be assumed to be free or safe from dangerous ordnance and chemicals. The Seaside, Del Rey

Oaks, and Monterey County parcels within Historical Site 39 have been designated for residential and commercial development despite the clear threat to human health. Tens of thousands of pounds of OEW/UXO have been removed from these parcels yet the Army and FORA still refuse to acknowledge the fact that these Parcels were used for ordnance training. In the 1995 RI/FS Site 39, onsite receptor analysis for residential and commercial use was not included because these uses were not expected. "Available future land use plans indicate that the site is not expected to be developed for residential, industrial, or commercial use." (1995 RI/FS Vol. III Baseline Risk Assessment For Site 39) Site 39 was expected to be off limits to development because of the known threats to human health and safety from military munitions. Site 39 should have been categorized as one Range due to the clear evidence of military munitions being used thorough the entire Historical Site 39, wall to wall.

Historical Range maps indicate that over the years as ranges were decommissioned, new ranges were opened. It appears that over time there are literally layers and overlaps of ranges the extent of which is unknown.(2)

"Site 39 was used Since the early 1900s for ordnance training activities. As a result, OEW, including UXO, is present at the site. OEW is defined as bombs and war heads; guided and unguided ballistic missiles; artillery, mortar, and rocket ammunition; small arms ammunition; anti-personnel and anti-tank mines; demolition charges; pyrotechnics; grenades; torpedoes and depth charges; containerized or uncontainerized high explosives and propellants; nuclear materials; chemicals and radiological agents; and all similar or related items designed to cause damage to personnel or materials. Oil in which explosive compounds are detected will be considered OEW if the concentration is sufficient to present an imminent hazard. UXO is a subset of OEW and consists of unexploded bombs, warheads, artillery shells, mortar rounds, and chemical weapons. Components or ordnance items (e.g., boosters, bursters, fuzes, igniter tubes) are also included in the UXO definition. Nonuclear materials, chemical agents, or biological agents have been found or reported to have been used at the site." (1995 RI/FS Site 39)(3)

A partial list of military munitions, live and inert, found within the Seaside1-4, Del Rey Oaks, and Monterey County parcels include but is not limited to the following; "fragment hand grenades MKII , smoke hand grenades M18, hand grenade M10, 4inch trench mortars MK1, 4.2 inch mortars, 4inch trench mortars FM, 4inch trench ordnance components, blasting caps M6, blasting caps M7, hand grenade fuzes M228, 75mm Shrapnel MK1, 37mm LE MK1 , 75mm HE MK1, Livens projector FM, surface trip flare M49, 3.5inch rocket M29, 35mm Rockets M73, 3inch Hotchkiss projector, activator mine AT M1, mine AT M1, primer igniter tube M57, cartridge ignition M2, signal illumination M125, mine fuze M6A1, rifle grenade M22, 57mm projector HE M306, flash artillery M110, projectile PD M503ch mortars HC, 3inch trench mortars MK1, 81mm mortar HE M43, 4.2 inch mortars, 40mmprojector M781." (USACE documents)

Seaside Parcels; "The teams dug up and removed 43,695 specific anomalies, weighing nearly 50,000 pounds, and consisting of debris and munitions from the areas. Most of the material was range debris, totaling 46,745 lbs; 2963 lbs were munitions debris, and 292 items were identified as munitions. 52 of these munitions and explosives were too deteriorated and unsafe to remove from the site. These unsafe items were blown in place.

These items included Stokes mortars and 4.2 inch mortars, plus Livens projectiles. These items were scrutinized carefully, and when the contents could not be confirmed, the contractors called in the Army special unit that deals with chemical warfare materials (CWM). This unit examined the three types of Munitions and Explosives of Concern for chemical weapons materials and found titanium tetrachloride in all of them. Titanium tetrachloride was used during WW I as a smoke agent in projectiles that were fired at enemy lines to obscure sight lines and decrease visibility.” (Dr. Peter L. Defer Comments Draft MRS-SEA 1-4 Time Critical Removal Action 2004)(4)

Environmental contamination is now directly linked to adverse human health effects. Illness in the U.S. has reached epidemic levels likely due to lax regulation, oversight, and enforcement of environmental laws in place to protect human health, safety and the environment. Nationally, conservatively, 1 in 150 children has Autism. Asthma, Alzheimer’s Disease, Diabetes, Immune System Disorders, Dementia, Cancers, Organ Diseases to list a few are at epidemic levels. Today, the U.S. public is sicker than ever before. It is time to seriously consider the cause of illness rather than treating the symptoms. What part is environmental contamination playing in this unprecedented epidemic?

Studies now show the unborn fetus, nursing mothers, infants, and children are especially vulnerable to extremely low levels of environmental contamination.

“The periods of embryonic, foetal and infant development are remarkably susceptible to environmental hazards. Toxic exposures to chemical pollutants during these windows of increased susceptibility can cause disease and disability in infants, children and across the entire span of human life. Among the effects of toxic exposures recognized in the past have been spontaneous abortion, congenital malformations, lowered birthweight and other adverse effects. These outcomes may be readily apparent. However, even subtle changes caused by chemical exposures during early development may lead to important functional deficits and increased risks of disease later in life. The timing of exposure during early life has therefore become a crucial factor to be considered in toxicological assessments.” (2007 Faroes Statement)(5)(6)

In addition to munitions constituents, it is understood pesticide use was wide spread throughout military bases and in training areas. Did the Base Wide RI/FS address this serious contaminate?

The FOCAG has regularly raised questions, concerns, and objections to Army’s and FORA’s Remediation Plans to no avail. The FOCAG’s concerns have been ignored by Army, FORA and the Regulatory Agencies. To date, there has been no meaningful change of course or willingness to adopt the FOCAG’s recommendations. FORA, EPA, and DTSC failed to respond to the FOCAG 3-11-08 FORA ESCA RP Letter.(7) Officials have allowed CERCLA to be waived and are responsible for the abomination of law.

There is a history of slicing up OEW/UXO Site Remediation into pie pieces and placing the pieces of information into multiple documents. Anyone looking at a single document is only given a partial picture of the extent of the potential contamination within a Site or Parcel. This makes it virtually impossible for the decision makers and the public to be fully

informed. In order to make sound decisions, full disclosure of all aspects of remediation and potential contamination should be compiled in a single document for each Site or Parcel.

For Example; the Seaside Parcels 1-4 are now referred to as former small arms ranges. Soil sampling for residual contaminants has been limited to Lead, Antimony, and Copper. According to the 1995 RI/FS Ranges 22, 23, 24 are shown to have included the use of 40mm grenades, hand grenades, rifle launched smoke grenades, and other ordnance.(8) It is understood Old Range 22 which runs parallel with Gen. Jim Moore Rd. was a Ordnance Range. Ordnance with an array of constituents has been discovered and removed throughout these parcels yet testing for their constituents is not part of the soil analysis. This is a major omission of critical information. This information would have been a significant factor in the selection of the Site remedy and remedial action chosen for the Sites. The City of Seaside plans to build **1500** homes and commercial space on these Sites. Historical maps indicate these areas within historical Site 39, were military ordnance training areas prior to small arms ranges. The extensive discovery of OEW/UXO on the Seaside parcels right down to General Jim Moore Rd. supports the 1995 RI/FS suspected uses as military ordnance training areas. The fact is Seaside Parcels 1-4 are former military ordnance and small arms ranges. The unwillingness to acknowledge military ordnance training occurred within the Seaside Parcels is a significant omission. The argument has been "there's no evidence this area was used for ordnance training". The fact is the entire Site 39, boundary to boundary is one big enmeshment of Training Areas and Ranges.

Additionally, it appears when a new cleanup document is released, often, previously discovered and removed OEW/UXO items have been omitted. It concerns the public that the breadth of contamination may be diminished thru data manipulation. By omitting critical information the reader could get the impression the land is cleaner and safer than it really is. If the reader is given the full extent of discovered munitions, the potential contamination from their use, and the potential health risks resulting from exposure to the contamination, the wisdom of residential and commercial use would be questionable.

There should be a maintained file with a set of data that compiles all the Site specific remedial actions and findings and is updated regularly upon receipt of new information. All documents should have a running tally of all the previously discovered and removed OEW/UXO items including their constituents. It would be helpful for A reader to be able to know the total number and poundage of OEW/UXO items found to date.

There are very serious unanswered questions with the remediation and development of former Fort Ord military training areas.

1) Millions of troops trained at Fort Ord. How many millions or billions of pounds of military munitions were used in the training of troops? Any estimates? If not, why not?

2) Of the millions or billions of pounds of military munitions used, how many pounds of their constituents were released into the environment? Any estimates? If not, why not?

3) Were did the residual contaminants go?

- 4) Could all the contaminants simply disappear?
- 5) How many gallons of pesticides are suspected to have been used at Fort Ord?
- 6) Was the use of pesticides in training areas a common practice?
- 7) What types/names of pesticides were used at Fort Ord?
- 8) Is there testing for pesticides? If not, why not?
- 9) Does Soil analysis of ranges include every known or suspected OEW/UXO constituent used at Fort Ord? If not, why not?
- 10) Babies and toddlers commonly eat soil and other substances off the ground. Has this phenomena been analyzed? If not, why not?
- 11) Have Maximum Residual Levels (MRL's) been established for the constituents in the attached Military Munitions Chemicals Of Concern Table 1? If not, why not?
- 12) If the extent of residual contamination and MRL's have not been established, how can an acceptable level of cleanup be know for residential or commercial use?
- 13) Is there a screening program in place to monitor for hazardous substances at Fort Ord? If not, why not? Will there be a program to monitor potential negative health impacts of residents living in homes built on former training areas and ranges? If not, why not?
- 14) Perchlorate is known to be a widely used constituent in military munitions used at Fort Ord . Is there testing being conducted to identify the extent of Perchlorate contamination in former training areas and ranges? If not, why not? If yes, the remediation documents don't appear to include any discussion or analysis.(9)
- 15) Synergism and synergistic effects of chemicals are a very important part of Risk Assessment.(10) I don't recall seeing any analysis in the Fort Ord Base Wide RI/FS addressing synergism. Is synergism covered in any Fort Ord Human Health Risk or Environmental Assessments? If not, why not?
- 16) Is there endocrine disruption screening being conducted at former Fort Ord? If not, why not?(11)

If a single person becomes ill or dies, as a result of ambitious economic development interests, the publics trust will have been breached. Under no circumstance should peoples health be compromised for a profit. Nothing is more important than a persons well being. With so many unanswered questions, and in light of new and significant information on health hazards of environmental contamination, former military munitions training areas and ranges should be prohibited from being developed. Residential housing, commercial and other public uses should not be allowed due to the high probability of adverse health effects from exposure to military munitions OEW/UXO and residual contamination.

The Fort Ord Base Wide EIR is outdated. It is in the public's best interest to begin the new EIR process. Again we ask, when will the Scoping Session for a revised Base Wide EIR be held?

Please Provide a detailed written response to this paper and the 3-11-08 paper within 15 working days and send a copy to all FOCAG Members and the Regulators.

Sincerely,

Lance Houston
Fort Ord Community Advisory Group

Attachments; available at http://fortordcag.org/Superfund/CleanUp/StatusStats/8_12_08_FOCAG_position_paper_attachments_1_12.PDF

- 1) Table1: Military Munitions OEW/UXO, 103 Contaminates of Concern (COC's)
- 2) Archive Search Report ASR; Site 39: 12 Range Maps
- 3) Site 39 Military Munitions; Types and Functions
- 4) Dr. Peter L. Defer comments; TCRA MRA SEA.1-4 Sept. 21, 2004
- 5) The Faroes Statement 2007
www.ncrlc.com/1-pfd-files/faroes_statement.pdf
- 6) Neurodevelopmental Disorders in Children
<http://environmentalchemistry.com/yogi/environmental/200804childrenautismadhd.html>
- 7) FOCAG Position Letter 3-11-08; FORA ESCA Remediation Program
www.fortordcag.org/PrivateCleanup/3_13_08_FORA_ESCA_RP_Letter_final.pdf
- 8) Fort Ord; Site 39 Training Ranges
- 9) GAO 2005 Report; Perchlorate A System to Track Sampling and Cleanup / Fort Ord
www.gao.gov/cgi-bin/getrpt?GAO-05-462
- 10) Synergism; Potential Synergistic effects of chemicals
www.ccohs.ca/oshanswers/chemicals/synergism.html
- 11) Endocrine-Disrupting Chemicals Threaten Animal--and Human Reproduction
www.chechecnet.org/HealththeHouse/education/articles-detail.asp?Main_ID=489
- 12) Civil War cannonball kills Virginia relic collector / ordnance can kill 150 years later
<http://www.newsweek.com/id/135153?tid=relatedcl>
- 13) 1999 EPA Position Paper Range Rule - FOCAG Position Letter 3-13-08 attachments
www.epa.gov/fedfac/documents/uxomemo.htm
- 14) 1998 Wingspread statement - FOCAG Position Letter 3-13-08 attachments
www.rachel.org/library/getfile.cfm?ID=189

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ATTACHMENT 2

UXO/OEW items found CSUMB Parcel

UXO/OEW Items Found Sites 4C, 7, 8, 13B, 18, sampling

UXO/OEW Items Found Site CSU

UXO/OEW Items Found Site HFA/CSU

UXO/OEW Items Found Site CSU Foot Print

Total UXO/OEW items found including small arms 274,585

OE Items Found Sites 4C, 7, 8, 13B, 18 sampling OE-0012

These OEW items from sampling only as of March 9, 1994. Sites declared OEW contaminated January 1994.

4C	GRENADERS, RIFLE, SMOKE	4
	DEVICE PYROTECHNIC SIMULATOR	250
7	FLARE, PARACHUTE	1
	MINE, AT, TRAINING, INERT	3
	ACTIVATOR, MINE	46
	FIRING DEVICE, PRESSURE RELEASE	4
	CARTRIDGE, CA.30, BLANK	10
	CARTRIDGE, 5.56MM	10
	SIMULATOR, GUNFLASH	9
	GRENADE, RIFLE, SMOKE	4
8	CARTRIDGE, CAL. 30, BLANK	162
	CARTRIDGE, CAL. 30, TRACER	200
	CARTRIDGE, CAL.30,BALL	6000
	FUZE, GRENADE, M205A2500	
	GRENADE, RIFLE, M9, HE	2
13B	CARTRIDGE, 5.56MM, LINKED, BLANK	504
	CARTRIDGE, 7.62MM,BLANK	978
	MINE, AT, INERT	27
	MINE, AP, INERT	71
	FUZE, MINE, LIVE	39
	FUZE, GRENADE, LIVE	2
	FIRING DEVICE, PRESSURE	221
	FIRING DEVICES, PULL	120
	GRENADE, SMOKE	8
	GRENADE, SMOKE, M18-SERIES,EXPENDED	8
	FLASH SIMULATOR	2
	FIRING DEVICE, PRESSURE RELEASE	145
	CHARGE, DEMOLITION, BLOCK, TNT, 1/2-LB,INERT	1
	BOMB, FRAG, 220 LB, INERT	1
	FLARE, PARACHUTE	47
	PROJECTILE, SUB-CAL, 25MM, FUNCTIONED.	2
	FLARE, SURFACE, TRIP, M49A1	3
	MORTAR, 60MM, PRACTICE, INERT	5
	MORTAR, 81MM, PRACTICE, INERT	3
	MISC, OEW RELATED MATERIAL	25
	GRENADE, PRACTICE, M26	2
	GRENADE, PRACTICE, M67,FUNCTIONED	1
	HAZMAT BAG - BIO	1
	GRENADE, RIFLE, INERT	1
	GRENADE, SMOKE, RIFLE	1
	PROJECTILE, 37MM, HE, M63 w/M58 FUZE	1 (BIP)
	CAN, AMMUNITION, 30CAL, EMPTY	6
	GRENADE, CN, EMPTY	4
	BRACKET, MOUNTING, FLARE, M49	2
	FUZE, GRENADE, TRAINING,	2
	CARTRIDGE, 105MM, EXPENDED	1
	FLARE, PARA, M48 PRACTICE	13
	MOTOR, 3.5" ROCKET, EXPENDED	1
18	SMOKE, GRENADE	1
	FUZE, MINE, FUNCTIONED	8
	FUZE, MINE, LIVE	7
	MINE, AT, TRAINING, INERT	19
	MINE, AP, TRAINING, INERT	56
	FLARE, PARACHUTE	30
	FIRING DEVICE, PRESSURE RELEASE	28
	PYROTECHNICS, LOOSE	10 LBS

OE Items Found Site CSU OE-0121

Item	Live	Expended/inert	Total
Bomb, HE Fragmentation, 25 lb.	1	0	1
Signal, Illumination, Aircraft, AN-M37 Type	13	66	79
Charge, Propellant, Mortar, M3	1	0	1
Projectile, 37 mm, TP, M63 Mod 1	1	0	1
Base Coupler, Standard	1	0	1
Cap, Blasting, Electric	37	0	37
Charge, Demolition, TNT	95	0	95
Cone, Shaped Charge, HE	1	0	1
Cartridge, 12 Gauge	1	0	1
Cartridge, Caliber 30, Ball	58	0	58
Cartridge, Caliber 30, Blank	38,926	0	38,926
Cartridge, 5.56 mm, Ball	4	0	4
Cartridge, 5.56 mm, Blank	46,976	0	46,976
Cartridge, 60 mm, Illumination, M83	10	8	18
Cartridge, 7.62 mm, Ball	42	0	42
Cartridge, 7.62 mm, Blank	12,614	0	12,614
Squib, Electric	31	0	31
Firing Device, Release, M1	2	0	2
Flare, Trip, Parachute, M48	1	12	13
Signal, Illumination, Ground, M125 Type	328	84	412
Flare, Surface, Trip, M49	9	0	9
Flare, Surface, Trip, M49A1	36	20	56
Fuze, Grenade	28	190	218
Grenade, Hand, Smoke, M18 Type	19	75	94
Grenade, Hand, Riot, CS, M7A3	3	1	4
Grenade, Hand, HC Smoke, AN-M8	5	0	5
Grenade, Hand, Illumination, MK1	20	11	31
Grenade, Hand, Fragmentation, MK2	1	0	1
Grenade, Hand, Practice	3	19	22
Grenade, Rifle, Smoke, M22 Type	27	103	130
Signal, Illumination, Ground, M19A2 Type	6	68	74
Grenade, Rifle, Red Smoke, Streamer, M23	6	0	6
Grenade, Rifle, WP Smoke, M19A1	1	0	1
Mine, AP, Practice, M8	2	0	2
Mine, AT, Practice, Light, M10	1	0	1
Primer, Percussion	13	0	13
Projectile, 37 mm, AP-T, M80	2	1	3
Compound, Pyrotechnic (pounds)	13	0	13
Rocket, Practice, 3.5", M29	0	92	92
Motor, Rocket, 3.5"	0	1	1
Rocket, HE, 3.5", AT, M28	1	2	3
Rocket, Practice, 35 mm, Subcaliber, M73	6	0	6
Simulator, Projectile, Airburst, M74	37	52	89
Simulator, Blast, Electric, M80 Type	1	0	1
Simulator, Launch, AT Rocket/Missile, M22	9	1	10
Simulator, Explosive Booby Trap, M117 Type	1	1	2
Simulator, Projectile, Ground Burst, M115A2	13	0	13
Smoke Pot, HC	2	10	12
Compound, Slag and OEW (pounds)	347	0	347
Firing Device, Combination, M142	1	0	1
Fuze, Mine, Combination, M10A2	1	0	1
Grenade, Hand, Practice, MK2	12	0	12
Compound, Smoke (bag)	13	0	13
Grenade, Hand, WP smoke, M15	2	0	2
Grenade, Hand, Offensive, MK3A2	0	1	1
Grenade, Hand, Incendiary, AN-M14	0	1	1
Tube, Flash, Cartridge Case, Artillery	4	0	4
Site CSU Total	99,788	836	100,624

OE Items Found Site HFA/CSU OE-0122

Item	Live	Expended/inert	Total
Signal, Illumination, Aircraft, AN-M37 Type	1	0	1
Base Coupler, Standard	3	4	7
Cartridge, Caliber 30, Ball	14	0	14
Cartridge, Caliber 30, Blank	303	0	303
Cartridge, 5.56 mm, Ball	40	0	40
Cartridge, 5.56 mm, Blank	99	0	99
Cartridge, 7.62 mm, Ball	1	0	1
Cartridge, 7.62 mm, Blank	85	0	85
Firing Device, Release, M1	1	5	6
Firing Device, Pressure, M1A1	2	31	33
Firing Device, Tension and Release, M3	0	4	4
Firing Device, Release, M5	3	111	114
Flare, Surface, Trip, M49A1	0	1	1
Fuze, Grenade	0	62	62
Grenade, Hand, Smoke, M18 Type	0	5	5
Grenade, Hand, Fragmentation, MK2	1	0	1
Grenade, Hand, Practice	0	3	3
Firing Device, Combination, M142	0	1	1
Grenade, Hand, Practice, MK2	0	1	1
Site HFA/CSU Total	553	228	781

OE Items Found Site CSU Foot Print OE-0002

Part 1: CSU Footprint OEW removal items 28 Feb 94 to 14 April 94.

Note: OEW Items Found are in 2 separate documents OE-0002 and OE-0012

STATUS REPORT; REMOVAL ACTION, CSU PROPERTY
 STARTED: 28 FEB 94
 AS OF DATE (COB): 14 April 94
 GRIDS CLEARED TODAY: 11
 TOTAL GRIDS CLEARED: 609 of 1374 = 44% COMPLETED

<u>OEW ITEMS RECOVERED/DESTROYED</u>	<u>TOTAL</u>
Activator, AT Mine, M1	97
Activator, AT Mine, M1 inert	12
Assembly, Tail, Mortar, 60mm	2
Base coupling with blasting cap	1
Base coupling with percussion primer	278
Base coupling inert	315
Bomb, Frag, 25lb w/M103 Fuze inert	1
Charge, Black Powder, Hand Grenade, MKII	21
Charge, Demolition, TNT, .5 lb	15
<u>Ctg, 7.62mm, Blank</u>	<u>8770</u>
<u>Ctg, 7.62mm, Ball</u>	<u>1870</u>
<u>Ctg, 7.62mm, functioned</u>	<u>1514</u>
<u>Ctg, 5.56mm, Ball</u>	<u>201</u>
<u>Ctg, 5.56, Blank</u>	<u>25288</u>
<u>Ctg, 5.56mm, functioned</u>	<u>3037</u>
<u>Ctg, Cal 30, Ball</u>	<u>9290</u>
<u>Ctg, Cal 30, Blank</u>	<u>15564</u>
<u>Ctg, Cal 30, functioned</u>	<u>9316</u>
<u>Ctg, Cal 50, Ball</u>	<u>2</u>
<u>Ctg, Cal 50, functioned</u>	<u>2</u>
Ctg, 75mm, Signal, expended	3
Ctg, 90mm, Signal, expended	2
Ctg, 106mm RR, live primer	1
Ctg, 106mm RR, expended	7
Ctg, 40mm, Prac, M583A1	2
Ctg, 40mm, Prac, M583A1 inert	2
Element, Delay, HG, Prac, M10	193
Firing Device, PR, M5 with base coupling	1093
Firing Device, M5, functioned	155
Firing Device, PR, M5 w/o base coupling	1394
Firing Device, M2	1094
Firing Device, M3 with base coupling	3750
Firing Device, M3 functioned	678
Firing Device, M1 with base coupling	149
Firing Device, M1 w/o base coupling	1963
Firing Device, M1 functioned	570
Firing Device, M10 functioned	442
Firing Device, M57, elec functioned	1
Flare, Trip, M49	31
Flare, Trip, M49 functioned	10
Flare, Signal, M18A1	7
Flare, Signal, M18A1 functioned	4
Flare, Surface, Trip, Parachute, M48	6
Flare, Surface, trip, parachute, M48, expended.	23
Fuze, Mine, combination, M10 with base coupling	202
Fuze, Mine, M10 functioned	11

Fuze, Grenade, Hand, M10A2	206
Fuze, Grenade, Hand, M10A2, functioned	193
Fuze, Grenade, Hand, M205A2, functioned	181
Fuze, Grenade, Hand, M205A2	158
Fuze, Mine, Practice, M604	378
Fuze, Mine, Practice, M604, functioned	96
Fuze, Trip, M12 (for M49 trip flare)	712
Grenade, Hand, Practice, unfuzed, inert	24
Grenade, Hand, MkII, HE with fuze, w/ safety pin.	1
Grenade, Hand, MkII, HE, fuzed broken off	1
Grenade, Hand, MkII, HE, dud, impinged striker	1
Grenade, Rifle, WP, M19A1	22
Grenade, Rifle, Flare, Parachute,	96
Grenade, Rifle, Flare, functioned	8
Grenade, Rifle, M11, practice, inert	45
Grenade, Hand, CS, M7-series.	24
Grenade, Hand, CS, M7 Series functioned	1
Grenade, Hand, HC Smoke,	9
Grenade, Hand, Smoke, M18-series	44
Grenade, Hand, Smoke, M18-series functioned	12
Grenade, Hand, Illumination, Mk1, hung striker.	1
Grenade, Hand, Illumination, MK1	2
Grenade, Hand, Illumination, MK1 functioned	6
Mine, AT, M12, practice, inert	48
Mine, AP, M8, practice, inert	292
Mine, AT, M6, practice, inert	27
Mine, AT, M20, practice, inert	38
Mine, AT, M10, practice, inert	40
Mine, AT, M7, practice, inert	19
Mine, AT, M19, practice	5
Mine, AP, M4, practice, inert	2
Mine, AP, M2, practice, inert	74
Mine, AP, M14, practice, inert	19
Mine, AT, M16, practice, inert	6
Mine, AP, M18, practice, inert	28
Mortar, 81mm, M43A1 w/fuze	6
Projectile, 20mm, TP-T	1
Projectile, 37mm, inert	1
Projectile, 105mm, w/fuze, unfired, inert.	3
Rocket, 2.36", HEAT, M6, fired	2
Rocket, 2.36", Practice, M7A3, unfired	7
Rocket, 3.5", Practice, unfired	2
Rocket, 3.5", Practice, fired	2
Signal, Smoke, M127A1	2
Signal, Smoke, M62	6
Signal, Smoke, M62, expended	52
Signal, Illumination, expended	9
Signal, Illumination	10
Signal, 40mm, RS, M662	11
Simulator, Blast, M110	17
Simulator, Blast, M115	2
Simulator, Hand Grenade, M116	2
Simulator, Booby Trap, M118	3
Simulator, Booby Trap, M119	2

OE Items Found Site CSU Foot Print**Part 2:** CSU OEW removal items 14 April 94 to 30 June 94.

Removal Action, CSU footprint

OE-0012 ; Table 2-5

Delivery Order 015

18 April 94 to 60 June 94

<u>OEW ITEMS RECOVERED/DISTROYED</u>	<u>TOTAL</u>
Activator, Mine M1	150
Activator, Mine M1 inert	24
Assembly, Tail, Mortar, 60mm	1
Base Coupling	282
Base Coupling inert	763
Charge, Demo, TNT	15
Charge, Demo, TNT inert	4
Charge, Black Powder, Hand Grenade, MKII inert	6
Ctg, 40mm, Practice, M583A1 inert	3
<u>Ctg, 5.56mm, Ball</u>	<u>8</u>
<u>Ctg, 5.56mm, Ball inert</u>	<u>1130</u>
<u>Ctg,30cal, Ball</u>	<u>3600</u>
<u>Ctg,30cal, Ball inert</u>	<u>362</u>
<u>Ctg, 5.56mm, Blank</u>	<u>6249</u>
<u>Ctg, 5.56mm, Blank inert</u>	<u>7659</u>
<u>Ctg, 30cal, Blank</u>	<u>19023</u>
<u>Ctg, 30cal, Blank inert</u>	<u>19570</u>
<u>Ctg, 7.62mm, Blank</u>	<u>6036</u>
<u>Ctg, 7.62mm, Blank inert</u>	<u>10775</u>
<u>Ctg, 7.62mm, Ball</u>	<u>745</u>
<u>Ctg, 7.62mm, Ball inert</u>	<u>955</u>
<u>Ctg, 12GA.</u>	<u>3</u>
<u>Ctg, 12GA. Inert</u>	<u>3</u>
Ctg, 90mm, Signal, Expended inert	1
Firing Device, M2	3
Firing Device, M2 inert	1133
Firing Device, M5	750
Firing Device, M5 inert	2287
Firing Device, M10	1
Firing Device, M10 inert	1469
Firing Device, M3	948
Firing Device, M3 inert	2508
Firing Device, M1	32
Firing Device, M1 inert	1157
Firing Device, M57	1
Firing Device, M57 inert	18
Flare, Trip, M49	16
Flare, Trip, M49 inert	75

Flare, Parachute, M48 inert	66
Flare, Signal, M18A1	2
Flare, Signal, M18A1 inert	82
Fuze, Mine, Practice, F117	1
Fuze, Mine, M10	63
Fuze, Mine, M10 inert	26
Fuze, Grenade, M10A2	3
Fuze, Grenade, M10A2 inert	43
Fuze, M12 inert	12
Fuze, Grenade, M205A2	310
Fuze, Grenade, M205A2 inert	746
Fuze, Mine, Practice, M604	340
Fuze, Mine, Practice, M604 inert	91
Grenade, Rifle, M11 inert	7
Grenade, Hand, CS, M7 Series	26
Grenade, Hand, CS, M7 Series inert	4
Grenade, Hand, Illumination, MKI	3
Grenade, Hand, Illumination, MKI	29
Grenade, Hand, Smoke, M18 Series	7
Grenade, Hand, Smoke, M18 Series inert	82
Grenade, Hand, HC Smoke inert	7
Grenade, Rifle, Flare	2
Grenade, Rifle, Flare inert	35
Grenade, Hand, MKII, HE Filled	2
Grenade, Hand, MKII, HE Filled inert	6
Grenade, Hand, Practice, Unfuzed, Inert	4
Grenade, Hand, Practice, Unfuzed, Inert inert	43
Mine, AP, MP14 inert	5
Mine, AP, M4 Practice inert	1
Mine, AP, M18A1 inert	73
Mine, AT, M19, Practice	2
Mine, AP, M2, Practice	33
Mine, AT, M7, Practice inert	23
Mine, AT, M8, Practice inert	4
Mine, AP, M12, Practice	2
Mine, AP, M12, Practice inert	22
Mine, AT, M10, Practice inert	2
Mine, AT, M20, Practice inert	36
Mortar, 81mm Practice inert	2
Projectile, 105mm, w/Fuze inert	2
Rocket, 3.5", Practice, inert	1
Rocket, 2.36", Practice, M7A3 inert	6
Signal, Illumination,	7
Signal, Illumination, inert	44
Signal, 40mm, RS, M662	5
Signal, Smoke, M127A1 inert	22
Simulator, Blast, M110	2
Simulator, Blast, M110 inert	2

PRIMER PERC, MKIIA	7
PRIMER PERC, MKIIA inert	15
SIMULATOR BOOBYTRAP M119	4
SIMULATOR BOOBYTRAP M119 inert	1
SIMULATOR BOOBYTRAP M118	4
SIMULATOR BLAST ELECTRIC, M80	641
1.1in A.A. Mk2 (Navy)	1
SIMULATOR, BLAST M22 ATWO35	1
Grenade, M33 Practice w/p inert	1
Grenade, M25A2C/S	2
Simulator Airburst M74A1	10
Simulator Airburst M74A1 inert	110
Fuze Hand Grenade M228	3
Fuze Hand Grenade M228 inert	2
Signal Parachute M22A1	2
Signal Parachute M22A1 inert	14
Smoke Pot, HC	10
Mine, Flare M48 inert	60
FUZE MINE M4	1
Signal Smoke M65	1
SIGNAL FLASH/SOUND M74 inert	3
CAPS Blasting	36
Grenade, Rifle M23 Green Smoke	21
Grenade, Rifle M19 Violet Smoke	9
Grenade, Rifle Smoke HC	13
Cartridge 50 Cal M48A (spotter)	1
Smoke Screening (Task Thrown) inert	8

ATTACHMENT 3

Excerpts

Issues Relevant to Group 2 RI/FS Work Plan

Issues Relevant Fort Ord training areas

Section 1

OE-0011: delivery order 15 entry 03; CSU footprint indications are Site 13 heavily contaminated

COMMENTS/CONCERNS: Site 13A grids 9&10 are inside locked area team that samples site 13A will get the key and lay these grids. Indications from sampling in site 13 are the area is heavily contaminated.

OE-0011: delivery order 15 entry 04; CSU footprint continue to encounter heavy contamination in Site 13

COMMENTS/CONCERNS: TM1 encountered problems locating site 11 due to difference in grid references and area COE wanted sampled. TM 2 had problems with post police at site 5, police refused to allow team leader to call CP for assistance, team was threatened with guns and night sticks. TM continues to encounter heavy contamination in site 13, indication are this area will require extensive clearance. Radio communications are still a problem, COE issued radioes do not work because of terrain, Range control radioes work well.

OE-0011: delivery order 15 entry 011; CSU footprint site 18 heavily contaminated with magnetic anamolies

COMMENTS/CONCERNS: SITE 3 IS NOT LOCATED AT THE GRID REFERENCE INDICATED IN THE ARCHIVE REPORT, SITE 3 IS AT FR094547. GPS CREW CONTINUES TO DOCUMENT SAMPLE SITES. TEAM 2 CONTINUES TO ENCOUNTER HEAVY BRUSH AS WELL AS POISON OAK. SITE 18 IS HEAVILY CONTAMINATED WITH MAGNETIC ANAMOLIES.

OE-0011: delivery order 15 entry 15; CSU footprint

UXO SUMMARY				
UXO LOCATED				
TYPE	QUANTITY	LOCATION	DISPOSITION	
M7 AT PRAC MINE	4	13	ALL UXO DISPOSED OF BY DEMOLITION AT RANGE 36 BY THE US ARMY EOD DET	
M2/M48 AP MINE PRAC	18	13		
M1 AT MINE PRAC	1	13		
M18 SMOKE GRENADE	3	13/18		
FUSE M604 PRAC	1	13		
FUSE GRENADE	1	13		
M12 AT MINE PRAC	1	13		
PRESSURE FIRING DEVICE	1	13		
M110 FLASH SIMULATOR	2	13		
FUSE M2/M48 MINE	4	13		
PRESS RELEASE FIR DEV	1	13		
7.62 LINKED BLANKS	155	13		STORED IN MAG

OE-0011: delivery order 15 Entry 16; CSU Footprint 250 LB AN/M88 fragmentation bomb found Site 18, 13B, Sites 18, 13B heavily contaminated... uncovering burial sites of all types of ordnance

COMMENTS/CONCERNS: UXO TYPES AND QUANTITIES ARE BEING RECORDED BY CEHND SAFETY SPECIALIST DAILY. I WILL NOT INCLUDE IN DAILY JOURNAL UNLESS THERE IS SPECIAL CIRCUMSTANCES. TM 1 LOCATED A 250LB AN/M88 FRAG BOMB W/O FUZE IT IS BELIEVED TO BE A EOD TRAINING AID, AN ATTEMPT TO DET IT WILL DETERMINE IF IT IS HE LOADED. ALL GRIDS ENCOUNTERED TO DATE HAVE BEEN HEAVILY CONTAMINATED AND WE ARE UNCOVERING BURIAL SITES OF ALL TYPES OF DISCARDED ORDNANCE. BRUSH IS HEAVY AND POISON OAK IS STILL PRESENTING PROBLEMS.

OE-0011: delivery order 15 entry 17; CSU Footprint located numerous mines with live mouse traps underneath

WORK ACCOMPLISHED: TM 1 COMPLETED 11 GRIDS WITH 77 DIGS TEAM LOCATED NUMEROUS MINES WITH LIVE MOUSE TRAPS UNDERNEATH. TM 2 COMPLETED 5 GRIDS W/531 DIGS TEAM DUGS NUMEROUS HITS ON MILITARY TRASH. TM 3 COMPLETED 6 GRIDS
EXPLANATION OF DISCREPANCY: NONE

OE-0011: delivery order 15 entry 27; CSU Footprint 13 UXO located

WORK PLANNED: ALL TEAMS SAMPLING IN SITE 13B.

WORK ACCOMPLISHED: TEAMS COMPLETED 12 GRIDS IN SITE 13 AND EXCAVATED 960 HITS 13 UXO WERE LOCATED INCLUDING SMALL ARMS.

OE-0011: delivery order 15 entry 28; CSU Footprint 6 UXO located

WORK PLANNED: ALL TEAMS SAMPLING IN SITE 13B.

WORK ACCOMPLISHED: TEAMS COMPLETED 14 GRIDS IN SITE 13 AND EXCAVATED 1240 HITS 6 UXO WERE LOCATED EXCLUDING SMALL ARMS.

OE-0011: delivery order 15 entry 29; CUS footprint 13 UXO located

WORK PLANNED: TEAM 1 ASSIGNED TO LAYING OUT GRIDS IN CSU FOOTPRINT. TEAMS 2, 3, & 4 SWEEPING GRIDS IN FOOTPRINT, GRUB TEAM CUTTING BRUSH SUPPORTING TM

WORK ACCOMPLISHED: TEAMS COMPLETED 13 GRIDS IN SITE AND EXCAVATED 854 HITS 13 UXO LOCATED EXCLUDING SMALL ARMS.

OE-0011: delivery order 15 entry 30; CUS footprint 52 UXO located

WORK PLANNED: TEAM 1 ASSIGNED TO LAYING OUT GRIDS IN CSU FOOTPRINT. TEAMS 2, 3, & 4 SWEEPING GRIDS IN FOOTPRINT, GRUB TEAM CUTTING BRUSH SUPPORTING TM

WORK ACCOMPLISHED: TEAMS COMPLETED 13 GRIDS IN SITE AND EXCAVATED 813 HITS 52 UXO LOCATED EXCLUDING SMALL ARMS.

OE-0011: delivery order 15 entry 31; CSU footprint 520 UXO located excluding small arms... located large area of buried ammo 2000 + RDS

WORK PLANNED: TEAM 1 ASSIGNED TO LAYING OUT GRIDS IN CSU FOOTPRINT. TEAMS 2, 3, & 4 SWEEPING GRIDS IN FOOTPRINT, GRUB TEAM CUTTING BRUSH SUPPORTING TM

WORK ACCOMPLISHED: TEAMS COMPLETED 7 GRIDS IN SITE AND EXCAVATED 1024 HITS 520 UXO LOCATED EXCLUDING SMALL ARMS, TM 3 LOCATED LARGE AREA OF BURIED AMMO 2000 + RDS

OE-0011:

NEW DELIVERY ORDER 015A Large portions of Daily Operations Journals are omitted/missing

NEED: daily CHND Safety and Leader Journal and UXO Reports

LARGE GAP IN RECORD: 3-17-1994 to 5-25-1994 Missing

*** SEE OE-0012: Table 2-5; Summary of OEW located and disposed of during delivery order 015 4-4-1994 to 6-30-1994 this appears to be the OE-0002 TCRA Status Report, CSUMB OEW found (ATTACHMENT 2 OEW items found)**

OE-0011: Delivery Order 015 Entry 15: CSU Footprint large quantities of scrap
COMMENTS/CONCERNS: TEAMS CONTINUE CLEARANCE AND GRUBBING BRUSH. GRID CLEARANCE CONTINUES TO BE SLOWED BY THE THICK BRUSH, HEAVY MANZANITA AND POISON OAK. IN ADDITION TO THE VEGETATION THE LARGE QUANTITIES OF SCRAP SLOW PROGRESS. BURIED C-RATION CANS AND 7.62 BELT LINKS SEEM TO BE EVERYWHERE.

OE-0011: Delivery Order 015 Entry 26: CSU Footprint back hoe brought in Site is heavily contaminated

COMMENTS/CONCERNS: HEAVY BRUSH AND THICK MANZANITA CONTINUE TO SLOW PROGRESS. POISON OAK CONTINUES TO BE A BIG PROBLEM FOR EVERYONE. PLACED A TEAM WITH A BACKHOE IN THE FIELD TODAY TO SUPPORT THE CLEARANCE TEAMS AND DIGS THE HEAVILY CONTAMINATED SITE. SEEMED TO WORK VERY WELL AND MADE SIGNIFICANT PROGRESS TODAY.

OE-0011: Delivery Order 015A Entry 27; CSU Footprint 4-14-1994
Grid 37-D EOD specialists became ill, vomiting. HAZ MAT team called in...
all intrusive work stopped

COMMENTS/CONCERNS: AT APPROXIMATELY 0845 THIS MORNING TM6 CALLED ON THE RADIO FROM GRID 37-D STATING THAT WHILE DIGGING UP A TRASH PIT TWO EOD SPECIALISTS BECAME ILL, ONE VOMITED AND THE OTHER BECAME DIZZY. THE TEAM HAD RETREATED UP WIND TO A SAFE AREA AND REQUESTED ASSISTANCE. HFA SITE SAFETY AND COE REP RESPONDED. SUXOS CALLED BILL COLLINS AND REQUESTED ASSISTANCE. THE TWO MEN WERE TAKEN TO THE BASE HOSPITAL BY HFA SAFETY, COE TEAM. BASE HAZ MAT ARRIVED AND DECONTAMINATED ALL EOD PERSONNEL AND SECURED THE AREA. ALL INTRUSIVE WORK WAS STOPPED AT 1130 HOURS. CLEARANCE TEAMS WERE SENT BACK INTO THE FIELD TO PICK UP UXO RELATED SCRAP ON THE SURFACE REMAINING WELL CLEAR OF THE CONTAMINATED AREA.

OE-0011: Delivery Order 015A Entry 28; CSU Footprint vehicles and equipment impounded due to possible HAZ MAT contamination

COMMENTS/CONCERNS: DUE TO THE POSSIBLE HAZ MAT CONTAMINATION ALL BRUSH CREW LABORS TERMINATED AT NOON UNTIL FURTHER NOTICE. CONCERNED ABOUT CONTINUING WORK FOR ENTIRE JOB. HAZ MAT PERS HAVE SSO VEHICLE AND TM 6 VEHICLE IMPOUNDED DUE TO POSSIBLE CONTAMINATION. ALSO ALL OF TM 6'S EQUIPMENT AND MOST PERSONAL ITEMS HAVE BEEN IMPOUNDED.

OE-0011: Delivery Order 015A Entry 29; CSU Footprint fence placed around HAZ MAT pit

COMMENTS/CONCERNS: CONTINUE TO BRUSH GRIDS, TM 6 STILL WITHOUT EQUIPMENT DUE TO POSSIBLE CONTAMINATION. SSO VEHICLE REMAINS IMPOUNDED??
BASE PLACED HURRICANE FENCE AROUND ACTUAL PIT.

OE-0011: Delivery Order 015A Entry 38; CSU Footprint 501 UXO items excavated

WORK ACCOMPLISHED: UXO TEAMS COMPLETED 21 GRIDS, 1135 EXCAVATIONS AND LOCATED AND REMOVED 501 ITEMS OF UXO. BACKHOE CREW COMPLETED 6 GRIDS AND 33 DIGS, NO UXO WAS RECOVERED, TEAM REMOVED APPROX. 50LBS SCRAP.
EXPLANATION OF DISCREPANCY: WORK BEGAN ON 3 MAY VICE 2 MAY TO ALLOW THE COE TIME TO REVIEW AND APPROVE MONITORING PLANS.

COMMENTS/CONCERNS: THIS WAS FIRST WORK WEEK WHERE AIR MONITORING WAS CONDUCTED AT EACH EXCAVATION, THIS WEEK WAS MODIFIED TO ALLOW HUNTSVILLE TIME TO REVIEW AND COMMENT ON MONITORING PLAN. WORK WEEK WILL RETURN TO MON THUR. A BACKHOE CREW WAS ADDED TO BEGIN EXCAVATIONS OF MARKED GRIDS. MORE CREWS WILL BE ADDED AS NEEDED. BACK HOE CREW COMPLETED 6 GRIDS.

Section 2

OE-0202 Site 13B CAIS chemicals 1997 pp ii

The FFO, which consists of approximately 28,000 acres, is located along the Pacific Ocean in northern Monterey County, California. FFO is near the cities of Marina, Del Rey Oaks, Seaside, Sand City, and Monterey, California. The land for Fort Ord was purchased in 1917 and was comprised of several camps. The installation was used as an infantry training center. During World War II, troops assigned to Edgewood Arsenal, Maryland, trained and conducted experiments at Fort Ord. CAIS were used at Fort Ord prior to 1974 for field training of troops.

On March 10, 1997, during the OE removal action on Site 13B, Army contractor personnel discovered two cans of buried CAIS. A total of 24 glass ampules were recovered intact and were identified as items from a K951 CAIS. The K951 set originally contained glass ampules containing 1.4 ounce solutions of 5 percent mustard (HD) in chloroform, 5 percent Lewisite (L) in chloroform, 50 percent chloropicrin (PS) in chloroform and phosgene (CG). The specific contents of the individual ampules were not identified because some of the cardboard mailing tubes, which contained the labeling of the contents, had decomposed. The K951 kit could contain any of the four types of agent or industrial chemical. The recovered items were overpacked in two single round containers (SRC) by the TEU and stored in explosive storage location (ESL) 768 located in the former ammunition supply point (ASP).

OE-0265D Memorandum For The Record Chemical Agent Identification Sets (CAIS)

The K951 ampules (also called vials) are frequently found in burial sites at old WWII training areas. They are sometimes found loose, sometimes found in their original steel cylinders (also called "pigs") (see figure 13), and are sometimes found in drums, cans, or other disposal containers. When found loose, the agent type cannot be readily identified without sophisticated spectrographic equipment, and a worst case assumption of phosgene should be made by field personnel.

OE-0265E CAIS 13B 4500 motor pool

As you know, CAIS ampoules were discovered during the course of routine Ordnance and Explosives (OE) removal activities at OE site 13B on March 10, 1997. The ampoules were recovered intact and no personnel were exposed. The ampoules were discovered about 2 feet deep in an oak woodland area about 100 meters south-east of the 4500 area motor pool complex. OE removal work at this site immediately ceased on March 10, 1997 when the ampoules were discovered. A map depicting the location where the ampoules were discovered is provided at enclosure 1. The site was secured in accordance with Army Regulation 50-6 Nuclear and Chemical Weapons and Materiel, Chemical Surety. Guards were posted at the area until the ampoules were transported to the Ammo Supply Point (ASP). The area is cordoned off and posted with yellow "CAUTION" tape and signs.

OE-0005A Site 4C CSUMB Foot Print See HAZ MAT below area of 4C

6.2.4. Site 4, CBR Training areas, (vicinity FR 091552, FR 082557, and 096568).

Discussion: These facilities appear on 1957 and 1958 maps. Currently there is a gas chamber where soldiers test their masks for leaks at FR 091552. Tear gas agents like powdered or encapsulated CS and CN are used in these chambers. A U.S. Chemical Systems Laboratory document from 1983 states that classroom training took place in Building 2820. As part of this training, minute quantities of mustard gas were used for familiarization. These were probably part of the Chemical Agent Identification Sets, four of which, according to the document, were transferred to Edgewood Arsenal.

Recommendations: It is possible that powdered tear gas agent was dumped in the area or used capsules were discarded here. A walk through of the area only produced signs of pyrotechnic use and a suspect washout area. Recommend that the area be checked for residue; also groundwater and soil sampling should be considered.

OE-0012 Chapter 2 CSUMB HAZ MAT Incident

OEW SEARCH AND REMOVAL OPERATIONS

On April 14, 1994, while investigating a burial site for OEW, two UXO personnel uncovered a chemical substance that made them nauseous. The HFA QC/Site Safety Officer and the CEHND Safety Representative immediately responded to the site.

OEW SEARCH AND REMOVAL STAND DOWN (HTRW INCIDENT)

OEW intrusive operations were halted on April 14, 1994, due to the hazardous materials incident, pending results of an investigation and chemical analysis, and approval of changes to the SSHP. HFA personnel were reassigned to grubbing and removing brush and collecting and removing non-OEW scrap from the CSU Footprint. All local laborers were released until further notice.

OEW SEARCH AND REMOVAL OPERATIONS RESUMED

Intrusive operations were resumed in the CSU Footprint on May 3, 1994. Local laborers previously used for brush removal and grubbing were not rehired due to the requirement that all personnel working site had to have the 40 hour HTRW certification. Instead, clearing and grubbing operations were completed by OEW teams as they progressed in their respective areas.

OE-0005A 1993 ASR appendix E Chemical Warfare Agents

- Spoke with Staff Sergeant Davis, Operations NCO at the 87th Ord Det (EOD). He had been the team leader on the suspect chemical incident involving the unknown drum. He stated that UXB International discovered the drum while digging a ditch. One of their personnel recognized the drum as having reinforcing bands much like some of the chemical agent storage containers. The location was at Fifth and Eighth streets. The barrel was empty, but later testing indicated traces of mustard.

- SSG Davis also knew of chemical agent training kits (containing a 10% solution HD) which had been buried along Imjin Road. He mentioned a report he had received from Forces Command EOD referencing these kits. I asked him to send me a copy of the report.

OE-0005A 1993 ASR appendix E

- Mr. Stickler recalled no knowledge of toxic chemical training or use of chemical filled munitions. However, he confirmed the use of 4" stokes mortars on Range 48 and did not discount the possibility of having fired or disposed of chemical munitions (Range 49, FR 09445470, was an old demolition area where a wide variety of munitions were disposed of).

- Other comments made by Durham/Stickler:

- An M57A1 250 lb. general purpose bomb (HE filled) was disposed of in place by the 87th EOD on 28 Apr 93. This bomb was in the impact area. Mr. Durham gave me a copy of the incident sheet.

- Bombing runs were made out of Salinas Army Airfield during WWII. This airfield was shut down shortly after the war ended.

The 250lb bomb was found in front of Ranges 41-43 impact area

Del Rey Oaks

- According to Mr. Stickler, "Ranges 26-31 will be a real bone of contention, because developers assume that since it is listed as a small arms range, it must be clean". He stated that it is contaminated with 37mm anti-aircraft and 75mm howitzer rounds.

6.5.4 Mr. Jerry Stratton

Mr. Stratton was formerly with the Director of Plans, Training, and Mobilization at Fort Ord. He stated that the Navy had boats fire into the inland Impact Area from Monterey Bay a long time ago (WWII era) before base housing was built, and aerial bomb drops were conducted into the Impact Area. He also stated that the inland Impact Area is essentially the same since WWII, not larger or smaller now than before and statically defined over time.

OE-0005A CSU Foot Print

6.2.15. Site 18, 100lb. Bomb. (vicinity FR 090567, in the confidence course area).

DISCUSSION: In the 1970's this area was a minefield practice area used to teach Trainees methods for locating landmines (mine and booby-trap area #1; see 6.2.6.). Currently there is an obstacle course in the area. A map made by a Sergeant Beardsley, an EOD NCO stationed at Fort Ord for many years, shows a 100lb. bomb found in this area. There are two theories as to how it may have gotten here:

a. It was accidentally jettisoned during bombing practice, or because of aircraft malfunction. The South Parade Ground was used as an airfield in the past. If so, an aircraft approaching from the east could have ejected a bomb in this area. A 1949 aerial photo of the area shows that it was certainly not a bombing range.

b. The bomb was an EOD training aid left in place and forgotten. Mr. Durham stated that the area once contained aircraft fuselages for emergency and EOD training.

RECOMMENDATION: The sweep of mine and booby-trap area #1 should be widened to include the confidence course area. It is not known whether the bomb was an HE-filled munition or inert, nor is it known if the bomb was armed. Any deep ordnance must be excavated with care.

OE-0122 Pg. 3 DOD 6655.9STD
under Chapter 12, DOD 6055.9-STD,
DOD Ammunition and Explosives Safety
Standards. DOD real property known to
be contaminated with ammunition and
explosives that may endanger the general
public may not be released from DOD
custody until the most stringent efforts
have been made to ensure appropriate
protection to the public.

OE-0122 Pg. 7 Hazardous Material Site
12.1 This area is part of the future
California State University wildlife area
that was left uncleared by the previous
contractor due to a hazardous material
incident that halted all intrusive work. An
environmental company (HLA Inc.) was
contracted to remediate and conduct soil
sampling of the site.

SOW OE-0012

1.1.1 This action is also being completed under Chapter 12, DOD
6055.9-STD, DOD Ammunition and Explosives Safety Standards. DOD
real property that is known to be contaminated with ammunition
and explosives that may endanger the general public may not be
released from DOD custody until the most stringent efforts have
been made to ensure appropriate protection of the public.

Old Magnetometer GA-52C and GA-72CX used for sites prior to October 1994

OE-0121 SITE CSU

12.3 This site is 69.8 acres and has 315
total 100 foot square grids, of which 100
percent (315 grids) were cleared to a
depth of four feet. 100,624 OE items were
recovered, 98,621 of which were small
arms. Many hazardous UXO items were
found, these were destroyed at demo
range 36A or in place. The clearance was
completed on July 27, 1995.

OE-0122 SITE HFA/CSU Area cleared April 25, 1995

12.3 This site contains 5.73 acres and
has 25 total 100 foot square grids, of
which 100 percent (25 grids) were
cleared to a depth of four feet. 781 OE
items were recovered 542 of which were
small arms. The clearance was
completed on June 20, 1995. This
included the satisfactory QC and QA
inspections.

OE-0012 CSU footprint Chapter 2

Section 12.3

A total of, 163,929 OEW, were located and disposed of during this Removal
Action [see Table 2-5]. Of this total, 110,600 rounds, were small arms
ammunition [Table 2-6], and 13 UXO were detonated in place [see Table 2-7].

Section 12.4

Grid sheets are provided that indicate each grid containing OEW, the grids where
OEW was located in the CSUMB, and the UXO team that cleared each grid.
Individual Grid sheets are not provided for grids that did not contain OEW or did
not contain an anomaly requiring excavation with a backhoe [see Appendix G].

OE-0011 Journal Summary entries CSU Footprint OE/OEW found:

2-22-1994 Order 15, entry 29, (30) 81MM, (45) UXO, AT Mines and components
2-23-1994 order 15, entry 30, (52) UXO excluding small arms
2-24-1994 order 15, entry 31, (520) UXO, uncovered large area of small arms 2000+
4-14-1994 order 015A, entry 27, TM hit Haz Mat and got sick. Work stopped
5-3-1994 order 015A, entry 38, (501) UXO found
5-4-1994 order 015A, entry 39, (627) UXO found, backhoe crew (112) practice Mines
5-5-1994 order 015A, entry 40, (240) UXO found, backhoe crew (280) firing devices/mines
5-6-1994 order 015A, entry 41, (4725) UXO found, backhoe crew 9 UXO
5-9-1994 order 015A, entry 42, (1029) UXO found
5-10-1994 order 015A, entry 43, (759) UXO found
5-11-1994 order 015A, entry 44, (588) UXO found
5-12-1994 order 015A, entry 45, (109) UXO found
5-16-1994 order 015A, entry 46, (1440) UXO found
5-17-1994 order 015A, entry 47, (546) UXO found
5-18-1994 order 015A, entry 48, (462) UXO found
5-19-1994 order 015A, entry 49, (1076) UXO found
5-23-1994 order 015A, entry 50, (1919) UXO found
5-24-1994 order 015A, entry 51, (424) UXO found
5-25-1994 order 015A, entry 52, (61) UXO found
Entry 53 missing
5-31-1994 order 015A, entry 54, (1211) UXO found

OE-0002 TCRA 13B buried under 30 feet of fill
Sinkhole Practice Mortar Range SITE 13B

The Sinkhole Practice Mortar Range was identified from a map dated July 15, 1957. It is east of the 4400/4500 block motor pool, east block, and south of Inter-Garrison Road

(Plate 1). It is believed that this area was used for firing practice mortars and training troops in nonfiring drills (dry-fire). HLA conducted a site tour on November 2, 1993, and found no evidence of ordnance use. In a subsequent discussion, Roy Durham stated that he knew of no mortar practice in that area. However, he also stated that as much as 30 feet of fill was later placed in this area during the construction of the 4400/4500 block motor pools.

OE-0002 Interim summary report 13B Approx. 1 kilometer square = 247
2.6.10 SITE 13B

2.6.10.1 This site is identified as a mortar range in the archives search report. The site is approximately one kilometer square. One hundred sample grids were placed in this site, and fifty-seven grids were sampled before the site was declared contaminated on 31 January 1994.

OE-0005A

Note: 1 square kilometer = 247 acres

ATTACHMENT 4

California Real Estate Disclosure

Residential Disclosure Law

THE RESIDENTIAL DISCLOSURE LAW

A Brief Explanation

SELLER OR AGENT FOR THE SELLER MUST DISCLOSE-IT'S THE LAW!

Under California Law, the seller of real property - or the agent for the seller - must disclose "accurate information of material fact" telling whether historical evidence indicates that an event of natural origin is likely to affect the desirability and value of the property, even if the property is listed "as is".

This report contains information about the Risk Elements which is derived from specified Public Records. The information provided in this report may be material in determining the condition of the Property as well as potential limitations or restrictions on development and maintenance of the Property. A number of California statutes apply to all real property within the State; however, California Civil Code Section 1102 (commonly known as the "Residential Disclosure Law") mandates the specific form of disclosures in relation to residential real property.

AFFECTED PROPERTY:

The Residential Disclosure Law specifically governs the form of disclosures as they apply to "residential property" which is defined as real property containing not more than 4 dwelling units. Certain residential real property is excluded from the Residential Disclosure Law such as probate sales, sales by a lender after foreclosure, etc. (See Civil Code Section 1102.2.)

INCLUDED TRANSACTIONS:

The Residential Disclosure Law mandates certain disclosures to a party who is acquiring an interest in residential real property whether by sale, exchange, installment land contract, lease with option to purchase, option to purchase, or ground lease coupled with the improvements.

OTHER LAWS:

The Residential Disclosure Law does *not* limit or abridge any obligation of disclosure created by other provisions of the law or which may exist in order to avoid fraud, misrepresentation, or deceit in the transaction.

STATUTORY FORMS - The Residential Law requires:

that a statutory form entitled "*Natural Hazard Disclosure Statement*" can be completed and executed by the seller, buyer and their respective agents

with respect to certain specified disclosures including Special Flood Hazard Areas, Areas of Potential Flooding - Dam Inundation, Very High Hazard Severity Zones, Wildland - State Responsibility Areas, Earthquake Fault Zones, and Seismic Hazard Zones ("Natural Hazard Zones") and that a statutory form entitled "*Local Option Real Estate Transfer Disclosure Statement*" be completed and executed by the seller, buyer and their respective agents with respect to certain disclosures if and when mandated by local ordinance.

RULES REGARDING DETERMINATIONS:

The Residential Disclosure Law stipulates that if the map or accompanying information for a specific Natural Hazard Zone is not of sufficient accuracy or scale that a reasonable person can determine a property is located within one of these natural hazard areas, the seller or seller's agent must mark "Yes" on the Natural Hazard Disclosure Statement. The seller or seller's agent may mark "No" on the Natural Hazard Disclosure Statement if he or she attaches a report that verifies the property is not in the hazard zone.

MAP SOURCES:

Recipient(s) should be aware that natural hazard maps available from state and local agencies may have been produced years or decades ago. For more information on the production and review dates of given maps, please contact your local authorities.

NO WAIVERS:

Waiver of the requirements of the Residential Disclosure Act is void as against public policy.

MORE INFORMATION:

Copies of the applicable statutes may be obtained at your local law library or from <http://www.leginfo.ca.gov/calaw.html>.

ATTACHMENT 5

**UXO/OEW Omitted Documents and dates
available Fort Ord Cleanup web site**

Omitted Documents and dates made available on web

Administrative Record Documents Containing OEW Information Pertinent to the Group 2
RI/FS Work Plan.

Available at: www.fortordcleanup.com/adminrec/arsearchresults.asp

Search by Record Numbers:

- OE-0002 1994 OEW Time Critical Removal Action (TCRA)
2003
- OE-0011 Vol. II 1994 Phase I and Phase II OEW After Action Report
2005-2008
- OE-0012 Vol. I 1994 Phase I and Phase II OEW After Action Report
2008
- OE-0013 Vol. III 1994 Phase I and Phase II OEW After Action Report
2008
- OE-0029 1997 Engineering evaluation/Cost Analysis Phase I; Appendix K Comments
2005-2008
- OE-0036 1996 Evaluation and Comparison of UXO Detectors; using best detectors?
2008
- OE-0085 Army letter no transfer by deed until ordnance and explosives cleanup complete
2004
- OE-O142 1994 Land Disposal Site Plan Appendix C; Required Remediation depths
2005
- OE-0202 1997 Draft Non-Stockpile Chemical Material Former Fort Ord
2008
- OE-0265C 2000 Site OE-13B After Action Report
2003-2004-2005
- OE-0265D 1997 Memorandum Chemical Agent Identification Sets(CAIS) Former Fort Ord
2007
- OE-0265E 1997 DOD letter to DTSC; CAIS sets found at Former Fort Ord
2007
- OE-0244 1999 DTSC letter to Army; Cleanup issues need to be addressed
2005
- OE-0227A 2000 OE Removal After Action Report ; OE-13C
2003-2008

ATTACHMENT 6

Pyrotechnic Devices

Perhaps the most widely use munitions

These Munitions are widely used in the training of US Military troops.

Pyrotechnics are used to send signals, to illuminate areas of interest, to simulate other weapons during training, and as ignition elements for certain weapons.(1)

Pyrotechnic Devices

Military Explosives (Chemistry) 30 September 1984

UNITED STATES PYROTECHNICS; CHAPTER 10

All pyrotechnic compositions contain oxidizers and fuels. Additional ingredients present in most compositions include binding agents, retardants, and waterproofing agents. Ingredients such as smoke dyes and color intensifiers are present in the appropriate types of compositions.

Oxidizers: are substances in which an oxidizing agent is liberated at the high temperatures of the chemical reaction involved.

Fuels: include finely powdered aluminum, magnesium, metal hydrides, red phosphorus, sulfur, charcoal, boron, silicon, and suicides. The most frequently used are powdered aluminum and magnesium.

Binding agents: include resins, waxes, plastics, and oils. These materials make the finely divided particles adhere to each other when compressed into pyrotechnic items.

Retardants are materials that are used to reduce the burning rate of the fuel-oxidizing agent mixture, with a minimum effect on the color intensity of the composition.

Waterproofing agents are necessary in many pyrotechnic compositions because of the susceptibility of metallic magnesium to reaction with moisture, the reactivity of metallic aluminum with certain compounds in the presence of moisture, and the hygroscopicity of nitrates and peroxides.

Color intensifiers:

- hexachloroethane (C₂Cl₆)
- hexachlorobenzene (C₆Cl₆)
- polyvinyl chloride
- dechlorane (C₁₀Cl₁₂).

Smoke dyes are azo and anthraquinone dyes. These dyes provide the color in smokes used for signaling, marking, and spotting.

Flares and Signals The illumination provided by a flare is produced by both the thermal radiation from the product oxide particles and the spectral emission from excited metals.

Infrared Flare Formulas:

Silicon
Potassium nitrate (KNO₃)
Cesium Nitrate (CsNO₃)
Rubidium Nitrate (RbNO₃)
Hexamethylene
tetramine
Epoxy resin

Red-Green Flare System:

Barium nitrate
Strontium nitrate 13
Potassium perchlorate
Magnesium
Dechlorane
Polyvinyl acetate resin

Signal flares are smaller and faster burning than illuminating flares. Various metals are added these compositions to control the color of the flame.

Colored and White Smoke The pyrotechnic generation of smoke is almost exclusively a military device for screening and signaling. Screening smokes are generally white because black smokes are rarely sufficiently dense. Signal smokes, on the other hand, are colored so as to assure contrast and be distinct in the presence of clouds and ordinary smoke.

Venturi thermal generator type. The smoke producing material and the pyrotechnic fuel block required to volatilize the smoke material are in separate compartments. The smoke producing material is atomized and vaporized in the venturi nozzle by the hot gases formed by the burning of the fuel block.

Burning type. Burning type smoke compositions are intimate mixtures of chemicals. Smoke is produced from these mixtures by either of two methods. In the first method, a product of combustion forms the smoke or the product reacts with constituents of the atmosphere to form a smoke. In the second method, the heat of combustion of the pyrotechnic serves to volatilize a component of the mixture which then condenses to form the smoke. White phosphorus, either in bulk or in solution, is one example of the burning type of smoke generator.

Explosive dissemination type. The smoke producing material is pulverized or atomized and then vaporized, or a preground solid is dispersed by the explosion of a bursting charge. The explosive dissemination smoke generator may contain metallic chlorides which upon dispersal, hydrolyze in air. Examples are titanium, silicon, and stannic tetrachloride.

Smoke Agent Mixtures:

White phosphorus
Sulfur trioxide
FS agent

HC mixture
FM agent
Crude oil

The preferred method of dispersing colored smokes involves the vaporization and condensation of a colored organic volatile dye. These dyes are mixed to the extent of about 50 percent with a fuel such as lactose (20 percent) and an oxidizer (30 percent) for which potassium chlorate is preferred.

Tracers and Fumers The principal small arms application of military pyrotechnics is in tracer munitions where they serve as incendiaries, spotters, and as fire control. Two types of tracers are used. The difference between the two types is the method of tracking. The more frequently used tracer uses the light produced by the burning tracer composition for tracking. Smoke tracers leave a trail of colored smoke for tracking. Red is the flame color most often employed in tracers.

Igniter and Tracer Compositions

Strontium peroxide
Magnesium
1-136 Igniter
Calcium resinate
Barium peroxide
Zinc stearate
Toluidine red (identifier)
Strontium nitrate
Strontium oxalate
Potassium perchlorate
Polyvinyl chloride

Incendiaries Two types of incendiaries are commonly used. The traditional type is a bomb containing a flammable material. These materials include thermite (a mixture of aluminum and rust), phosphorus, and napalm. In addition, the case of the bomb may be constructed of a material such as magnesium that will burn at a high temperature once ignited. Depleted uranium is used extensively in pyrotechnics which have armor piercing capabilities.

Depleted uranium deficient in the more radioactive isotope U235, is the waste product of the uranium enrichment process. The depleted uranium is formed into projectiles that can penetrate armor because of their high density and mechanical properties. The impact of the projectile causes the uranium to form many pyrophoric fragments which can ignite fuel and munition items.

Pyrophoric Metals

U Uranium
Th Thorium
Zr Zirconium
Hf Hafnium
Ce Cerium
La Lanthanum

Pr	Praseodymium
Nd	Neodymium
Sm	Samarium
Y	Yttrium
Ti	Titanium

Delays and Fuses Delay compositions are mixtures of oxidants and powdered metals which produce very little gas during combustion.

Photoflash Compositions Photoflash compositions are the single most hazardous class of pyrotechnic mixtures. The particle size of the ingredients is so small that burning resembles an explosion. The various photoflash devices are similar, differing principally in size and the amount of delay.

Colored smokes:

- Yellow: Auramine hydrochloride
- Green: 1,4-Di-p-toluidinoanthraquinone with auramine hydrochloride
- Red: 1-Methylantraquinone
- Blue: Not suitable for signaling because of excessive light scatter.

Currently used dyes:

- Orange: 1-(4-Phenylazo)-2-naphthol
- Yellow: N, N-Dimethyl-p-phenylazoaniline
- Blue: 1,4-Diamylaminoanthraquinone

Black Powders Used in Pyrotechnics

- Potassium nitrate
- Sodium nitrate
- Charcoal
- Coal (semibituminous)
- Sulfur

Ignition Mixtures Components

- Aluminum (powdered)
- Ammonium dichromate
- Asphaltum
- Barium chromate
- Barium peroxide
- Boron (amorphous)
- Calcium resinate
- Charcoal
- Diatomaceous earth (See also superfloss)
- Specular Hematite / Barshot (Fe₂O₃) (Red) CAS 14808-60-7 / 14464-46-1
- Magnetite/Black Iron Oxide (Fe₃O₄) Powder from READE (Black)
- Potassium nitrate
- Potassium perchlorate
- Laminac
- Magnesium (powdered)

Sodium nitrate
Nitrocellulose
Parlon (chlorinated rubber)
Pb02 -
Paleo Bond Adhesive Pb304
Sr peroxide
Sugar
Superfloss
Titanium
Toluidine red toner
Vegetable oil
Vistanex (polyisobutylene)
Zinc Stearate
Zirconium

Referances:

- 1) Handbook on the Management of Ordnance and Explosives at Closed, Transferring, and Transferred Ranges and Other Sites; December 2001
www.epa.gov/fedfac/pdf/IFUXOCTTHandbook.pdf

US EPA 2002: Handbook on the Management of Ordnance and Explosives at Closed, Transferring, and Transferred Ranges and Other Sites

Chemicals Found in

Pyrotechnics

Aluminum
Barium
Chromium
Hexachlorobenzene
Hexachloroethane
Iron
Magnesium
Manganese
Titanium
Tungsten
Zirconium
Boron
Carbon
Silicon
Sulfur
White Phosphorus
Zinc
Chlorates
Chromates
Dichromates
Halocarbons
Iodates
Nitrates
Oxides
Perchlorates

ATTACHMENT 7

Table 1 and Table 2

Military Munitions Constituents And their Potential Health Hazards

Fort Ord Training Areas Constituents

Munitions Contaminates not being looked for on all FORA ESCA RP Parcels

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

Compound	CAS No.	Recognized/Suspected Human Health Hazards
1) Bis(2-chloroethyl)ether	111-44-4	Recognized: Carcinogen P65 Suspected: Neurotoxicant HAZMAP,Respiratory Toxicant EPA-HEN,Skin or Sense Organ Toxicant EPA-HEN
2) 4-Chlorophenyl phenyl ether	7005-72-3	Listed: Hazardous Substances (Superfund) Priority Pollutants (Clean Water Act)
3) 2-Nitrophenol	88-75-5	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Neurotoxicant EPA-SARA
4) 1,3-Dichlorobenzene	541-73-1	Suspected: Cardiovascular or Blood Toxicant NJ-FS, Gastrointestinal or Liver Toxicant NJ-FS, Kidney Toxicant NJ-FS, Respiratory Toxicant NJ-FS
5) Fluorene	86-73-7	Suspected: Gastrointestinal or Liver Toxicant ATSDR
6) 2,4-Dimethylphenol	105-67-9	Suspected: Cardiovascular or Blood Toxicant IRIS, Kidney Toxicant NJ-FS, Gastrointestinal or Liver Toxicant NJ-FS, Skin or Sense Organ Toxicant NJ-FS
7) 1,2-Dichlorobenzene	95-50-1	Suspected: Endocrine Toxicant RTECS, Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant HAZMAP,Neurotoxicant DAN HAZMAP, Skin or Sense Organ Toxicant HAZMAP
8) Azobenzene	103-33-3	Recognized: Carcinogen P65
9) 2,4-Dichlorophenol	120-83-2	Suspected: Cardiovascular or Blood Toxicant LADO RTECS, Endocrine Toxicant JNHS KEIT, Immunotoxicant ATSDR
10) 1,4-Dichlorobenzene	106-46-7	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant LADO RTECS, Developmental Toxicant ATSDR JANK, Gastrointestinal or Liver Toxicant ATSDR EPA-HEN OEHHA-CREL RTECS,Kidney Toxicant KLAA OEHHA-CREL RTECS,Neurotoxicant DAN EPA-HEN OEHHA-CREL RTECS,Respiratory Toxicant OEHHA-CREL RTECS, Skin or Sense Organ Toxicant EPA-HEN LU RTECS
11) Hexachlorobenzene	118-74-1	Recognized: Carcinogen P65, Developmental Toxicant P65, Suspected: Cardiovascular or Blood Toxicant LADO RTECS, Endocrine Toxicant BKH BRUC IL-EPA JNHS KEIT RTECS, Gastrointestinal or Liver Toxicant EPA-HEN OEHHA-CREL RTECS ZIMM, Immunotoxicant IPCS,Kidney Toxicant RTECS, Neurotoxicant EPA-SARA, Reproductive Toxicant ATSDR EPA-SARA FRAZIER, Skin or Sense Organ Toxicant EPA-HEN
12) 4-Chloro-3-Methylphenol	59-50-7	Suspected: Immunotoxicant NAP

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

13) Bis(2-chloroisopropyl)ether	39638-32-9	Suspected: Carcinogen SCDM
14) Phenanthrene	85-01-8	Suspected: Respiratory Toxicant NTP-HS, Skin or Sense Organ Toxicant NTP-HS
15) 2,4,6-Trichlorophenol	88-06-2	Recognized: Carcinogen P65, Suspected: Gastrointestinal or Liver Toxicant RTECS, Respiratory Toxicant EPA-HEN
16) Uranium	7440-61-1	Recognized: Carcinogen P65-MC, Suspected: Cardiovascular or Blood Toxicant EPA-HEN Kidney Toxicant ATSDR HAZMAP LAND MERCK, Neurotoxicant DAN, Reproductive Toxicant FRAZIER, Respiratory Toxicant EPA-HEN NEME
17) Anthracene	120-12-7	Suspected: Endocrine Toxicant KEIT, Gastrointestinal or Liver Toxicant ATSDR RTECS, Skin or Sense Organ Toxicant KLAA TIMB
18) 2,4-Dinitrophenol	51-28-5	Suspected: Cardiovascular or Blood Toxicant EPA-HEN RTECS, Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant EPA-HEN, Neurotoxicant EPA-HEN RTECS, Reproductive Toxicant EPA-SARA, Skin or Sense Organ Toxicant EPA-HEN LU
19) Hexachloroethane	67-72-1	Recognized: Carcinogen P65, Suspected: Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant ATSDR EPA-HEN OEHHA-CREL RTECS, Kidney Toxicant OEHHA-CREL RTECS, Neurotoxicant ATSDR EPA-HEN OEHHA-CREL,
20) Dibutyl phthalate	84-74-2	Suspected: Developmental Toxicant ATSDR CERHR EPA-SARA JANK NTP-R P65-CAND, Endocrine Toxicant BKH JNHS KEIT WWF, Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant HAZMAP, Kidney Toxicant RTECS, Neurotoxicant DAN RTECS, Reproductive Toxicant EPA-SARA NTP-R P65-CAND, Skin or Sense Organ Toxicant HAZMAP
21) 4-Nitrophenol	100-02-7	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Neurotoxicant EPA-HEN EPA-SARA RTECS, Skin or Sense Organ Toxicant EPA-HEN RTECS
22) Nitrobenzene	98-95-3	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant EPA-HEN HAZMAP MALA RTECS, Kidney Toxicant MERCK, Neurotoxicant EPA-HEN RTECS, Reproductive Toxicant EPA-SARA, Respiratory Toxicant OEHHA-CREL RTECS, Skin or Sense Organ Toxicant HAZMAP
23) Fluoranthene	206-44-0	Suspected: Gastrointestinal or Liver Toxicant ATSDR
24) 2-Methyl-4,6-Dinitrophenol	534-52-1	Suspected: Cardiovascular or Blood Toxicant EPA-HEN HAZMAP RTECS, Gastrointestinal or Liver Toxicant EPA-HEN RTECS, Kidney Toxicant HAZMAP, Neurotoxicant ATSDR DAN EPA-HEN RTECS, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

25) Isophorone	78-59-1	Suspected: Carcinogen EPA-HEN IRIS OPP-CAN SCDM, Developmental Toxicant OEHHA-CREL Gastrointestinal or Liver Toxicant ATSDR OEHHA-CREL, Kidney Toxicant RTECS, Neurotoxicant EPA-HEN HAZMAP, Respiratory Toxicant EPA-HEN RTECS, Skin or Sense Organ Toxicant EPA-HEN HAZMAP RTECS
26) Pyrene	129-00-0	Suspected: Neurotoxicant RTECS, Skin or Sense Organ Toxicant RTECS
27) Pentachlorophenol	87-86-5	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant EPA-HEN LADO RTECS, Developmental Toxicant ATSDR EPA-SARA OEHHA-CREL, Endocrine Toxicant ATSDR BRUC IL-EPA JNHS KEIT RTECS WWF, Gastrointestinal or Liver Toxicant EPA-HEN OEHHA-CREL RTECS, Immunotoxicant EPA-HEN, Kidney Toxicant EPA-HEN OEHHA-CREL, Neurotoxicant DAN EPA-HEN RTECS, Reproductive Toxicant ATSDR EPA-SARA, Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant EPA-HEN HAZMAP RTECS
28) Bis(2-chloroethoxy)methane	111-91-1	Suspected: Skin or Sense Organ Toxicant NTP-HS
29) Butylbenzyl phthalate	85-68-7	Suspected: Carcinogen IRIS, Developmental Toxicant CERHR P65-CAND, Endocrine Toxicant BKH JNHS KEIT WWF, Neurotoxicant RTECS, Reproductive Toxicant CERHR
30) 1,2,4-Trichlorobenzene	120-82-1	Suspected: Carcinogen OEHHA-TCD P65-CAND, Developmental Toxicant EPA-SARA, Neurotoxicant DAN HAZMAP RTECS
31) 3,3'-D Dichlorobenzidine	91-94-1	Recognized: Carcinogen P65, Suspected: Gastrointestinal or Liver Toxicant EPA-HEN RTECS Immunotoxicant EEC HAZMAP, Kidney Toxicant RTECS, Neurotoxicant EPA-HEN, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EEC HAZMAP
32) Naphthalene	91-20-3	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant EPA-HEN HAZMAP LADO MALA, Developmental Toxicant EPA-HEN EPA-SARA, Gastrointestinal or Liver Toxicant EPA-HEN, Neurotoxicant ATSDR DAN EPA-HEN RTECS, Respiratory Toxicant ATSDR FOTH OEHHA-CREL, Skin or Sense Organ Toxicant EPA-HEN LU RTECS
33) Benzo(a)anthracene	56-55-3	Recognized: Carcinogen P65
34) Hexachlorobutadiene	87-68-3	Suspected: Carcinogen EPA-HEN IRIS P65-CAND SCDM, Cardiovascular or Blood Toxicant RTECS, Developmental Toxicant EPA-SARA JANK, Endocrine Toxicant RTECS, Gastrointestinal or Liver Toxicant OEHHA-CREL RTECS, Kidney Toxicant ATSDR HAZMAP KLAA OEHHA-CREL RTECS STAC, Neurotoxicant DAN, Reproductive Toxicant EPA-SARA
35) Chrysene	218-01-9	Recognized: Carcinogen P65

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

36) 2-Chloronaphthalene	91-58-7	Listed: Hazardous Constituents (Resource Conservation and Recovery Act), Hazardous Substances (Superfund), Priority Pollutants (Clean Water Act), Lacks at least some of the data required for safety assessment
37) Bis(2-ethylhexyl)phthalate	117-81-7	Recognized: Carcinogen P65, Developmental Toxicant P65, Reproductive Toxicant P65 Suspected: Endocrine Toxicant BKH BRUC IL-EPA JNHS KEIT WWF, Gastrointestinal or Liver Toxicant EPA-HEN OEHHA-CREL RTECS, Respiratory Toxicant OEHHA-CREL RTECS Skin or Sense Organ Toxicant RTECS
38) Dimethyl phthalate	131-11-3	Suspected: Immunotoxicant HAZMAP, Neurotoxicant DAN RTECS, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN HAZMAP
39) Di-n-octyl phthalate	117-84-0	Suspected: Endocrine Toxicant BRUC JNHS, Gastrointestinal or Liver Toxicant ATSDR
40) 2,6-Dinitrotoluene	606-20-2	Recognized: Carcinogen P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant ATSDR RTECS, Neurotoxicant EPA-SARA
41) Benzo(b)fluoranthene	205-99-2	Recognized: Carcinogen P65
42) Acenaphthylene	208-96-8	Suspected: Respiratory Toxicant RTECS
43) Benzo(k)fluoranthene	207-08-9	Recognized: Carcinogen P65
44) Acenaphthene	83-32-9	Suspected: Gastrointestinal or Liver Toxicant ATSDR
45) Benzo(a)pyrene	50-32-8	Recognized: Carcinogen P65, Suspected: Developmental Toxicant JANK P65-PEND, Endocrine Toxicant KEIT WWF, Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant IPCS, Respiratory Toxicant EPA-HEN FOTH RTECS, Skin or Sense Organ Toxicant LADO RTECS
46) 2,4-Dinitrotoluene	121-14-2	Recognized: Carcinogen P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant ATSDR EPA-HEN RTECS, Gastrointestinal or Liver Toxicant OEHHA-CREL, Neurotoxicant ATSDR EPA-HEN EPA-SARA OEHHA-CREL RTECS
47) Ideno(1,2,3-cd)pyrene	193-39-5	Suspected: Carcinogen EPA-IRIS, Developmental, Reproductive, Endocrine, Genotoxicity,
48) Diethyl phthalate	84-66-2	Suspected: Endocrine Toxicant JNHS WWF, Gastrointestinal or Liver Toxicant ATSDR RTECS, Immunotoxicant HAZMAP, Neurotoxicant RTECS, Reproductive Toxicant ATSDR, Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant HAZMAP RTECS

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

49) Dibenzo(a,h)anthracene	53-70-3	Recognized: Carcinogen P65, Suspected: Skin or Sense Organ Toxicant LADO
50) Benzidine	92-87-5	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant HAZMAP, Gastrointestinal or Liver Toxicant OEHHA-CREL RTECS, Immunotoxicant IPCS, Kidney Toxicant EPA-HEN KLAA RTECS, Neurotoxicant OEHHA-CREL
51) Benzo(g,h,i)perylene	191-24-2	Listed: Hazardous Constituents (Resource Conservation and Recovery Act), Hazardous Substances (Superfund), Priority Pollutants (Clean Water Act), Lacks at least some of the data required for safety assessment
52) 4-Bromophenyl phenyl ether	101-55-3	Listed: Hazardous Constituents (Resource Conservation and Recovery Act), Hazardous Substances (Superfund), Priority Pollutants (Clean Water Act), Lacks at least some of the data required for safety assessment
53) N-Nitrosodiphenylamine	86-30-6	Recognized: Carcinogen P65, Suspected: Kidney Toxicant RTECS, Respiratory Toxicant RTECS
54) N-Nitrosodimethylamine	62-75-9	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant EPA-HEN KLAA RTECS, Developmental Toxicant JANK, Gastrointestinal or Liver Toxicant DOSS EPA-HEN HAZMAP LADO MALA RTECS ZIMM, Immunotoxicant IPCS, Neurotoxicant RTECS, Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant RTECS
55) Phenol	108-95-2	Suspected: Cardiovascular or Blood Toxicant EPA-HEN HAZMAP OEHHA-CREL RTECS, Developmental Toxicant EPA-SARA JANK, Gastrointestinal or Liver Toxicant EPA-HEN OEHHA-CREL, Kidney Toxicant OEHHA-CREL, Neurotoxicant DAN EPA-HEN OEHHA-CREL, RTECS, Reproductive Toxicant FRAZIER P65-CAND, Respiratory Toxicant EPA-HEN OEHHA-AREL RTECS, Skin or Sense Organ Toxicant EPA-HEN HAZMAP KLAA OEHHA-AREL RTECS
56) Hexachlorocyclopentadiene	77-47-4	Suspected: Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant ATSDR RTECS, Neurotoxicant EPA-SARA, Reproductive Toxicant EPA-SARA, Respiratory Toxicant ATSDR EPA-HEN HAZMAP OEHHA-CREL RTECS, Skin or Sense Organ Toxicant EPA-HEN HAZMAP
57) 2-Chlorophenol	95-57-8	Suspected: Neurotoxicant RTECS, Skin or Sense Organ Toxicant RTECS
58) 1-Methylnaphthalene	90-12-0	Suspected: Respiratory Toxicant ATSDR
59) Acetophenone	98-86-2	Suspected: Skin or Sense Organ Toxicant EPA-HEN

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

60) Diphenylamine	122-39-4	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Gastrointestinal or Liver Toxicant EPA-TRI, Immunotoxicant HAZMAP, Kidney Toxicant EPA-TRI, Neurotoxicant DAN RTECS, Respiratory Toxicant RTECS,
61) 2-Aminonaphthalene	91-59-8	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant HAZMAP, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant RTECS
62) 1-Nitropyrene	5522-43-0	Recognized: Carcinogen P65
63) 2,5-Diphenyloxazole (Biphenyl)	92-52-4	Suspected: Cardiovascular or Blood Toxicant RTECS, Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant EPA-HEN HAZMAP RTECS, Kidney Toxicant EPA-HEN MERCK, Neurotoxicant EPA-HEN HAZMAP RTECS, Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant EPA-HEN
64) 2-Nitronaphthalene	581-89-5	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant RTECS
65) Triethylaluminum	97-93-8	6 of 8 basic tests to identify chemical hazards have not been conducted on this chemical or are not publicly available according to US EPA's 1998 hazard data availability study.
66) 2 Methyl naphthalene	91-57-6	Suspected: Respiratory Toxicant ATSDR FOTH
67) 2-Methylphenol (o-Crestol)	95-48-7	Suspected: Carcinogen IRIS, Cardiovascular or Blood Toxicant OEHHA-CREL, Endocrine Toxicant RTECS, Gastrointestinal or Liver Toxicant RTECS, Neurotoxicant ATSDR DAN EPA-SARA RTECS, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN RTECS
68) 3-Methylphenol (m-Crestol)	108-39-4	Suspected: Carcinogen IRIS OPP-CAN, Cardiovascular or Blood Toxicant OEHHA-CREL, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant RTECS, Neurotoxicant DAN RTECS, Respiratory Toxicant ATSDR EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN RTECS
69) 4-Methylphenol (p-Crestol)	106-44-5	Suspected: Carcinogen IRIS, Cardiovascular or Blood Toxicant OEHHA-CREL, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant RTECS, Neurotoxicant ATSDR DAN RTECS, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN LADO RTECS
70) 2,4,5-Trichlorophenol	95-95-4	Suspected: Cardiovascular or Blood Toxicant LADO, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN
71) HMX	2691-41-0	Suspected: Gastrointestinal or Liver Toxicant ATSDR, Neurotoxicant ATSDR RTECS

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

72) RDX	121-82-4	Suspected: Carcinogen IRIS SCDM, Gastrointestinal or Liver Toxicant RTECS, Neurotoxicant ATSDR HAZMAP RTECS, Reproductive Toxicant ATSDR
73) 2,4,6-Trinitrotoluene (TNT)	118-96-7	Suspected: Carcinogen IRIS SCDM, Cardiovascular or Blood Toxicant HAZMAP LADO MALA RTECS STAC, Gastrointestinal or Liver Toxicant ATSDR DIPA HAZMAP LADO RTECS ZIMM, Neurotoxicant RTECS, Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant LU
74) 1,3,5-Trinitrobenzene	99-35-4	Suspected: Cardiovascular or Blood Toxicant RTECS, Neurotoxicant RTECS, Respiratory Toxicant RTECS
75) 2-Amino-4,6-Dinitrotoluene (2ADNT)	35572-78-2	Recognized: Carcinogens
76) 4-Amino-2,6-Dinitrotoluene (4ADNT)	19406-51-0	Recognized: Carcinogens
77) 1,3- Dinitrobenzene	99-65-0	Recognized: Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant ATSDR HAZMAP RTECS, Gastrointestinal or Liver Toxicant DIPA MALA, Neurotoxicant DAN RTECS, Respiratory Toxicant RTECS
78) Nitroglycerin	55-63-0	Suspected: Carcinogen ORD-SF, Cardiovascular or Blood Toxicant HAZMAP KRIS LADO RTECS Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant HAZMAP, Kidney Toxicant MERCK, Neurotoxicant DAN RTECS, Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant HAZMAP
79) Dioxin (TCDD)	1746-01-6	Recognized: Carcinogen P65, Developmental Toxicant P65, Suspected: Cardiovascular or Blood Toxicant ATSDR EPA-HEN LADO OEHHA-CREL RTECS, Endocrine Toxicant BKH BRUC IL-EPA JNHS KEIT OEHHA-CREL RTECS WWF, Gastrointestinal or Liver Toxicant EPA-HEN LADO OEHHA-CREL RTECS ZIMM, Immunotoxicant ATSDR NAP, Kidney Toxicant MERCK RTECS, Neurotoxicant STAC, Reproductive Toxicant OEHHA-CREL, Respiratory Toxicant OEHHA-CREL RTECS, Skin or Sense Organ Toxicant EPA-HEN HAZMAP KLAA RTECS
80) Furan	110-00-9	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant RTECS, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant RTECS, Respiratory Toxicant RTECS
Other Constituents, Flash Composition, Smoke Charge, Pyrotechnics		
81) Potassium Perchlorate	7778-74-7	Suspected: Cardiovascular or Blood Toxicant MALA
82) Flaked Aluminum (Aluminum)	7429-90-5	Suspected: Cardiovascular or Blood Toxicant LADO, Neurotoxicant ATSDR DAN KLAA LU, Reproductive Toxicant FRAZIER, Respiratory Toxicant KLAA LU NEME

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

83) Sulfur	7704-34-9	Listed: Registered Pesticides (Federal Insecticide, Fungicide, and Rodenticide Act) Air Contaminants (California Occupational and Safety Health Act) Lacks at least some of the data required for safety assessment
84) Pentaerythritol tetranitrate (PETN)	78-11-5	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Skin or Sense Organ Toxicant RTECS
85) Magnesium Powder (Magnesium)	7439-95-4	Suspected: Respiratory Toxicant NEME
86) Sodium Nitrate	7631-99-4	Suspected: Cardiovascular or Blood Toxicant RTECS, Respiratory Toxicant RTECS
87) Barium Nitrate	10022-31-8	Suspected: Carcinogen, A poison via ingestion subcutaneous, parenteral, and intravenous routes (Toxnet)
88) Phosphorus, white	7723-14-0	Suspected: Cardiovascular or Blood Toxicant EPA-HEN RTECS, Gastrointestinal or Liver Toxicant DIPA DOSS EPA-HEN LADO MALA RTECS ZIMM, Kidney Toxicant EPA-HEN HAZMAP, Musculoskeletal Toxicant EPA-HEN, Neurotoxicant EPA-HEN RTECS, Reproductive Toxicant ATSDR EPA-SARA OEHHA-CREL, Respiratory Toxicant ATSDR EPA-HEN HAZMAP RTECS, Skin or Sense Organ Toxicant HAZMAP KLAA RTECS
89) Polyvinyl Chloride	9002-86-2	Suspected: Gastrointestinal or Liver Toxicant DIPA, Respiratory Toxicant HAZMAP
90) Titanium Tetrachloride	7550-45-0	Suspected: Respiratory Toxicant ATSDR EPA-HEN HAZMAP, Skin or Sense Organ Toxicant EPA-HEN HAZMAP
Metals:		
91) Copper	7440-50-8	Suspected: Cardiovascular or Blood Toxicant HAZMAP KLAA, Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant ATSDR DOSS KLAA RTECS ZIMM, Kidney Toxicant MERCK, Reproductive Toxicant EPA-SARA FRAZIER, Respiratory Toxicant NEME OEHHA-AREL OEHHA-CREL
92) Barium	7440-39-3	Suspected: Developmental Toxicant EPA-SARA, Neurotoxicant DAN, Reproductive Toxicant FRAZIER, Respiratory Toxicant NEME

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

93) Cadmium	7440-43-9	Recognized: Carcinogen P65, Developmental Toxicant P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant BENO KLAA LADO RTECS, Endocrine Toxicant IL-EPA KEIT WWF, Immunotoxicant IPCSKidney Toxicant ATSDR EPA-HEN HAZMAP KLAA LAND MERCK OEHHA-CREL RTECS STAC, Neurotoxicant DAN ,Respiratory Toxicant EPA-HEN HAZMAP NEME OEHHA-CREL RTECS
94) Lead	7439-92-1	Recognized: Carcinogen P65, Developmental Toxicant P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant BENO EPA-HEN HAZMAP KLAA KRIS LADO MALA STAC, Endocrine Toxicant BRUC IL-EPA KEIT WWF,Gastrointestinal or Liver Toxicant EPA-HEN RTECS STAC, Immunotoxicant IPCS,Kidney Toxicant EPA-HEN HAZMAP KLAA LAND MERCK STAC,Neurotoxicant DAN EPA-HEN EPA-SARA FELD HAZMAP KLAA LU RTECS STAC, Respiratory Toxicant NEME,Skin or Sense Organ Toxicant KLAA
95) Nickel	7440-02-0	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant OEHHA-CREL, Developmental Toxicant EPA-SARA, Immunotoxicant EEC HAZMAP OEHHA-AREL SNCI, Kidney Toxicant KLAA, Neurotoxicant FELD, Reproductive Toxicant EPA-SARA FRAZIER JANK, Respiratory Toxicant ATSDR EPA-HEN HAZMAP KLAA LU NEME OEHHA-AREL OEHHA-CREL RTECS, Skin or Sense Organ Toxicant EEC EPA-HEN HARV HAZMAP KLAA LADO TIMB
96) Aluminum	7429-90-5	Suspected: Cardiovascular or Blood Toxicant LADO, Neurotoxicant ATSDR DAN KLAA LU, Reproductive Toxicant FRAZIER, Respiratory Toxicant KLAA LU NEME
97) Chromium	7440-47-3	Suspected: Carcinogen HAZMAP SCDM, Gastrointestinal or Liver Toxicant CARB TAC, Immunotoxicant HAZMAP, Kidney Toxicant HAZMAP KLAA MERCK, Reproductive Toxicant FRAZIER, Respiratory Toxicant HAZMAP NEME, Skin or Sense Organ Toxicant HAZMAP KLAA LADO TIMB
98) Potassium	7440-09-7	Lacks at least some of the data required for safety assessment
99) Calcium	7440-70-2	Air Contaminants (California Occupational and Safety Health Act) Lacks at least some of the data required for safety assessment
100) Mercury	7439-97-6	Recognized: Developmental Toxicant P65, Suspected: Cardiovascular or Blood Toxicant KLAA, Endocrine Toxicant IL-EPA KEIT WWF, Gastrointestinal or Liver Toxicant RTECS STAC, Immunotoxicant HAZMAP SNCI, Kidney Toxicant HAZMAP KLAA LAND MERCK STAC, Neurotoxicant ATSDR DAN EPA-HEN EPA-SARA FELD HAZMAP KLAA OEHHA-CREL RTECS STAC, Reproductive Toxicant EPA-SARA FRAZIER HAZMAP OEHHA-AREL, Respiratory Toxicant HAZMAP NEME, Skin or Sense Organ Toxicant HAZMAP KLAA RTECS
101) Zinc	7440-66-6	Suspected: Cardiovascular or Blood Toxicant ATSDR, Developmental Toxicant EPA-SARA, Immunotoxicant OEHHA-CREL, Reproductive Toxicant EPA-SARA, Respiratory Toxicant NEME OEHHA-CREL RTECS, Skin or Sense Organ Toxicant RTECS

Table 1: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants at Fort Ord, California

102) Titanium Metal Powder	7440-32-6	Suspected: Respiratory Toxicant NEME
103) Antimony	7440-36-0	Suspected: Cardiovascular or Blood Toxicant BENO LADO, Neurotoxicant DAN, Reproductive Toxicant EPA-SARA FRAZIER, Respiratory Toxicant EPA-HEN NEME, Skin or Sense Organ Toxicant EPA-HEN
104) Beryllium	7440-41-7	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant KLAA, Gastrointestinal or Liver Toxicant ATSDR DOSS LADO MALA, Immunotoxicant EEC OEHHA-CREL, Kidney Toxicant LAND, Reproductive Toxicant FRAZIER, Respiratory Toxicant EPA-HEN HAZMAP KLAA LU NEME OEHHA-CREL, Skin or Sense Organ Toxicant EEC
105) Cadmium	7440-43-9	Recognized: Carcinogen P65, Developmental Toxicant P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant BENO KLAA LADO RTECS, Endocrine Toxicant IL-EPA KEIT WWF, Immunotoxicant IPCS, Kidney Toxicant ATSDR EPA-HEN HAZMAP KLAA LAND MERCK OEHHA CREL RTECS STAC, Neurotoxicant DAN, Respiratory Toxicant EPA-HEN HAZMAP NEME OEHHA-CREL RTECS

Most Table 1 Constituents compiled from 1994 Basewide RI/FS Vol. II Table 12

Human Health Hazard Information source: Scorecard Database <http://www.scorecard.org/chemical-profiles/index.tcl>

Cancer References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=cancer

Developmental Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=endo

Endocrine Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=endo

Gastrointestinal or Liver Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=liver

Immunotoxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=immun

Kidney Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=kidn

Neurotoxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=neuro

Reproductive Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=repro

Skin or Sense Organ Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=skin

Respiratory Toxicants: www.scorecard.org/health-effects/explanation.tcl?short_hazard_name=resp

Cardiovascular or Blood Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=cardio

Musculoskeletal Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=musc

Table 2: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants Fort Ord, California

Compound	CAS No.	Recognized/Suspected Human Health Hazards
1) Lead Azide	13424-46-9	Suspected: Carcinogen P65
2) Mercury Fulminate	628-86-4	Recognized: Developmental Toxicant P65-MC
3) Diazodinitrophenol (DDNP)	87-31-0	No Health data found
4) Lead Styphnate	15245-44-0	No Health data found
5) Tetracene (hydrocarbon)?	92-24-0	Suspected: Carcinogen CCRIS
6) Potassium Dinitrobenzofuroxane (KDNBF)	29267-75-2	No Health data found
7) Lead Mononitroresorcinate (LMNR)	51317-24-9	No Health data found
8) Antimony sulfide	1315-04-4	No Health data found
9) Zirconium	7440-67-7	No Health data found
10) Lead dioxide	1309-60-0	Recognized: Carcinogen P65-MC, Developmental Toxicant P65-MC, Reproductive Toxicant P65-MC
11) Gum Arabic	no match	No Health data found
12) Potassium chlorate	3811-04-9	HAZMAP: Methemoglobinemia, Anemia,
13) Lead mononitroresorcinate	51317-24-9	HAZMAP: Neurotoxin, Hepatotoxin, Nephrotoxin, Reproductive Toxin
14) Nitrocellulose (BK2-W)	9004-70-0	HAZMAP: Neurotoxin,
15) Lead thiocyanate	592-87-0	HAZMAP: Neurotoxin, Hepatotoxin, Nephrotoxin, Reproductive Toxin
16) Nitrostarch	?	No Health data found
17) 1,2,4-Butanetriol Trinitrate (BTN)	6659-60-5	HAZMAP DOT listed Hazardous Materials
18) Diethyleneglycol Dinitrate (DEGN)	693-21-0	HAZMAP DOT listed Hazardous Materials, Suspected: Neurotoxicant RTECS, Respiratory Toxicant RTECS
19) Triethylene Glycoldinitrate (TEGN)	111-22-8	No Health data found
20) 1,1,1 Trimethylethane Trinitrate (TMETN)	3032-55-1	No Health data found
21) Ethylenediamine Dinitrate (EDDN)	20829-66-7	No Health data found
22) Ethylenedinitramine (Haleite)	505-71-5	No Health data found
23) Nitroguanidine (NQ)	556-88-7	Suspected: Respiratory Toxicant RTECS
24) 2,4,6-Trinitrophenylmethylmramine (Telryl)	479-45-8	Suspected: Immunotoxicant HAZMAP, Neurotoxicant DAN RTECS, Respiratory Toxicant HAZMAP, Skin or Sense Organ Toxicant HAZMAP RTECS
25) Ammonium Picrate	131-74-8	HAZMAP: Skin Sensitizer, Hepatotoxin
26) Hexamethylene	110-82-7	Suspected: Neurotoxicant DAN HAZMAP RTECS
27) Dechlorane	2385-85-5	Recognized: Carcinogen P65, Suspected: Endocrine Toxicant BKH EPA-SDWA IL-EPA JNHS KEIT RTECS, Gastrointestinal or Liver Toxicant ATSDR RTECS, Kidney Toxicant MERCK
28) Sulfur trioxide	7446-11-9	Suspected: Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant RTECS
29) Calcium resinate	9007-13-0	No Health data found
30) Barium peroxide	1304-29-6	New Jersey Haz. Sub. Fact Sheet: http://nj.gov/health/eoh/rtkweb/documents/fs/0190.pdf

Table 2: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants Fort Ord, California

31) Zinc stearate	557-05-1	Skin, eye, and respiratory tract irritant CAMEO
32) Toluidine red	2425-85-6	No Health data found
33) Strontium nitrate	10042-76-9	NJ-HSFS: Repeated exposure may damage the lungs, heart, liver, and kidneys and affect the nervous system.
34) Strontium oxalate	814-95-9	No Health data found
35) Auramine hydrochloride (yellow)	2465-27-2	Suspected: Carcinogen CPDB, Gastrointestinal or Liver Toxicant RTECS
36) 1,4-Di-p-toluidinoanthraquinone (green)	128-80-3	No Health data found
37) 1-Methylantraquinone (red)	954-07-4	HAZMAP: Possible Carcinogen, Hepatotoxin, Skin Sensitizer
38) 1-(4-Phenylazo)-2-naphthol (orange dye)	?	No Health data found
39) N,N-Dimethyl-p-phenylazoaniline (yel dye)	60-11-7	IARC: Possible Carcinogen, HAZMAP: Hepatotoxin, Skin Sensitizer
40) 1,4-Diamylaminoanthraqdinone (blue dye)	2646-15-3	No Health data found
41) Ammonium dichromate	7789-09-5	Recognized: Carcinogen P65-MC, Suspected: Cardiovascular or Blood Toxicant RTECS, Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant EEC SNCl, Kidney Toxicant RTECS, Skin or Sense Organ Toxicant EEC
42) Asphaltum	8052-42-4	Recognized: Carcinogen P65
43) Barium chromate	10294-40-3	Recognized: Carcinogen P65-MC
44) Boron	7440-42-8	Suspected: Cardiovascular or Blood Toxicant KLAA, Developmental Toxicant ATSDR, Neurotoxicant LU, Respiratory Toxicant LU
45) Potassium nitrate	7757-79-1	HAZMAP: Methemoglobinemia
46) Laminac	?	No Health data found
47) Sodium nitrate	7631-99-4	Suspected: Cardiovascular or Blood Toxicant RTECS, Respiratory Toxicant RTECS
48) Parlon (Chlorinated rubber)	9006-03-5	EPA Pesticide Inert Ingredient
49) Superfloss	7631-86-9	No Health data found
50) Vistanex (polyisobutylene)	9003-27-4	No Health data found
51) Thorium Tu	7440-29-1	Recognized: Carcinogen P65-MC
52) Zirconium Zr	7440-67-7	Suspected: Respiratory Toxicant NEME
53) Hafnium Hf	7440-58-6	No Health data found
54) Cerium Ce	7440-45-1	Suspected: Respiratory Toxicant NEME, Dermatotoxin HAZMAP
55) Lanthanum La	7439-91-0	No Health data found
56) Praseodymium Pr	7440-10-0	No Health data found
57) Neodymium Nd	7440-00-8	No Health data found
58) Samarium Sm	7440-19-9	HAZMAP: Internal Toxicity: High
59) Yttrium Y	7440-65-5	HAZMAP: Hepatotoxin, Fibrogenic
60) Rubidium Nitrate	13126-12-0	No Health data found
61) Cesium Nitrate	7789-18-6	Substance may be toxic to blood central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.
62) Specular Hematite	14808-60-7	No Health data found
63) Magnetite	1309-38-2	No Health data found

Constituents compiled from: Chapter 10 Pyrotechnic Devices: Military Explosives (Chemistry) 30 September 1984

Table 2: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminants Fort Ord, California

31) Zinc stearate	557-05-1	Skin, eye, and respiratory tract irritant CAMEO
32) Toluidine red	2425-85-6	No Health data found
33) Strontium nitrate	10042-76-9	NJ-HSFS: Repeated exposure may damage the lungs, heart, liver, and kidneys and affect the nervous system.
34) Strontium oxalate	814-95-9	No Health data found
35) Auramine hydrochloride (yellow)	2465-27-2	Suspected: Carcinogen CPDB, Gastrointestinal or Liver Toxicant RTECS
36) 1,4-Di-p-toluidinoanthraquinone (green)	128-80-3	No Health data found
37) 1-Methylantraquinone (red)	954-07-4	HAZMAP: Possible Carcinogen, Hepatotoxin, Skin Sensitizer
38) 1-(4-Phenylazo)-2-naphthol (orange dye)	?	No Health data found
39) N,N-Dimethyl-p-phenylazoaniline (yel dye)	60-11-7	IARC: Possible Carcinogen, HAZMAP: Hepatotoxin, Skin Sensitizer
40) 1,4-Diamylaminoanthraqdinone (blue dye)	2646-15-3	No Health data found
41) Ammonium dichromate	7789-09-5	Recognized: Carcinogen P65-MC, Suspected: Cardiovascular or Blood Toxicant RTECS, Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant EEC SNCl, Kidney Toxicant RTECS, Skin or Sense Organ Toxicant EEC
42) Asphaltum	8052-42-4	Recognized: Carcinogen P65
43) Barium chromate	10294-40-3	Recognized: Carcinogen P65-MC
44) Boron	7440-42-8	Suspected: Cardiovascular or Blood Toxicant KLAA, Developmental Toxicant ATSDR, Neurotoxicant LU, Respiratory Toxicant LU
45) Potassium nitrate	7757-79-1	HAZMAP: Methemoglobinemia
46) Laminac	?	No Health data found
47) Sodium nitrate	7631-99-4	Suspected: Cardiovascular or Blood Toxicant RTECS, Respiratory Toxicant RTECS
48) Parlon (Chlorinated rubber)	9006-03-5	EPA Pesticide Inert Ingredient
49) Superfloss	7631-86-9	No Health data found
50) Vistanex (polyisobutylene)	9003-27-4	No Health data found
51) Thorium Tu	7440-29-1	Recognized: Carcinogen P65-MC
52) Zirconium Zr	7440-67-7	Suspected: Respiratory Toxicant NEME
53) Hafnium Hf	7440-58-6	No Health data found
54) Cerium Ce	7440-45-1	Suspected: Respiratory Toxicant NEME, Dermatotoxin HAZMAP
55) Lanthanum La	7439-91-0	No Health data found
56) Praseodymium Pr	7440-10-0	No Health data found
57) Neodymium Nd	7440-00-8	No Health data found
58) Samarium Sm	7440-19-9	HAZMAP: Internal Toxicity: High
59) Yttrium Y	7440-65-5	HAZMAP: Hepatotoxin, Fibrogenic
60) Rubidium Nitrate	13126-12-0	No Health data found
61) Cesium Nitrate	7789-18-6	Substance may be toxic to blood central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.
62) Specular Hematite	14808-60-7	No Health data found
63) Magnetite	1309-38-2	No Health data found

Constituents compiled from: Chapter 10 Pyrotechnic Devices: Military Explosives (Chemistry) 30 September 1984

ATTACHMENT 8

Explosives, Propellants, uses and constituents

Military Explosives (Chemistry) 30 September 1984

Explosives, Propellants, Pyrotechnics

Lead Azide: $Pb(N_3)_2$, is a salt of hydrazoic acid, HN_3 . The compound is white, has a nitrogen content of 28.86 percent and a molecular weight of 291.26. At the melting point, 245°C to 250°C, decomposition into lead and nitrogen gas occurs. The pure compound has two crystal modifications: an orthorhombic form and a monoclinic form. The orthorhombic form, which is also called the alpha form, has a density of 4.68 grams per cubic centimeter and unit cell dimensions of $a = 11.31$ Angstroms, $b = 16.25$ Angstroms, and $c = 6.63$ Angstroms. The monoclinic form, which is also called the beta form, has a density of 4.87 grams per cubic centimeter and unit cell dimensions of $a = 18.49$ Angstroms, $b = 8.84$ Angstroms, and $c = 5.12$ Angstroms. The compound is usually prepared as colorless, needlelike crystals.

Other Lead Azide Types:

- Dextrinated Lead Azide (DLA)
- Service Lead Azide (SLA)
- Colloidal Lead Azide (CLA)
- Polyvinylalcohol Lead Azide (PVA-LA)
- RD-1333 lead azide
- Dextrinated Colloidal Lead Azide (DCLA)

Mercury Fulminate $Hg(ONC)_2$, is a salt of fulminic or paracyanic acid. The acid undergoes polymerization very rapidly in both aqueous and ethereal solutions, and so cannot be isolated. The structure of fulminic acid, and thus the salts of this acid, is undetermined. Mercury fulminate has an oxygen balance to CO_2 of -17 percent, an oxygen balance to CO of -5.5 percent, a nitrogen content of 9.85 percent, and a molecular weight of 284.65. When mercury fulminate is crystallized from water, a hydrate, $Hg(ON: C).1/2 H_2O$, is formed that has a nitrogen content of 9.55 percent and a molecular weight of 293.64. The anhydrous form, which is crystallized from alcohol, is white when pure but normal manufacturing yields a gray product of only 98 to 99 percent purity. The crystals formed are octahedral but are usually truncated. Only the smaller crystals are fully developed. The crystal density is 4.43 grams per cubic centimeter.

Diazodinitrophenol (DDNP) This explosive is also known as 4,5-dinitrobenzene-2-diazo-1-oxide, dinol, diazol and may be referred to as DADNP. The compound is a greenish yellow to brown solid with tabular crystals. DDNP has a crystal density of 1.63 to 1.65 grams per cubic centimeter at 25°C and a molecular weight of 210.108. DDNP is not dead pressed even at a pressure of 896,350 kilopascals (130,000 pounds per square inch).

Lead Styphnate Two forms of lead styphnate are used as primary explosives: basic and normal. Basic lead styphnate has a nitrogen content of six percent and a molecular weight of 705.53.

The compound has two crystal forms: yellow needles with a density of 3.878 grams per cubic centimeter and red prisms with a density of 4.059 grams per cubic centimeter. The apparent density is 1.4 to 1.6 grams per cubic centimeter. Normal lead styphnate has a nitrogen content of nine percent and the monohydrate has a molecular weight of 468.38.

Tetracene is also known as guanyldiazoguanyl tetrazene and 4-guanyl-1-(nitrosoaminoguanyl)-1-tetrazene. The compound is a colorless to pale yellow, fluffy material with needle crystals, an oxygen balance to CO₂ of -57.6 percent, an oxygen balance to CO of -43 percent, a nitrogen content of 74.4 percent, and a molecular weight of 188.15. Tetracene forms a hydrate with three molecules of water. The melting point of the pure compound is between 140°C and 160°C accompanied by decomposition and explosion. The apparent density is only 0.45 grams per cubic centimeter. When compressed at 20,685 kilopascals (3,000 pounds per square inch), the density is 1.05 grams per cubic centimeter. The crystal density is 1.7 grams per cubic centimeter. The compound can be easily dead pressed. Tetracene is practically insoluble in water and ethanol and so can be stored wet with water or a mixture of water and ethanol. The compound is also insoluble in ether, benzene, acetone, carbon tetrachloride, and ethylene dichloride. Tetracene is soluble in dilute nitric acid or strong hydrochloric acid. In a solution with hydrochloric acid, the hydrochloride is precipitated by the addition of ether. Tetracene may then be recovered by treatment with sodium acetate or ammonium hydroxide. The heat of formation is 270 calories per gram and the heat of detonation is 658

Potassium Dinitrobenzofuroxane (KDNBF) is a red crystalline solid with a nitrogen content of 21.21 percent and molecular weight of 264.20. The oxygen balance of the compound to CO₂, H₂O, and K₂O is -42.4 percent. The anhydrous salt has a density of 2.21 grams per cubic centimeter and a melting point, with explosive decomposition, of 210°C. KDNBF is soluble to the extent of 0.245 grams per 100 grams of water at 30°C. Between the temperatures of 50°C to 500°C the specific heat is 0.217 calories per gram per degree centigrade. KDNBF is used in primary compositions.

Lead Mononitroresorcinate (LMNR) has a nitrogen content of 3.89 percent, an NO₂ content of 12.77 percent, a lead content of 57.51 percent, and a molecular weight of 360.30. The compound forms microscopic reddish brown crystals. LMNR has slow burning properties and a low combustion temperature. The compound is used in electric detonators with DLA as the spot charge to initiate a PETN base charge, as an upper charge, and as an ingredient in primary compositions.

Primary Compositions are mixtures of primary explosives, fuels, oxidizers, and other ingredients used to initiate detonation in high explosive charges or ignite propellants and pyrotechnics. The ingredients and the portions of the ingredients for individual priming compositions are determined empirically from the use the composition is intended for. Fuels commonly used in priming compositions are lead thiocyanate, antimony sulfide, and calcium silicide. The last two also serve to

sensitize the composition to friction or percussion. Oxidizing agents include potassium chlorate and barium nitrate. Other ingredients include primary explosives and binders. The major determining factor in ingredient selection is the impetus which is to detonate the priming composition. The types of impetus commonly used are percussion and electrical.

Percussion Priming Compositions FA959, FA982, FA956, Compounds:

- Normal lead styphnate
- Tetracene
- Barium nitrate
- Antimony sulfide
- Powdered zirconium
- Lead dioxide
- PETN
- Aluminum
- Gum Arabic

Stab Detonator Priming Compositions NOL130, PA101, NOL 60, Compounds:

- Lead azide
- Basic lead styphnate
- Tetracene
- Barium nitrate
- Antimony sulfide
- Powdered aluminum

Electric Priming Compositions I, II, III, IV, V, VI, Compounds:

- Potassium chlorate
- Lead mononitroresorcinate
- Nitrocellulose
- Lead thiocyanate
- DDNP
- Charcoal
- Nitrostarch
- Titanium
- Aluminum

Aliphatic Nitrate Esters compounds in this class are prepared by O-type nitration in which a nitro group is attached to an oxygen atom of the compound being nitrated.

1,2,4-Butanetriol Trinitrate (BTN) This explosive is also known as a, b, g-trihydroxybutane trinitrate and is sometimes referred to as BTTN. The compound is a light yellow liquid with a density of 1.520 at 20°C, a molecular weight of 241, a melting point of -27°C, an oxygen balance to CO₂ of 17 percent, and a refractive index of 1.4738 at 20°C. The liquid has a viscosity of 62 centipoises at 20°C. 1,2,4- Butanetriol trinitrate is slightly soluble in water, miscible with alcohol, ether, acetone, and a solution of 2 parts ether and 1 part alcohol. BTN has a heat of

formation of 368 calories per gram, a heat of combustion of 2,167 calories per gram, and a heat of detonation of 1,458 calories per gram. This compound is a good gelatinizer for nitrocellulose and can be used as a substitute for nitroglycerin in double-base propellants. Heat, vacuum stability, and volatility tests indicate more stability than nitroglycerin. Impact sensitivity is about the same as for nitroglycerin. Brisance, as measured by the sand test, is about the same: 49 grams crushed versus 51.5 grams for nitroglycerin or 47 grams for TNT. The five second explosion temperature is 230°C versus 220°C for nitroglycerin. BTN can be manufactured by the nitration of 1,2,4-butanetriol with a mixture of nitric and sulfuric acids.

Diethyleneglycol Dinitrate (DEGN) This explosive is also known as dinitrodiglycol or 2,2'-oxybisethanol dinitrate and is sometimes referred to as DEGDN. The compound is a clear, colorless, odorless liquid with a nitrogen content of 14.29 percent, a theoretical maximum density of 1.39 grams per cubic centimeter, an oxygen balance to CO₂ of -41 percent, and a molecular weight of 196. DEGN boils between 160° and 161°C and can, upon cooling, form a stable solid with a melting point of 2°C or remain liquid to a freezing point of -11.2° to 11.40°C. Other characteristics of the liquid are: refractive index at 20°C with sodium light, 1.450; viscosity at 20°C, 8.1 centipoises; vapor pressure at 20°C, 0.0036 torr; vapor pressure at 25°C, 0.00593 torr; vapor pressure at 60°C, 0.130 torr; specific gravity, 1.385. At 60°C DEGN has a volatility of 0.19 milligrams per square centimeter per hour. At constant pressure, the heat of combustion is 2,792 calories per gram. The heat of formation is -99.4 kilocalories per mole. The heat of detonation is 1,161 calories per gram. DEGN is readily soluble in ether, acetone, chloroform, benzene, nitrobenzene, toluene, nitroglycerin, and glacial acetic acid but is insoluble in ethanol, carbon tetrachloride, and carbon disulfide. Solubility in water at 25°C and 60°C is 0.40 and 0.46 gram per 100 grams, respectively. DEGN's chemical reactivity is similar to nitroglycerin's, but is less subject to hydrolysis and is not readily saponified by alcoholic sodium hydroxide. DEGN can be used as an explosive and can be used in propellants as a colloiding agent for nitrocellulose. Propellants based on DEGN and nitrocellulose develop relatively low temperatures and cause relatively little erosion of guns, but are unduly volatile.

Nitrocellulose (NC) or cellulose nitrate is a mixture of nitrates obtained by nitrating cellulose. Cellulose is a long chain polymer of anhydroglucose units (C₅H₁₀O₅). The number of anhydroglucose units or degree of polymerization (DP) is variable. Cellulose used for preparation of military grades of nitrocellulose have a DP of approximately 1,000 to 1,500. Cellulose threads possess micellar structure and consist of numerous rod-like crystallites oriented with their long axis parallel to the thread axis, thus forming a fiber. Almost pure cellulose is found in the pith of certain plants, in absorbent cotton, and in some filter papers. Pure cellulose is most readily obtained from cotton by treating with a dilute acid or base solution then thoroughly washing with water. At the present time most of the cellulose for nitrocellulose preparation is obtained from coniferous wood, which is 50 to 60 percent cellulose. Another source is straw, which is 30 to 40 percent cellulose. The nitration of cellulose involves replacement of the hydrogen in the

three hydroxyl (OH) groups in the anhydroglucose units with NO₂ groups. A representative formula for the nitrated cellulose may be written as C₆H₇(OH)_x(ONO₂)_y where x + y = 3. The mononitrate, x = 2 and y = 1, has a nitrogen content of 6.76 percent; the dinitrate, x = 1 and y = 2, has a nitrogen content of 11.11 percent; the trinitrate, x = 0 and y = 3, has a nitrogen content of 14.14 percent. As a practical matter, however, any desired degree of nitration up to 14.14 percent may be obtained by adjusting the composition of the mixed acid used for nitration, the acid to cellulose ratio, the time of nitration, or the temperature of nitration. In nitrocellulose with less than 14.14 percent nitrogen, the NO₂ groups are distributed randomly along the entire length of the cellulose polymer, so x and y should be regarded as average values over the entire length of the chain. The nitrogen content determines the chemical and physical properties of any particular nitrocellulose. The five grades of nitrocellulose listed below are recognized and used.

Other Nitrocellulose Types:

- Pyroxylin or collodion,
- Pyrocellulose
- Guncotton
- High nitrogen nitrocellulose
- Blended nitrocellulose

Nitroglycerin (NG), glycerol trinitrate, or 1,2,3-propanetriol trinitrate, is a clear, colorless, odorless, oily liquid with a theoretical maximum density of 1.596 grams per cubic centimeter. Nitroglycerin has a sweet, burning taste and a molecular weight of 227.1. Nitroglycerin is soluble in one liter of water to the extent of only 0.173, 0.191, 0.228, and 0.246 gram at 20°, 30°, 50° and 60°C, respectively and is essentially nonhygroscopic when exposed to atmospheric humidity.

Nitrostarch (NS) is a mixture of nitrates obtained by nitrating starch. The general formula for starch is C₆H₁₀O₅. The structure of starch is the same as for nitrocellulose, with the exception that the polymer chains are spiral rather than straight. The starch molecule consists of approximately 1,000 anhydroglucose units. The nitration of starch involves replacement of the hydrogen in the three hydroxyl (OH) groups in the anhydroglucose units with NO₂ groups. A representative formula for the nitrated starch may be written as C₆H₇(OH)_x(ONO₂)_y where x + y = 3. The NO₂ groups are distributed randomly along the entire length of the starch molecule, so x and y should be regarded as averages over the entire length of the chain. The following empirical formula can be employed to obtain y as a function of the nitrogen content N: $y = 162N / (1400 - 45N)$

Pentaerythritol Tetranitrate (PETN) is also known as 2,2-bis [(nitrooxy) methyl]-1,3-propanediol dinitrate; penthrite; or nitropenta and may be referred to as TEN. The compound is a white solid with a molecular weight of 316.2. PETN has two polymorphs: one with a tetragonal crystalline structure and the other with an orthorhombic crystalline structure. The phase change between the two

polymorphs occurs at 130°C. The tetragonal crystals have a density of 1.778 grams per cubic centimeter and the orthorhombic crystals have a density of 1.716 grams per cubic centimeter. Normal manufacturing yields tetragonal crystals. The unit cell dimensions of the tetragonal crystals are a=9.38 Angstroms, b=9.38 Angstroms, and c =6.71 Angstroms. The dimensions for the orthorhombic crystals are a=13.29 Angstroms, b = 13.49 Angstroms, c = 6.83 Angstroms. There are two molecules per cell in the tetragonal form and four molecules per cell in the orthorhombic form. The interatomic distances have been determined as 1.50 Angstroms for the C-C bonds, 1.37 Angstroms for the C-O bonds, 1.36 Angstroms for O-N bonds, and 1.27 Angstroms for N-O bonds. PETN melts at 141.3°C. The boiling point is 160°C under a pressure of 2 torr; 180°C under a pressure of 50 torr. Under atmospheric pressure at temperatures above 21 0°C, PETN decomposes rapidly and in some cases detonates. The vapor pressure of solid PETN can be found by the empirical equation: $\log p = 16.73 - 7750/T$. PETN is more sensitive to initiation than nitrocellulose, RDX, or tetryl, as judged by the sand test. This is shown, also, by the fact that PETN with 35 percent of water present can be detonated by a No. 6 electric blasting cap, whereas RDX fails to explode if more than 14 percent of water is present. PETN is one of the most sensitive of the standardized military explosives.

Triethylene Glycol dinitrate (TEGN) This explosive is also referred to as TEGDN. The compound is a light yellow, oily liquid with a nitrogen content of 11.67 percent, a molecular weight of 240.20, and an oxygen balance to CO₂ of -66.6 percent. The melting point of the solid is - 19°C. Other characteristics of the liquid are: refractive index, 1.4540; viscosity at 20°C, 13.2 centipoises; vapor pressure at 25°C, less than 0.001 torr; volatility at 60°C, 40 milligrams per square centimeter per hour; and density, 1.335 grams per cubic centimeter. At constant pressure, TEGN's heat of combustion is 3428 calories per gram, heat of explosion is 725 kilocalories per kilogram, and heat of formation is -603.7 kilocalories per kilogram. TEGN is very soluble in acetone, ether, and a solution of 2 parts ether and 1 part ethanol. TEGN is soluble in carbon disulfide and slowly soluble in water. The primary use of TEGN is as a gelatinizing agent for nitrocellulose in propellants, but TEGN can also be used as a component in a liquid explosive, a plasticizer in the fabrication of flexible explosive sheets, and as a plasticizer in pyrotechnic flares.

1,1,1 Trimethylolethane Trinitrate (TMETN) This explosive is also known as metriol trinitrate and is sometimes referred to as MTN. The compound is a slightly turbid, viscous oil with a nitrogen content of 16.41 percent and a molecular weight of 255.15. TMETN has a melting point of -3°C and an apparent boiling point of 182°C, but this is merely the temperature at which decomposition becomes vigorous enough to resemble boiling. Other properties of the liquid are a density of 1.47 grams per cubic centimeter at 22°C and a refractive index of 1.4752 at 25°C. TMETN is practically insoluble in water. Less than 0.015 grams dissolved per 100 grams of water at up to 60°C. TMETN is soluble in alcohol and many other organic solvents. At 60°C TMETN's volatility is 24 milligrams per square centimeter. The heat of formation is 422 calories per gram at constant volume and 446 calories per gram at constant pressure. The heat of combustion is 2,642 calories per gram at constant volume with the water being liquid. In an acid bath,

TMETN is hydrolyzed to the extent of 0.018 percent in 10 days at 220°C and 0.115 percent in 5 days at 60°C. TMETN can be used as a flash and erosion reducing additive in propellants and an ingredient of commercial explosives. TMETN alone does not gelatinize nitrocellulose unless the temperature is raised to 100°C, which would be dangerous. But if mixed with only 8 percent of metriol triacetate, gelatinization takes place at 80°C. When TMETN is mixed with nitroglycerin, the mechanical properties of double-base cast propellants are improved. Combinations with triethylene glycol dinitrate are used as plasticizers for nitrocellulose.

Cyclotetramethylenetetranitramine (HMX) is also known as: octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine; 1,3,5,7-tetranitro-1,3,5,7-tetrazacyclooctane; cyclotetramethylene tetranitramine; or octogen. HMX is a white, crystalline solid with a nitrogen content of 37.84 percent, a theoretical maximum density of 1.905 grams per cubic centimeter, a nominal density of 1.89 grams per cubic centimeter, a melting point of 285°C, and a molecular weight of 296.17. There are four polymorphs of HMX: an alpha, beta, gamma, and delta form. Each polymorph has a range of stability and there are differences among them in physical properties such as density, solubility, and refractive index. The most common polymorph is the beta form. The term HMX without an alpha, gamma or delta qualifier refers to the beta form throughout the rest of this text. The crystalline structure of beta HMX is monoclinic with a density of 1.903 grams per cubic centimeter. The unit cell dimensions are a=6.54 Angstroms, b=11.05 Angstroms, and c=8.70 Angstroms. Beta HMX is stable to about 102°C to 104.5°C, when the crystalline structure is converted to the alpha form. The crystals of the alpha form are orthorhombic with a density of 1.82 grams per cubic centimeter. The unit cell dimensions are a=15.14 Angstroms, b =23.89 Angstroms, c = 5.91 Angstroms. At approximately 160°C to 164°C the meta stable gamma form exists. The crystals of the gamma form are monoclinic with a density of 1.76 grams per cubic centimeter. The unit cell dimensions are a=10.95 Angstroms, b =7.93 Angstroms, and c = 14.61 Angstroms. Above the 160°C to 164°C range to the melting point, the delta form exists. The crystals of the delta form are hexagonal with a density of 1.80 grams per cubic centimeter. The unit cell dimensions are a=7.71 Angstroms and b=32.55 Angstroms. The polymorphs may also be prepared by precipitation from solution under various conditions. The beta form is precipitated from a solution of HMX in acetic acid, acetone, nitric acid, or nitromethane with very slow cooling. The alpha form is precipitated from the same solution with more rapid cooling and the gamma form is precipitated with even more rapid cooling. The delta form is crystallized from solution such as acetic acid or betachloroethyl phosphate, in which HMX is only slightly soluble. Very rapid chilling of the solution is required.

Cyclotrimethylenetrinitramine (RDX) This explosive is also known as: hexahydro-1,3,5-trinitro-1,3,5-triazine; 1,3,5-trinitro-1,3,5-triazacyclohexane; cyclotrimethylene trinitramine; hexogen; cyclonite; or 1,3,5-trinitrotrimethylene-triamine. The compound is a white solid with a density of 1.806 grams per cubic centimeter, a nitrogen content of 37.84 percent, and a molecular weight of 222.13. RDX has orthorhombic crystals with a wide variety of habits; from needles when precipitated from HNO₃, to plates when precipitated from acetic acid, to a massive

form when precipitated from nitroethane or acetone. The unit cell dimensions are $a=13.18$ Angstroms, $b = 11.57$ Angstroms, and $c = 10.71$ Angstroms, and there are eight molecules per cell unit. On the Moh's scale RDX has a scratch hardness of 2.5. Other properties of pure RDX include a specific heat as shown in table 8-15 and a heat of combustion at constant pressure of 2,307.2 calories per gram. The heat of formation value is + 14.71 kilocalories per mole. RDX has an extremely low volatility. Pure RDX is used in press loaded projectiles but not in cast loaded projectiles because of extensive decomposition at the melting point. Cast loading is accomplished by blending RDX with a relatively low melting point substance. Compositions in which the RDX particles are coated with wax are called Composition A, in mixtures with TNT, Composition B, and blends with a nonexplosive plasticizer, Composition C. Straight RDX is used as a base charge in detonators and in some blasting caps, and as an oxidizer in specialized gun propellant.

Ethylenediamine Dinitrate (EDDN) This explosive is also designated EDD or EDAD. The compound is composed of white crystals with a specific gravity of 1.595 at 25/40, a nitrogen content of 30.10 percent, an oxygen balance to CO₂ of -25.8 percent, a melting point of 185° to 187°C, and a molecular weight of 186.13. The compound is soluble in water, but insoluble in alcohol or ether. EDDN has a heat of combustion of 374.7 kilocalories per mole at constant pressure, a heat of formation of 156.1 kilocalories per mole, and a heat of explosion of 127.9 to 159.3 kilocalories per mole. Eutectics are formed with ammonium nitrate, but EDDN is immiscible with molten TNT. An aqueous solution of EDDN is distinctly acidic. EDDN has been used to a limited extent as a bursting charge pressed in shells and as a cast charge in eutectic mixtures with ammonium nitrate. Mixtures with wax were used in boosters during World War II by the Germans.

Ethylenedinitramine (Haleite) This compound is also known as N' N'-dinitroethylene diamine; ethylene dinitramine; or 1,2-dinitrodiaminoethane, and is sometimes designated EDNA. The name Haleite is in recognition of the development of this compound as a military explosive by the late Dr. G. C. Hale of Picatinny Arsenal. The compound is white with an orthorhombic crystal structure, a nitrogen content of 37.33 percent, an oxygen balance to CO₂ of -32 percent, an oxygen balance to CO of -10.5 percent, and a molecular weight of 150.10. The density of the crystals vary from 1.66 to 1.77 depending on the solvent from which the crystallization took place.

Nitroguanidine (NQ) This explosive is also known as picrite or guanyl nitramine. The compound has a nitrogen content of 53.84 percent, an oxygen balance to CO₂ of -30.8 percent, a theoretical maximum density of 1.81 grams per cubic centimeter, a nominal density of 1.55 to 1.75 grams per cubic centimeter, and a molecular weight of 104.1. The melting point of nitroguanidine varies somewhat with the rate of heating. The pure material melts with decomposition at 232°C, but values from 220°C to 250°C are obtainable with various heating rates. At least two crystalline forms exist for nitroguanidine; alpha and beta.

2, 4,6Trinitrophenylmethylnitramine (Tetryl) This explosive is also known as: 2,4,6tetranitro-N-methyl aniline; N-methyl-N,2,4,6tetranitro-benzenamine; 2,4,6-trinitrophenylmethylnitramine; tetranitromethylamulene; or picrylmethylnitramine and is sometimes referred to as pyronite, tetrylit, tetralite, tetralita, or CE. The compound is colorless when freshly prepared and highly purified, but rapidly acquires a yellow color when exposed to light. Tetryl has a nitrogen content of 24.4 percent, an oxygen balance to CO₂ of -47 percent, a nominal density of 1.71 grams per cubic centimeter with a theoretical maximum density of 1.73 grams per cubic centimeter, and a molecular weight of 287.15. The melting point of the pure substance is 129.45°C and of the technical grade, 129°C.

Nitroaromatics. Compounds in this class are prepared by C-type nitration in which a nitrogroup is attached to a carbon atom of the compound being nitrated.

Ammonium Picrate This explosive is also known as ammonium 2,4,6-trinitrophenolate, explosive D, and Dunnite. The compound has a nitrogen content of 22.77 percent, an oxygen balance to CO₂ of -52 percent, a maximum crystal density of 1.717 grams per cubic centimeter, a nominal density of 1.63 grams per cubic centimeter, a melting point with decomposition of about 280°C and a molecular weight of 246. Ammonium picrate exists in a stable form as yellow, monoclinic crystals and a meta stable form as red, orthorhombic crystals. The unit cell dimensions are a =13.45 Angstroms, b

1,3-Diamino-2,4,6-Trinitrobenzene (DA TB) This explosive is also known as 2,4,6trinitro-1,3-diaminobenzene; 2,4,6-trinitro-7,3benzenediamine trinitro-m-phenylenediamine; or 2,4,6-trinitro-1,3-diaminobenzol and may be referred to as DATNB. The compound is a yellow, crystalline solid with a nitrogen content of 28.81 percent, a melting point of 286°C to 301°C with decomposition, and a molecular weight of 243.14.

1,3,5Triamino-2, 4,6Trinitrobenzene (TA TB) This explosive is also known as 2,4,6trinitro-1,3,5-benzenetriamine and may be referred to as TATNB. TATB has a nitrogen content of 32.56 percent, an oxygen balance to CO₂ of -55.78 percent, and a molecular weight of 258.18. TATB is yellow but exposure to sunlight or ultraviolet light causes a green coloration which, with prolonged exposure, turns brown. The compound has a theoretical maximum density of 1.937 grams per cubic centimeter and a nominal density of 1.88 grams per cubic centimeter. An instantaneous hot bar decomposition temperature of 450°C to 451 °C was reported with rapid thermal decomposition above 320°C. The structure of the crystalline lattice of TATB contains many unusual features. Some of these are the extremely long C-C bonds in the benzene ring, the very short C-N bonds, amino bonds, and the six furcated hydrogen bonds. Evidence of a strong intermolecular interaction, hydrogen bonds, in TATB is indicated by the lack of an observable melting point and very low solubility. The intermolecular network results in a graphite-like lattice structure with the resulting properties of lubricity and intercalation.

2,4,6-Trinitrotoluene (TNT) This explosive is also known as trotyl, tolit, triton, tritol, trilit, and 1-methyl-2,4,6-trinitrobenzene. TNT has been the most widely used military explosive from World War I to the present time. The advantages of TNT include low cost, safety in handling, fairly high explosive power, good chemical and thermal stability, favorable physical properties, compatibility with other explosives, a low melting point favorable for melt casting operations, and moderate toxicity. There are six possible ring nitrated TNT isomers. The alpha isomer, which is the one of military interest is symmetrical and will be referred to as TNT. The other five meta isomers will be identified by the Greek letters beta through eta excluding zeta. TNT is a yellow, crystalline compound with a nitrogen content of 18.5 percent, an oxygen balance to CO₂ of -73.9 percent, a molecular weight of 227.13, and a melting point of 80°C to 81°C. TNT shows no deterioration after 20 years storage in a magazine.

Impurities Present in TNT

- 2,4,5-Trinitrotoluene
- 2,3,4-Trinitrotoluene
- 2,3,6-Trinitrotoluene
- 2,3,5-Trinitrotoluene
- 3,4,5-Trinitrotoluene
- 2,6-Dinitrotoluene
- 2,4-Dinitrotoluene
- 2,3-Dinitrotoluene
- 2,5-Dinitrotoluene
- 3,4-Dinitrotoluene
- 3,5-Dinitrotoluene
- 1,3-Dinitrobenzene
- 1,3,5-Trinitrobenzene
- 2,4,6-Trinitrobenzyl alcohol
- 2,4,6-Trinitrobenzaldehyde
- 2,4,6-Trinitrobenzoic acid
- Alpha-nitrato-2,4,6-trinitrotoluene
- Tetranitromethane
- 2,2'-Dicarboxy-3,3',5,5'-tetranitroazoxybenzene (white compound)
- 2,2',4,4',6,6'-Hexanitrobibenzyl (HNBB)
- 3-Methyl-2',4,4',6,6'-pentanitrodiphenylmethane(MPDM)
- 3,3',5,5'-Tetranitroazoxybenzene

Compositions are explosives in which two or more explosive compounds are mixed to produce an explosive with more suitable characteristics for a particular application. Generally, the characteristics of the composition are intermediate between the characteristics of the individual explosive ingredients. For example, the addition of TNT to RDX reduces brisance somewhat but considerably improves sensitivity. The composition explosives are categorized by the number of ingredients contained in the mixture.

Binary Mixtures

Amatols are binary mixtures of ammonium nitrate and TNT. The percentages of ammonium nitrate and TNT are reflected in the nomenclature for each mixture, for example, 80/20 amatol consists of 80 percent ammonium nitrate and 20 percent TNT. Ammonium nitrate is insoluble in TNT. The chemical and physical properties of the constituents determine the properties of the amatol. The mixture begins to melt at TNT's melting point but the ammonium nitrate, which has a higher melting point, remains solid.

Composition A explosives consist of a series of formulations of RDX and a desensitizer. Compositions A and A2 contain the same percentages of materials as composition A3 but the type of wax used and the granulation requirements for the RDX are different. Composition A contains beeswax, while composition A2 contains a synthetic wax. Compositions A and A2 are no longer used. All of the composition A explosives are press loaded. The density of composition A3 is 1.47 and 1.65 grams per cubic centimeter when pressed to 20,685 kilopascals (3,000 pounds per square inch) and 82,740 kilopascals (12,000 pounds per square inch), respectively.

Composition B type explosives are mixtures of RDX and TNT. Composition B refers to mixtures of approximately 60 percent RDX and 40 percent TNT. Other portions of RDX and TNT are called cyclotols.

Composition C During World War II, the British used a plastic demolition explosive that could be shaped by hand and had great shattering power. As standardized by the United States, this explosive was designated as composition C and contained 88.3 percent RDX and 11.7 percent of a nonexplosive oily plasticizer. Included in the plasticizer was 0.6 percent lecithin, which helped to prevent the formation of large crystals of RDX which would increase the sensitivity of the composition.

Ednatols are mixtures of halite (ethylene dinitramine) and TNT. The most used halite/TNT portions are 60/40, 55/45, and 50/50. Ednatols are yellowish, uniform blends with a melting point of 80°C. The eutectic temperature is about 80°C. In an extrudation test at 65°C there was no extrudate. Ednatols are considered satisfactory for bursting charges in ammunition. All of the following data in the discussion of the properties of ednatol refer to the 55/45 mixture. 55/45 Ednatol has an oxygen balance to carbon dioxide of -51 percent and to carbon monoxide of -17 percent. The density of the cast explosive is 1.62 grams per cubic centimeter, which is four percent greater than that of cast TNT or halite pressed under 206,850 kilopascals (30,000 pounds per square inch).

LX-14 is an explosive which consists of 95.5 percent HMX and 4.5 percent estane 5702-F1. The mixture is a white solid with violet spots. LX-14 has a theoretical maximum density of 1.849 grams per cubic centimeter, a nominal density of 1.83 grams per cubic centimeter, and a melting point of greater than 270°C, with decomposition. The heat of formation is 1.50 kilocalories per mole. The calculated heats of detonation are 1.58 kilocalories per gram with liquid water and 1.43 kilocalories per gram with gaseous water. At a density of 1.835 grams per cubic centimeter the detonation velocity is 8,830 meters per second.

Octols are mixtures of HMX and TNT. Octol is used as an oil well formation agent and in fragmentation and shaped charges. In fragmentation tests using a 105 millimeter M1 shell, 15 percent more fragments are produced and the average velocity of the fragments is 100 meters per second faster than with a similar shell loaded with composition B. This improvement is attributed to both the higher rate of detonation of octol and the greater density of octol which permits a greater weight of explosive in the same volume.

Pentolite are castable explosive mixtures containing PETN and TNT. The most commonly used blend consists of 50/50 PETN/TNT. Other blends such as 75/25, 40/60, 30/70, and 10/90 have been occasionally employed but the 50/50 blend is superior in the characteristics of sensitivity to initiation, brisance, and suitability for melt loading. 87 percent TNT and 13 percent PETN form a eutectic with a freezing point of 76.7°C. Cast 50/50 pentolite, therefore, consists of 42.2 percent PETN, and 57.8 percent of the eutectic mixture.

Picratol is a mixture of 52 percent ammonium picrate and 48 percent TNT. Molten TNT has little or no solvent action on ammonium picrate, and consequently, cast picratol consists essentially of a physical mixture of crystals of the two explosives. The density of cast picratol is 1.61 to 1.63. This permits a weight of charge almost equal to that

Tetrytols are light yellow to buff mixtures of TNT and tetryl. As is the case for tetryl, tetrytols are no longer used by the United States but are still being used by other nations including various NATO allies. Tetrytols resemble tetryl more closely than they resemble TNT. They are more powerful but less sensitive than TNT. Tetrytols can be cast into munitions, which is an advantage over press loading. Table 8-73 compares the physical characteristics of various detritus compositions.

Ternary Mixtures

Amatex 20 The mixture has a nominal density of 1.61 grams per cubic centimeter and is used as a filler in ammunition items.

Amatex 20 consists of:

RDX	40 percent
TNT	40 percent
Ammonium nitrate	20 percent

Ammonal

Ammonals are mixtures containing, as principle ingredients, ammonium nitrate and powdered aluminum incorporated with high explosives such as TNT, DNT, and RDX. Powdered carbon was also used in earlier ammonals. In the ammonals that do not contain carbon, the mixture of ammonium nitrate and high explosive detonates developing a very high temperature which causes volatilization of the aluminum powder. In general, ammonals are fairly insensitive and stable mixtures but are hygroscopic due to the presence of ammonium nitrate. In the presence of

moisture, ammonals react with the same metals as amatols: copper, bronze, lead, and copper plated steel.

(HTA-3) are mixtures of HMX, TNT, and aluminum

Minol-2 are mixtures of TNT, ammonium nitrate, and aluminum.

Torpex is a silvery white solid when cast. The composition of torpex is 41.6 percent RDX, 39.7 percent TNT, 18.0 percent aluminum powder, and 0.7 percent wax.

Quaternary Mixtures

Depth bomb explosive (DBX) is the only explosive covered under quaternary mixtures. DBX consists of:

TNT	40 percent
RDX	21 percent
Ammonium nitrate	21 percent
Aluminum	18 percent

Industrial Explosives

Dynamites Military operations frequently necessitate excavation, demolition, and cratering operations for which the standard high explosives are unsuited. Recourse is made to commercial and special compositions. Commercial blasting explosives, with the exception of black powder, are referred to as dynamites although in some cases they contain no nitroglycerin.

Ammonium nitrate fuel oil explosives (ANFO) When ammonium nitrate is mixed with approximately 5.6 percent of a combustible material such as fuel oil, the heat liberated on detonation is increased by almost three-fold.

Propellants

Military Explosives (Chemistry) 30 September 1984

CHAPTER 9 UNITED STATES PROPELLANTS

Introduction Selection of a propellant for an application is made on the basis of the requirements of that specific application. In general, guns are designed to meet specified performance standards and withstand a specific pressure in the barrel. With a knowledge of the properties of the constituents normally used for propellants, the propellant designer creates a formulation to satisfy the performance standards and limitations of the gun. When ignited, the propellant produces large quantities of hot, gaseous products. Complete combustion or deflagration of the propellant occurs in milliseconds in guns and the pressure produced accelerates the projectile down the barrel.

Single-base propellants M1, M6, M10, and IMR.

Double-base gun propellants M2, M5, M8 and M18.

Triple-base gun propellants contain nitroguanidine as additional energizer which increases the energy content of the formulation without raising the flame temperature.

Composite propellants, used in solid fuel rockets, contain a polymer binder, a fuel, and an oxidizer.

Ball Propellants

Propellants Compounds: M1, M2, M5, M6, M8, M10, M31, M30, IMR, M18

- Nitrocellulose (NC)
- Nitrogen
- Nitroglycerin
- Barium nitrate
- Potassium nitrate
- Potassium sulfate
- Lead carbonate
- Nitroguanidine
- Dinitrotoluene
- Dibutylphthalate
- Diethylphthalate
- Diphenylamine
- Ethyl centralite
- Graphite
- Cryolite
- Ethyl alcohol (residual)

Diphenylamine, $(C_6H_5)_2NH$, is an ammonia derivative in which two of the hydrogens have been replaced by phenyl groups. Each phenyl ring has three hydrogens which can be replaced with nitro groups. Therefore, DPA can be

nitrated to the hexanitrate by absorbing the nitrogen oxides produced during the decomposition of nitrocellulose. DPA is nitrated relatively easily and the reaction is not exothermic. During the decomposition of nitrocellulose, DPA nitrates to the following compounds in succession.

N-nitrosodiphenylamine
2-nitrodiphenylamine
4-nitrodiphenylamine
N-nitroso-2-nitrodiphenylamine
N-nitroso-4-nitrodiphenylamine
4,4', 2,4', 2,2', and 2,4-dinitrodiphenylamines
N-nitroso-4, 4'-dinitrodiphenylamine
N-nitroso-2, 4'-dinitrodiphenylamine
2, 4, 4' and 2, 2', 4-trinitrodiphenylamines
2,2', 4,4'-tetranitrodiphenylamine
2,2', 4,4', 6-pentanitrodiphenylamine
Hexanitrodiphenylamine

The propellant does not start to become unstable until most of the diphenylamine has been converted to hexanitrodiphenylamines. A very accurate test to measure the remaining safe storage life in a propellant lot is to analyze the distribution profile of the nitro DPAs. Only about one percent DPA can be added to a propellant because its nitrated products change the ballistic properties.

Centralite I (which is also called ethyl centralite or symmetrical diethyldiphenylurea), $OC [N-(C_2H_5) (C_6H_5)]_2$, was developed in Germany for use in double base propellants. The compound acts as a stabilizer, gelatinizer, and waterproofing agent. Unlike diphenylamine, centralite can be used in relatively large proportions and some propellant compositions contain as much as eight percent of this material. Like diphenylamine, centralite is nitrated by the products of nitrocellulose decomposition. The following compounds are formed successively, as many as four being present simultaneously, as deterioration of the powder proceeds.

4-nitrocentralite
4,4' dinitrocentralite
N-nitroso-N-ethylaniline
N-nitroso-N-ethyl-4-nitraniline
2,4, dinitro-N-ethyl-aniline

Centralite II (which is also called methyl centralite or symmetrical dimethyl diphenylurea), $OC[N(CH_3) (C_6H_5)]_2$, also has been used as a stabilizer but is not considered to be as effective as the ethyl analogue

Three akardites, or acardites, are used to stabilize propellants. Akardite II is often used in DEGN containing propellants.

ATTACHMENT 9

Toxic Hazards of Practice Ammunition

Toxic Hazards of Practice Ammunition

Ammunition includes a variety of devices used to deliver an explosive, chemical, or pyrotechnic charge to a target. Military ammunition includes aerial bombs, mines, torpedoes, rockets, missiles, and a broad spectrum of explosive and non-explosive projectiles.

Ammunition consists of three basic elements: the primer (detonator), the propellant, and the projectile.

Most ammunition also has a casing, or cartridge, that encapsulates the primer and propellant and often grips some portion of the projectile.

The components of small-arms ammunition are typically held together by a cartridge case whereas the larger types of ammunition usually have no cartridge and the propellant is packed in separate combustible bags.

The conventional aerial bomb consists of an explosive or chemical agent in a container, one or more fuze-and-igniter mechanisms, and external fins (for directional stability).

Practice, Inert, and Dummy Ammunition and Bombs

Although the terms "inert", "dummy", and "practice" ammunition are often used interchangeably, the environmental and human health impacts are distinctly different.

According to a Department of Defense policy relevant to munitions, "wholly inert" ammunition has never been employed and has never contained reactive materials; an unused dummy munition is an example of a "wholly inert" ammunition. (It is important to note that once an item is employed as a component of a military munition, it is no longer considered "wholly inert".) Practice ammunition, by comparison, may contain or utilize smoke cartridges, fuzes, primers, igniter charges, propellants, incendiary components, and/or tracers – all of which may contain hazardous components.

Practice bombs are used to simulate the same ballistic properties of service type bombs. They are manufactured as either solid cast metal bodies or thin sheet metal containers. Since practice bombs contain no high explosive filler, a practice bomb signal cartridge (smoke) can be used for visual observation of weapon-target impact.

Practice bombs may also have a pyrotechnic cartridge that produces a flash of light and a puff of white smoke to show the point of bomb impact with the target.

Smoke ammunition contains smoke-producing substances such as chlorosulphonic acid mixture, titanium tetrachloride or white phosphorus; smoke-producing pyrotechnic compositions may contain hexachloroethane or red phosphorus. Smoke ammunition also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

Potential Health Effects: Specific Components of Practice Bombs

This is a partial list intended for educational purposes and should not be used for medical diagnosis. The effects of exposure to any hazardous substance depend on the dose, duration, how you were exposed, personal traits and habits, and whether other chemicals are/were present. This report also does not take into account the potential additive and synergistic effects of multiple exposures (exposure to more than one hazardous substance.)

Antimony Sulfide (S3 Sb2): Antimony is a chemical element that is normally used as an alloy with lead and other metals to increase their hardness, mechanical strength, corrosion resistance, and electrochemical stability. As an alloy, antimony is used in ammunition and cable sheathing.

Antimony compounds are also used as fire retardants, vulcanizing agents, ammunition primers and fireworks. Antimony sulfide is a stable complex of antimony formed in the presence of sulfur. Oral or inhalation exposure to antimony can cause anemia, intestinal disorders (stomach pain, vomiting or diarrhea) and heart problems (altered electrocardiograms).

Barium Nitrate: Barium nitrate is an oxidizing compound found in some incendiary mixtures and single-base propellants. Constitutes as much as 50% of some incendiary mixtures. Poisoning from ingestion can result in gastroenteritis, muscular paralysis, decreased pulse rate, and ventricular fibrillation.

Calcium Resinate: found in some tracer mixtures. Acute exposure through inhalation may irritate the respiratory tract. Symptoms may include coughing, shortness of breath, sore throat and runny nose. If sufficient amounts are inhaled and absorbed, symptoms may resemble those in acute ingestion. Acute skin contact may cause irritation with symptoms of redness, swelling, itching and pain. Acute eye contact may cause irritation with symptoms of redness, swelling, itching, tearing and pain. Acute ingestion may cause gastroenteritis (inflammation of the lining membrane of the stomach and intestines) with abdominal pain, nausea, vomiting and diarrhea. Systemic effects may follow and may include ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Information on health risks associated with long-term exposure not found.

Chlorosulphonic Acid: found in some smoke ammunition. This substance is poisonous. Liquid may cause burns to skin and eyes, and may be fatal if swallowed or inhaled. Chlorosulphonic Acid reacts violently with water, liberating toxic gas. Vapors may be irritating to skin and eyes. Inhalation of vapors may cause severe irritation of the respiratory system. Ingestion may cause severe burning of mouth and stomach. Chronic overexposure may result in lung damage. Decomposition products are: hydrogen chloride, sulfuric acid, oxides of sulfur, and hydrogen.

Dinitrotoluene: constitutes as much as 10% of some single-base propellants; used as a stabilizer in single-base propellants. Also used as a ballistic modifier (homogenizer) for single base propellants. Heart disease has been seen in workers exposed to 2,4- or 2,6-DNT. 2,4- and 2,6-DNT may also affect the nervous system and the blood of exposed workers. One study showed that male workers exposed to 2,4- and 2,6-DNT had reduced levels of sperm, but later studies did not confirm the finding. Exposure to high levels of these compounds in animals regularly show lowered numbers of sperm and reduced fertility. Studies of animals have also shown that a reduction in the numbers of red blood cells, nervous system disorders, and liver and kidney damage can occur. Both 2,4- and 2,6-DNT can cause liver cancer in laboratory rats, and may produce the same effect in humans. The U.S. Environmental Protection Agency has determined that the mixture of 2,4- and 2,6-DNT is a probable human carcinogen. Toxic gases and vapors (such as nitrogen oxides and carbon oxides) may be released in a fire involving dinitrotoluene.

Diphenylamine (DPA) is found in some single-base propellants. DPA is used as a stabilizer in single-based propellants. Since it is incompatible with Nitroglycerin, it is not used in double-base and triple-base propellant compositions. Inhalation of DPA may cause irritation to the mucous membranes. Inhalation of dust may cause systemic poisoning, symptoms may parallel those from ingestion exposure. Exposure through ingestion, skin contact, and inhalation may cause methemoglobinemia. Ingestion may cause anoxia, headache, fatigue, anorexia, cyanosis, vomiting, diarrhea, emaciation, hypothermia, bladder irritation, kidney, heart, and liver damage. Prolonged or repeated exposure from inhalation or skin absorption of liquid may cause damage to the nervous system, liver, kidneys, and bone marrow.

Ethyl Centralite: (Trade name: Carbamite; Synonym: Diphenyl Diethyl Urea) is used as a stabilizer, gelatinizer, and waterproofing agent in propellants. Ethyl Centralite can be used in relatively large proportions (up to 8%) of the propellant composition. Components are Ammonium Nitrate, Paraffin Oil, and Zinc Oxide. Acute exposure to ammonium nitrate can cause eye and skin irritation. Decomposition of ammonium nitrate caused by fire or overheating or the presence of impurities, gives rise to nitrous fumes causing initial irritant effect on the mucous membrane of the lungs. Fumes from decomposition are hazardous. Long-term health effects from chronic exposure are not known.

Hexachloroethane: found in some smoke ammunition. Exposure to high concentrations may cause liver and kidney damage. Hexachloroethane has been identified as a carcinogen or potential carcinogen. Inhalation: Harmful if inhaled. Dust or vapor irritating to the respiratory tract. Skin: Harmful if absorbed through the skin. Eye: Causes eye irritation. Ingestion: Harmful if swallowed. Ingestion of large amounts may cause central nervous system depression based on animal data.

Incendiary Compound IM-23: is composed of 50% potassium perchlorate and 50% magnesium aluminum alloy. The limited database on the toxicology of perchlorate confirms its potential to disrupt thyroid hormone production in mammalian test species, but no robust data exist to evaluate the dose-response for this thyroid effect or to evaluate other potential target tissues or effects. Acute inhalation of magnesium aluminum alloy powder may irritate the respiratory tract. Symptoms may include coughing, shortness of breath, sore throat and runny nose. Exposure to magnesium oxide fume subsequent to burning, welding or molten metal work can result in metal fume fever. Metal fume fever's temporary symptoms include fever, chills, nausea, vomiting and muscle pain. These symptoms usually occur 4-12 hours after exposure and last up to 48 hours. Magnesium oxide fume is a by-product of burning magnesium.

Lead Azide: found in some primers; lead azide is classified as an "explosive A" and is also referred to as "initiating explosive lead styphnate". Lead azide can affect you when breathed in. Skin and eye contact can cause irritation. Exposure can cause headaches, irritability, reduced memory, and disturbed sleep. Lead poisoning can cause poor appetite, colic, upsets stomach, nausea, and muscle cramps. Higher levels can cause muscle and joint pains, weakness, and nerve damage. Lead Azide may cause kidney and brain damage and damage to blood cells causing anemia. It has not been tested for its ability to cause cancer.

Lead Carbonate: found in some single-base propellants. Lead can be absorbed through the respiratory system. Local irritation of bronchia and lungs can occur and, in cases of acute exposure, symptoms such as metallic taste, chest and abdominal pain, and increased lead blood levels may follow. Ingestion: Poison! The symptoms of lead poisoning include abdominal pain and spasms, nausea, vomiting, headache. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in blood and urine with shock, coma and death in extreme cases. Lead and lead compounds may be absorbed through the skin on prolonged exposure; the symptoms of lead poisoning described for ingestion exposure may occur. Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels.

Lead Styphnate, Basic (Lead hydroxide styphnate, lead hydroxide 2,4,6 trinitroresorcinate): is an initiating explosive. According to Winchester Ammunition ©, Basic Lead Styphnate is highly toxic and is carcinogenic. Routes of absorption are: inhalation, ingestion, and skin and eye contact. Basic lead styphnate may be fatal if inhaled or ingested. Acute inhalation may cause irritation of nose, throat, upper respiratory tract, and lungs. Severe poisoning may impair vision by damaging the optic nerve. Chronic inhalation may cause damage to central and peripheral nerves, blood, kidneys, and the fetus. Male reproductive function may be impaired. Lead has been identified as an animal carcinogen; it may produce cancer in humans. It has been shown to affect fetal development. Lead crosses the placenta and may affect the fetus causing birth defects, mental retardation, behavioral disorders, and death during the first year of childhood. Decomposition of Basic Lead Styphnate produces carbon monoxide, nitrogen oxides, and lead fumes.

Lead Styphnate, Normal (Lead trinitroresorcinate): is an initiating explosive. According to Winchester Ammunition ©, Normal Lead Styphnate is highly toxic and is carcinogenic. Routes of absorption are: inhalation, ingestion, and skin and eye contact. Normal Lead Styphnate may be fatal if inhaled or ingested. Acute inhalation may cause irritation of nose, throat, upper respiratory tract, and lungs. Severe poisoning may impair vision by damaging the optic nerve. Chronic inhalation may cause damage to central and peripheral nerves, blood, kidneys, and the fetus. Male reproductive function may be impaired. Lead has been identified as an animal carcinogen; it may produce cancer in humans. It has been shown to affect fetal development. Lead crosses the placenta and may affect

the fetus causing birth defects, mental retardation, behavioral disorders, and death during the first year of childhood. Decomposition of Normal Lead Styphnate produces carbon monoxide, nitrogen oxides, and lead fumes – all of which are hazardous to human health.

Magnesium Aluminum Alloy: found in some incendiary mixtures. Acute exposure may irritate the respiratory tract. Symptoms may include coughing, shortness of breath, sore throat and runny nose. If sufficient amounts are inhaled and absorbed, symptoms may resemble those in acute ingestion. Skin contact may cause irritation with symptoms of redness, swelling, itching and pain. Ingestion may cause gastroenteritis (inflammation of the lining membrane of the stomach and intestines) with abdominal pain, nausea, vomiting and diarrhea. Systemic effects may follow and may include ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Magnesium oxide fume is a by-product of burning magnesium.

Magnesium Powder: found in some tracer mixtures. Dust may cause irritation to upper respiratory tract. Inhalation of fumes may result in "leukocytosis". Contact may cause irritation of skin, eyes, and mucous membranes. Inhalation may irritate the respiratory tract. Symptoms may include coughing, shortness of breath, sore throat and runny nose. If sufficient amounts are inhaled and absorbed, symptoms may resemble those in acute ingestion. Ingestion may cause gastroenteritis (inflammation of the lining membrane of the stomach and intestines) with abdominal pain, nausea, vomiting and diarrhea. Systemic effects may follow and may include ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Health effects of chronic exposure are unknown.

Mercury fulminate: is a crystalline compound used in primers, percussion caps, blasting caps and other detonators. All forms of mercury can cross the placenta to the fetus, but most of what is known has been learned from experimental animals. Chronic exposure through any route (inhalation, ingestion, or dermal absorption) can produce central nervous system damage. May cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Can cause skin allergies and accumulate in the body. Repeated skin contact can cause the skin to turn gray in color. Not a known reproductive hazard, but related mercury compounds can damage the developing fetus and decrease fertility in males and females. Environmental Toxicity: this substance is expected to significantly bioaccumulate.

Nitrocellulose: Single-base propellants contain approximately 80% nitrocellulose. Limited animal studies have concluded nitrocellulose is not toxic. Data is currently not available regarding potential human toxicity from drinking water and other exposures. Nitrocellulose is the principle ingredient of propellants, smokeless powders, rocket fuel, mortar increments and some explosives.

Polyvinyl Chloride: found in some tracer mixtures. Routes of exposure: inhalation and ingestion. According to the manufacturer, polyvinyl chloride as a resin is relatively inert. Its main hazard is associated with small amounts of unreacted vinyl chloride and other additives in plastic. Inhalation of dust should be avoided. Vinyl chloride, a combustion product of polyvinyl chloride is a known carcinogen and is known to induce the formation of tumors in lungs, thorax, respiratory system, and skin.

Potassium Sulfate: found in some single-base propellants. When burned, produces toxic sulfur dioxide fumes. Acute inhalation may irritate the respiratory tract. Symptoms may include coughing, shortness of breath, sore throat and runny nose. Skin contact may cause irritation with symptoms of redness, swelling, itching and pain. Acute ingestion may cause gastroenteritis (inflammation of the lining membrane of the stomach and intestines) with abdominal pain, nausea, vomiting and diarrhea. Systemic effects may follow and may include ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Effects of chronic exposure are unknown. Decomposition products: oxides of sulfur.

Red Phosphorus (Amorphous Phosphorus): constitutes as much as 50% of some incendiary mixtures. When heated, it emits highly toxic fumes of oxides of phosphorus. Red phosphorus

spotting charges can burn at 2,732 degrees Fahrenheit for one-tenth of a second and produce a 6- to 8- foot flame capable of starting vegetation on fire. Human health risks associated with acute or chronic ingestion are described as minimal.

Strontium Peroxide: found in some tracer mixtures. Routes of exposure include eye contact, skin contact, inhalation, and ingestion. Human effects and symptoms of overexposure from acute inhalation: irritation of the respiratory tract. Symptoms may include coughing, shortness of breath, sore throat, and runny nose. If sufficient amounts are inhaled and absorbed, symptoms may resemble those in acute ingestion. Acute skin contact may cause irritation with symptoms of redness, swelling, itching, and pain. Acute eye contact may cause irritation with symptoms of redness, swelling, itching, tearing, and pain. Acute ingestion may cause gastroenteritis (inflammation of the lining membrane of the stomach and intestines) with abdominal pain, nausea, vomiting, and diarrhea. Systemic effects may follow and may include ringing in the ears, dizziness, elevated blood pressure, blurred vision, and tremors. Effects of chronic exposure are unknown.

Strontium Nitrate: found in some tracer mixtures; constitutes 50% of some tracer mixtures. It is used to produce red in flares, stars and fires. Routes of exposure include eye contact, skin contact, inhalation, and ingestion. Human effects and symptoms of overexposure from acute inhalation: irritation of the respiratory tract. Symptoms may include coughing, shortness of breath, sore throat, and runny nose. If sufficient amounts are inhaled and absorbed, symptoms may resemble those in acute ingestion. Acute skin contact may cause irritation with symptoms of redness, swelling, itching, and pain. Acute eye contact may cause irritation with symptoms of redness, swelling, itching, tearing, and pain. Acute ingestion may cause gastroenteritis (inflammation of the lining membrane of the stomach and intestines) with abdominal pain, nausea, vomiting, and diarrhea. Systemic effects may follow and may include ringing in the ears, dizziness, elevated blood pressure, blurred vision, and tremors. Effects of chronic exposure are unknown.

Titanium Tetrachloride: found in some smoke ammunition; produces fumes in moist air. Acute exposure to titanium tetrachloride lasting seconds or minutes may cause injury to skin or mucous membranes of sufficient severity to threaten life or cause permanent physical impairment. Chronic exposure may cause similar permanent injury.

White Phosphorus: found in some smoke ammunition, emits highly toxic fumes or oxides of phosphorus. White phosphorus is dangerously reactive in air and turns red in sunlight. If combustion occurs in a confined space, it will remove the oxygen and render the air unfit to support life. High concentrations of the vapors evolved by burning it are irritating to the nose, throat, and lungs as well as the skin, eyes, and mucous membranes. If phosphorus is ingested, it can be absorbed from the gastrointestinal tract or through the lungs. The absorption rate of toxic quantities of phosphorus has an acute effect on the liver and is accompanied by vomiting and marked weakness. White phosphorus is especially hazardous to the eyes and can damage them severely; it can also seriously damage teeth and bones.

Zirconium: constitutes as much as 75% of some incendiary mixtures. Routes of exposure include eye contact, skin contact, inhalation, and ingestion. Human effects and symptoms of overexposure from acute inhalation: irritation of the respiratory tract. Symptoms may include coughing, shortness of breath, sore throat, and runny nose. If sufficient amounts are inhaled and absorbed, symptoms may resemble those in acute ingestion. Acute skin contact may cause irritation with symptoms of redness, swelling, itching, and pain. Acute eye contact may cause irritation with symptoms of redness, swelling, itching, tearing, and pain. Acute ingestion may cause gastroenteritis (inflammation of the lining membrane of the stomach and intestines) with abdominal pain, nausea, vomiting, and diarrhea. Systemic effects may follow and may include ringing in the ears, dizziness, elevated blood pressure, blurred vision, and tremors. Effects of chronic exposure are unknown.

Glossary

Acute exposure: Occurring over a short time, usually a few minutes or hours. An acute exposure can result in short-term or long-term health effects. An acute effect happens a short time (up to 1 year) after exposure.

Ammunition is a generic military term that applies to bombs, grenades, rockets, mines, projectiles and other similar weapons.

Bag guns employ propellant charges (grains) packed in silk bags. The use of bags is confined to large guns. The total number of bags is modified according to the weight and desired velocity of the separate projectile. The propellant bags are not attached to the projectile.

Black Powder, also called gunpowder, is a mixture of charcoal or other carbon and either potassium nitrate or sodium nitrate, with or without sulphur. It may be meal, granular, compressed or pelletized. Black powder is no longer used by the military as a propellant.

Bombs are explosive articles that are dropped from aircraft. They may contain a flammable liquid with bursting charge, a photo-flash composition or a bursting charge. The term excludes aerial torpedoes.

Bursters are a small charge of explosive used to open projectiles or other ammunition in order to disperse their contents.

Carcinogen: a substance or agent producing or inciting cancer.

Case guns fire fixed ammunition; the propellant is encased in a metal shell attached to the projectile.

Chronic exposure: Occurring over a long period of time (more than 1 year).

Deterrent: an organic material used to modify the burning characteristics of nitrocellulose. An analysis of deterrent showed that it contains 73.9% dinitrotoluenes (DNT's), 20.6% dibutyl phthalate, 2.2% diphenylamine, and 3.3% benzene and insolubles.

Detonators (Group B explosives) include blasting caps, small arms primers, and fuzes.

Double-base propellants are used in the United States for mortar propellants, small rocket engines, shotgun shells, the 7.62-mm NATO rifle cartridge, recoilless rifles, and the Navy's 5"/54-caliber gun. Double- and triple-based propellants contain nitroglycerin.

Expelling charge is an explosive designed to eject the payload (projectile) without damage

Fuzes trigger a detonation or explosion in ammunition. The trigger mechanism may be mechanical, electrical, chemical or hydrostatic.

Gunpowders or smokeless powders are the propellants in use today. This substance is produced by combining nitrocellulose (nitric acid and cotton) with ether and alcohol to produce a low explosive; a small quantity of diphenylamine is added as a stabilizer. Although called smokeless powders, they are neither smokeless nor in powder form, but in granule form. Smokeless powders are classed as either single or multibase (double- or triple-base) powders

High explosives are not used in practice ammunition; examples of high explosives include TNT, RDX, HMX and picric acid.

Incendiary ammunition contains a flammable solid, liquid or gel including white phosphorus and one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

Inert ammunition: See **Wholly inert**.

Initiating explosives (Group A) may contain lead azide, lead styphnate, mercury fulminate, tetracene, cyclonite (RDX), or pentaerythritol tetranitrate (PETN).

Illuminating ammunition is designed to produce an intense light for lighting up an area. Examples include illuminating cartridges, grenades and projectiles; and illuminating and target identification bombs. Illuminating ammunition may also include a burster, expelling charge or propelling charge.

Leukocytosis is a transient increase in the number of white blood cells (leukocytes) in the blood, due to various causes.

Low explosives include black powder, solid propellants, and pyrotechnics.

Methemoglobinemia, commonly referred to as "blue baby syndrome," is a condition that interferes with the blood's ability to carry sufficient oxygen to individual body cells and is often associated with exposure to elevated levels of nitrates in drinking water. However, exposure to other chemicals may also be a principal cause of methemoglobinemia; examples of industrial chemicals include: all isomers of dinitrotoluenes, 2,4,6 trinitrotoluene, m-dinitrobenzene, nitric oxides, and other toxins associated with munitions. Chlorate compounds, nitrobenzene, and nitroglycerin are also reported inducers of methemoglobinemia.

Practice ammunition containing a burster or expelling charge, but does not contain a main bursting charge. Normally it also contains a fuze and a propelling charge (propellant).

Primary explosives are very sensitive to heat, impact or friction and detonates or burn very rapidly. The main primary explosives are mercury fulminate, lead azide and lead styphnate.

Primers are used to ignite an explosive charge. A cap primers is a metal or plastics cap containing a small amount of primary explosive mixture that is readily ignited by impact. Tubular primers have a primer for ignition and a secondary charge of explosive such as black powder.

Projectiles are shells or bullets that are projected from a cannon or other artillery gun, rifle or other small arm. They may be inert, with or without tracer, or may contain a burster or expelling charge or a bursting charge.

Propellants are explosives used for propulsion or for reducing the drag of projectiles. They are classified by such terms as single-base, double-base, and composite.

Proof ammunition containing pyrotechnic substances, used to test the performance or strength of new ammunition, weapon component or assemblies.

Pyrophoric articles contain a substance capable of spontaneous ignition when exposed to air and an explosive substance or component. The term normally excludes articles containing white phosphorus.

Secondary explosives are relatively insensitive (when compared to primary explosives) and are usually initiated by primary explosives

Signal cartridges provide visual observation (smoke) of weapon-target impact. See also: Smoke ammunition.

Single-base propellants: nitrocellulose is the principal explosive present; other substances are added to control burning rates and stability.

Smoke ammunition contains smoke-producing substance such as chlorosulphonic acid mixture, titanium tetrachloride or white phosphorus; or smoke-producing pyrotechnic composition based on

hexachloroethane or red phosphorus. Smoke ammunition also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

Smokeless Powder is used almost exclusively as the propellant for gun and rocket ammunition. It is manufactured under uniform conditions and grained to a uniform size in the form of flakes, strips, sheets, balls, cords or perforated cylindrical grains. Some of the more frequently used types of smokeless powder are guncotton, Ballistite, and Cordite N.

Tracers for ammunition contain pyrotechnic substances designed to reveal the path of a projectile. **Triple-base** propellants are double-base propellants with the addition of nitroguanidine. Triple-base propellants are used in tank rounds and are being tested for new long-range artillery rounds. Double- and triple-based propellants contain nitroglycerin.

Wholly inert ammunition has never contained reactive materials; a dummy munition is an example of a wholly inert ammunition. It is important to note that once an item is employed as a component of a military munition, it is no longer considered wholly inert. See also: Practice ammunition.

Resources

Federation of American Scientists, Military Analysis Network. Practice Bombs.
<http://www.fas.org/man/dod-101/sys/dumb/practice.htm>

Federation of American Scientists, Military Analysis Network, Glossary of Terms.
<http://www.fas.org/man/dod-101/sys/land/glossary.htm#P>

Grolier International Encyclopedia, Ammunition, © 1991.

Grolier International Encyclopedia, Bomb, © 1991.

Report of the Nato Advanced Research Workshop on Destruction of Military Toxic Waste, Naaldwijk, The Netherlands, 22-27, May 1994. <http://www.opcw.nl/chemhaz/arwnaal1.htm> (September 21, 2000).

U.S. Department of Defense, Department of Defense Policy to Implement the EPA's Military Munitions Rule, July 1, 1998. http://www.uscg.mil/systems/gse/munitions_policy.htm

Defense Ammunition Center, Munitions Items Disposition Action System (MIDAS) Program, Navy Single Base Propellant Constituencies.
http://206.37.242.3/midas/disp_alt/DISPALTSNAVY_SINGLE_BASE_PROPELLANT_CONS.html

Island Pyrochemical Industries, Propellant Stabilizers.
<http://www.islandgroup.com/PropellantStabilizers.html>

Chemical Propulsion Information Agency, Propulsion Acronyms and Trade Names.
<http://www.jhu.edu/~cpia/acronyms.html>

University of Utah, Material Safety Data Sheets.
<http://www.health.adelaide.edu.au/rheum/TQEH/msds/msds.htm>

Chemical Propulsion Information Agency, Propulsion Acronyms and Trade Names.
<http://www.jhu.edu/~cpia/acronyms.html>

National Institute for Occupational Safety and Health (NIOSH), Occupation Safety and Health Guidelines for Dinitrotoluene.
<http://www.oshaslc.gov/SLTC/healthguidelines/dinitrotoluene/recognition.html>

Agency for Toxic Substances and Disease Registry, Public Health Statement, 2,4- and 2,6-Dinitrotoluene
<http://www.atsdr.cdc.gov/ToxProfiles/pbs8913.html>

USEPA, Office of Groundwater and Drinking Water, Perchlorate Fact Sheet.
<http://www.epa.gov/ogwdw/ccl/perchlor/perchlo.html>

Material Safety Data Sheet, Magnesium Aluminum Alloy Powder, Hummel Croton, Inc.
http://www.hummelcroton.com/m_mgal.html

Military Toxics Project - "Networking for Environmental Justice"

P.O. Box 558, Lewiston, ME, 04243

Phone: (207) 783-5091 - Fax: (207) 783-5096 - Web: www.miltoxproj.org

ATTACHMENT 10

GAO-04-147 Military Munitions

**DOD needs to address over
200 munitions contaminates**

Safety, Environmental, and Human Health Risks

Military munitions can pose risks to public safety, human health, and the environment. In terms of the explosive hazard, unexploded ordnance poses an immediate safety risk of physical injury to those who encounter it. Military munitions may also pose a health and environmental risk because their use and disposal may release constituents that may contaminate soil, groundwater, and surface water. Ranges contaminated with military munitions, especially those located in ecologically sensitive wetlands and floodplains, may have soil, groundwater, and surface water contamination from any of the over 200 chemical munitions constituents that are associated with the ordnance and their usage. When exposed to some of these constituents, humans potentially face long-term health problems, such as cancer and damage to heart, liver, and kidneys. Of these constituents, there are 20 that are of greatest concern due to their widespread use and potential environmental impact. Table 2 contains a listing of these munitions constituents, and table 3 describes some of the potential health effects of five of them.

Table 2: Munitions Constituents of Greatest Concern

Source: DOD, *Fiscal Year 2002 Defense Environmental Restoration Program Annual Report to Congress*.

While many of these constituents have been an environmental concern to the Department of Defense (DOD) for more than 20 years, the current understanding of the causes, distribution, and potential impact of constituent releases into the environment remains limited. The nature of these impacts, and whether they pose an unacceptable risk to human health and the environment, depend upon the dose, duration, and pathway of exposure, as well as the sensitivity of the exposed populations. However, the link between such constituents and any potential health effects is not always clear and continues to be studied.

Type of munitions constituents

Trinitrotoluene (TNT)
1,3-Dinitrobenzene
Nitrobenzene
2,4-Dinitrotoluene
2-Amino-4,6-Dinitrotoluene
2-Nitrotoluene
2,6-Dinitrotoluene
4-Amino-2,6-Dinitrotoluene
3-Nitrotoluene
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
2,4-Diamino-6-nitrotoluene
4-Nitrotoluene
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
2,6-Diamino-4-nitrotoluene

Methylnitrite
Perchlorate
1,2,3-Propanetriol trinitrate (Nitroglycerine)
Pentaerythritoltetranitrate (PETN)
1,3,5-Trinitrobenzene
N,2,4,6-Tetranitro-N-methylaniline (Tetryl) (White Phosphorus)

Table 3: Potential Effects of the Munitions Constituents Closely Associated with Military Munitions

Source: Environmental Protection Agency, *Handbook on the Management of Ordnance and Explosives at Closed, Transferring, and Transferred Ranges and Other Sites*.

Constituent Potential toxicity/effects

TNT: Possible human carcinogen, targets liver, skin irritations, and cataracts.

RDX: Possible human carcinogen, prostate problems, nervous system problems, nausea and vomiting. Laboratory exposure to animals indicates potential organ damage.

HMX: Animal studies suggest potential liver and central nervous system damage.

Perchlorate: Exposure causes itching, tearing, and pain; ingestion may cause gastroenteritis with abdominal pain, nausea, vomiting, and diarrhea; systemic effects may follow and may include ringing of ears, dizziness, elevated blood pressure, blurred vision, and tremors. Chronic effects may include metabolic disorders of the thyroid.

White Phosphorus: Reproductive effects. Liver, heart, or kidney damage; death; skin burns, irritation of throat and lungs, vomiting, stomach cramps, drowsiness.

ATTACHMENT 11

OE-0142 Résumé EOD Specialist 27 years experience

HUMAN FACTORS APPLICATIONS, INC.
EXPLOSIVE ORDNANCE DISPOSAL DIVISION

NAME: Richard T. Thiel

TITLE: Project Manager

Years of Civilian UXO Experience: 3

CIVILIAN UXO EXPERIENCE

4/90 - present HFA, Inc., Indian Head, Maryland. He was Team Leader/UXO Supervisor for more than 20 projects at Edgewood and Aberdeen Proving Grounds, locating and identifying hundreds of conventional and chemical munitions, including stokes mortars, projectiles, and rifle grenades. He was the QC/Safety Officer for the Level II Artillery Range Clearance at Camp Sarcee, Harvey Barracks, Calgary, Alberta, Canada. 87 UXOs were recovered. He provided UXO support for the first United Nations inspection of nuclear facilities in Baghdad, Iraq. He served as Project Manager for removal and disposal of 53,000 pounds of nitro cellulose at an abandoned DuPont Smokeless Powder Plant.

Project Manager for Rocky Mountain, Black Hills, Tooele, Tooele South, and Ogden delivery orders under this contract.

Years of Military EOD Experience: 27

MILITARY EOD EXPERIENCE

10/87 - 4/90 Served as Enlisted Detailer for EOD Community until retirement.

10/85 - 10/87 EOD Mobile Unit Three, NAB, Coronado, California. Served as Senior Enlisted Advisor to Commanding Officer. Was Senior EOD Technician in Command. Conducted or participated in range clearances at the Naval Gunfire Range, San Clemente Island and Naval Weapons Center, China Lake. Recovered and disposed of all types of Naval projectiles, mortars, and dropped munitions.

11/81 - 9/85 NAVSCOLEOD, Indian Head, Maryland. Senior instructor in Core Division. Also served as Assistant Director of Training.

9/79 - 10/82 EOD Detachment, Coronado, California. Served as Team Chief. Provided EOD support to all Pacific Fleet aircraft carriers. Assisted EOD Detachment, North Island, in range clearances at the Naval Gunfire Range, San Clemente, California. Conducted over 5,000 accident free dives

ATTACHMENT 12

OEW site Remediation Depths

DOD Fort Ord LDSP Table C

And

US EPA, DTSC, CSUMB comments

REMEDIATION DEPTHS AND LAND USE RESTRICTIONS

1. UXO remediation areas in land parcels to be used as nature preserves or other such low intensity use will be remediated to a depth of one foot prior to release. UXO remediation with high intensity use will be remediated to a depth of four feet prior to release. After release, any change in use of the property beyond that commensurate with the depth remediated shall be coordinated with the Army to ensure further remediation to the depth required by the intended use (see enclosure for remediation depth/use requirements).

2. It is not possible to accurately determine when and where construction will occur at Ft. Ord. Sufficient resources do not exist to remediate all OEW areas to a worst case depth before release. Land use restrictions are the only viable way to insure further remediation within the footprint of future construction.

3. All land use restrictions will accompany the deed in the transfer of properties.

**AMMUNITION AND EXPLOSIVES
LAND CLEARANCE PLANNING GUIDANCE**

Chapter 12 of DOD 6055.9-STD requires a clearance plan be presented to the DDESB for leasing, transferring, or disposing of DOD real property when ammunition and explosives contamination is known or suspected. The DDESB will review the plan for explosives safety considerations. The following matrix is to be used to identify the appropriate clearance depth. The ability to clear to a given depth will depend on the technology and funds available. It is necessary to identify and remove ammunition and explosives located from the surface to the applicable depth indicated.

CLEARANCE DEPTH (in Feet)

<u>PLANNED END USE</u>	<u>DEPTH</u>
Commercial/Residential Utility Construction Activity	10 ft. or excavation depth plus 4 ft., whichever is greater
Farming, recreation, Vehicle parking	4
Livestock grazing/ Wildlife preserve	0.5 - 1

The land used must be made aware of the increased risk to his/her operation when violations of the land use agreement occur.

Encl.

Required Remediation Depths

US EPA, Cal EPA, CSUMB

OE-0029 EE/CA Phase I, Appendix K, Austreng, J. (Cal EPA) Comments

DTSC understands from our June 12, 1997 meeting with California State University Monterey Bay representative that residential development has been planned within the boundaries of a UXO site. It's also our understanding that Department of Defense Safety Board Requirements for residential areas is clean up of UXO to a depth no less than 10 feet below land surface. Given the UXO clean ups at Fort Ord are generally to a depth of 3 or 4 feet. DTSC is concerned that clean up has not been done at this site to the level required.

OE-0029 EE/CA Phase I, Appendix K, California State University (CSUMB)

The preferred alternative for future CSU property should be a remediation program that 1) eliminates the need for future remedial actions with planned use of the property by the University, 2) does not obligate the University to implement and finance these actions, 3) does not restrict the planned use of the property, and 4) does not transfer a public safety liability to the University. A 10-foot removal over the entire site would be acceptable.

1999 EPA Position Paper Range Rule

1. DDESB 6055.9 Standards for depth of clearance generally are not being followed. [For example, at Fort Ritchie a surface clearance is proposed for a residential area. DDESB 6055.9 Standards (chapter 12) specifies that default depths of clearance to 10 feet should be used unless an alternative is justified and approved by the DDESB based on detailed site-specific information. As no detailed investigations have taken place over the range areas at Fort Ritchie, a default clearance depth of 10 feet should be used (unless bedrock is shallower). Please note that EPA views chapter 12 as critical due to the nature of explosives safety issues. In addition, many other range situations have already been documented to have uncontrolled listed wastes (and/or hazardous substances) and may present an imminent and substantial endangerment to human health and the environment. Other ranges with similar problems include: Savanna Army Depot, Fort Meade, Fort Ord, Badlands Bombing Range, Lowry Bombing Range, Umatilla Army Depot, Camp Bonneville, Jefferson Proving Ground, Nansemond Ordnance Depot, Tooele Army Depot, and NAF Adak.]

OE-0144 EE/CA Phase II

Field data collected at JPG and McKinley Range showed that sweep efficiencies using the Schonstedt GA-52CX magnetometer are 99 percent for the depth interval from surface to 2 feet below ground surface (bgs), decreasing to 94 percent in the 2- to 4-foot bgs interval, and to 71 percent in the 4- to 6-foot bgs interval. These efficiencies are based upon an average probability of detection of 60 percent from the surface to 10 feet bgs. For OE items having a detection limit above 4 feet bgs, the sweep efficiency would be 94 percent or greater and a removal action could be performed with high-confidence.

Great if your not the 1 out of 20

ATTACHMENT 13

DTSC letter to Army raising concerns with ordnance and explosives cleanup

“Unfortunately, the Army’s position, as expressed by your staff, continues to be that OEW is neither a hazardous substance or a hazardous waste. DTSC and the United States Environmental Protection Agency (U.S. EPA) continue to assert that OEW is a hazardous substance and a hazardous waste and is covered by the FFA. Both agencies agree including the OEW cleanup program under the FFA could resolve a number of regulatory issues. The following OEW issues need to be addressed pursuant to the FFA.”



Winston H. Hickox
Secretary for
Environmental
Protection

Department of Toxic Substances Control

Edwin F. Lowry, Director
400 P Street, 4th Floor, P.O. Box 806
Sacramento, California 95812-0806



Gray Davis
Governor

July 22, 1999

Colonel Daniel Devlin
Installation Commander
Commander, DFIFC & POM
Attention: ATZP-CDR
Presidio of Monterey, California 93944-5006

Dear Colonel Devlin:

The purpose of this letter is to bring to the Army's attention a number of issues that must be addressed regarding the cleanup program at the former Fort Ord. I am hopeful that the *Strategic Management, Analysis, Requirements and Technology (SMART) Team* the Army has proposed recently will result in some positive resolution on many of these issues. Nonetheless, I feel it is important that the Army, perhaps through this process, take into account several key needs that we have identified below and that these needs not be lost in the process. As you know, the Department of Toxic Substances Control (DTSC) has voiced concerns about the Army's independent investigation and clearance of Ordnance and Explosive Waste (OEW) at the base on several occasions. During the June 21, 1999, Tier 2 Conference Call, we were pleased to hear that your staff agreed to include the OEW cleanup program under the Federal Facilities Agreement (FFA).

Unfortunately, the Army's position, as expressed by your staff, continues to be that OEW is neither a hazardous substance nor a hazardous waste. DTSC and the United States Environmental Protection Agency (U.S. EPA) continue to assert that OEW is a hazardous substance and hazardous waste, and is covered by the FFA. Both agencies agree that including the OEW cleanup program under the FFA could resolve a number of regulatory issues. The following OEW issues need to be addressed pursuant to the FFA:

1. **IMMINENT AND SUBSTANTIAL THREAT TO PUBLIC HEALTH**

The Army must protect the community from currently existing OEW hazards on the former base. Since the base closed, the Army has only provided limited access control to areas where known OEW is located. There have been a number of reports of adolescents

and adults accessing these OEW areas and removing military items. A workplan and schedule to provide adequate fencing and 24 hour security of all OEW areas should be submitted to DTSC within thirty days. The plan should show that such security will be in effect within the following thirty days.

2. SURFACE CLEARANCE OF OEW

The Army must make surface clearance of all OEW areas and potential OEW areas a top priority because of the serious threat to humans. The Army currently wants to remove OEW from the surface and at depth at once in any given area. This complete removal approach will take much longer than just clearing the surface first. The workplan and schedule for the OEW investigation and removal effort must be prepared which addresses areas with the highest potential for access and accidental detonation first. This is in conformance with DoD guidance on OEW, which calls for surface clearance as a priority.

3. IN PLACE DETONATION OF OEW

The Army must study alternatives to detonating in place to reduce the disturbance to the surrounding community. OEW that can be safely moved from the point of discovery to a controlled facility, should be. The use of technologies such as blast chambers should also be evaluated.

4. BURNING BRUSH TO PREPARE FOR OEW CLEARANCE

DTSC and the Monterey Bay Unified Air Pollution Control District must agree that the community is properly protected from the effects of burning brush to clear areas for OEW removal. The Army's past attempts to burn areas for OEW removal have caused extensive smoke problems in the surrounding community. While we agree that brush will likely have to be cleared, so that OEW can be found and removed, the Army must study other possible brush removal methods, and/or ways to minimize the smoke nuisance condition created in the surrounding community, if burning must be used.

5. ADEQUACY OF OEW DETECTION AND REMOVAL TECHNIQUES

The Army must protect the public from OEW hazards by using the most effective equipment and field processes to detect OEW and conservatively interpret the results. Recently, during a random confirmation sampling, U.S. EPA found an 18 inch long rocket on a site that the Army had deemed as cleared for unrestricted use and property transfer. The Army will now have to re-sample the entire property to find out how many

more OEW devices were missed. U.S. EPA used a more sensitive instrument to survey only 10 percent of the area. A workplan and schedule must be prepared to investigate and use more advanced technologies for OEW detection.

6. REDEVELOPMENT OF FORT ORD

The communities surrounding Fort Ord are eager to develop portions of Fort Ord as soon as OEW hazards are removed. DTSC opposes residential development in or around OEW areas that have not been thoroughly cleared. Some land may never be cleared enough for any public use, some land will be adequately cleared only for industrial and commercial uses and in some limited, low-risk cases, land may be cleared to a degree to allow residential development. Adequate, enforceable land use controls must be implemented when unrestricted use is not allowed. DTSC's method to assure such control is to enter into and record a land use covenant with the landowner pursuant to California Civil Code section 1471. Since land use controls are a necessary part of the overall remedy, DTSC will be unable to approve property transfers or a final Record of Decision until such a covenant is in place.

7. OEW COMMUNITY PARTICIPATION PROGRAM

A more effective OEW removal action community participation and education program is needed. As the Army implements the items discussed above, the community should be informed and have the opportunity to input into the decision making process before any actions are taken. This is especially critical since the Restoration Advisory Board was disbanded recently. State law, nonetheless, requires an effective public participation program at the base.

8. DTSC APPROVAL OF REMOVAL ACTIONS

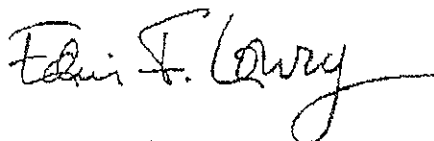
Removal actions need to be approved by DTSC as part of the hazardous substance cleanup process. We believe this can be accomplished by the Army without arguing over authority. Our review and approval will assure substantive compliance with applicable or relevant and appropriate state and federal rules. The Army must commit in the FFA that it will not proceed with removal actions, or finalize documents associated with removal actions, without DTSC approval.

It is important that these issues be resolved promptly. To that end, I have directed that senior management from DTSC be available to meet with you and your staff within the next thirty (30) days to review the State's concerns, and with the goal of settling upon an appropriate course of action.

Colonel Daniel Devlin
July 22, 1999
Page 4

Please have your staff contact Mr. Anthony Landis at (916) 255-3732 to discuss resolution of these issues, or you may contact me directly at (916) 322-0504.

Very truly yours,



Edwin F. Lowry
Director

cc: Secretary Winston H. Hickox
California Environmental Protection Agency
555 Capitol Mall, Suite 525
Sacramento, California 95814

Mr. Lach McClenahan
Site Mitigation
Department of Toxic Substances Control
301 Capitol Mall
Sacramento, California 95814

Mr. Stan Phillippe
Office of Military Facilities
Department of Toxic Substances Control
301 Capitol Mall
Sacramento, California 95814

ATTACHMENT 14

Fort Ord Ordnance Projectile Penetration Table And Fort Ord Munition Penetration Analysis

Deep penetrating ordnance has been found. Remediation depths not being adhered to

The Group 2 RI/FS Work Plan states ordnance found on surface.

Penetration Analysis vs. Sampling and Removal Action Report

<u>Study/Report</u>	<u>Site</u>	<u>Ordnance discovered</u>	<u>Qty</u>
Penetration Analysis:	Site 13B	Landmine	
1994 Sampling	Site 13B	Projectile 37mm HE	1
		60mm Mortar	5
		81mm Mortar	2
		Projectile 25mm	2
Penetration Analysis:	Site CSU footprint	Rifle Grenade	
1994 Removal	Site CSU footprint	Projectile 37mm	1
		Projectile 105mm	5
		81mm Mortar	8
1994/95 Removal	Site CSU	Projectile 37mm TP M63	1
		Projectile 37mm TP-1 M80	3

Ft. Ord Ordnance Penetration Table

Ordnance Item	Depth of Penetration (ft)			Max. Detection Depth ¹ (ft)
	in Sand	in Loam	in Clay	
14.5 mm Trainer/Spotter, M181-3A1	-0.2	-0.3	-0.4*	-0.3
22 mm Subcal for 81 mm mortar	-1.4*	-1.9*	-2.8*	-0.5
35 mm Subcal M73	-0.5	-0.7	-1.0*	-0.9
37 mm, M63	-3.9*	-5.2*	-7.9*	-0.9
40 mm, M822 (AA)	-2.3*	-3.0*	-4.5*	-1.1
40 mm, M677 (Mk 19)	-0.2	-0.3	-0.4	-1.1
40 mm, M381 (M203/M79)	-0.2	-0.3	-0.4	-1.1
57 mm, M306A1	-2.7*	-3.6*	-5.5*	-1.7
M9 Rifle Grenade	-0.1	-0.2	-0.2	-1.7
60 mm, M49A1 (charge 4)	-1.1	-1.5	-2.3*	-1.9
2.36" Rocket, M6A1	-0.4	-0.5	-0.8	-1.9
66 mm, M72 LAW	-0.9	-1.2	-1.8	-2.1
66 mm TPA, M74	-0.7	-0.9	-1.4	-2.1
75 mm, M48	-4.9*	-6.4*	-9.8*	-2.5
75 mm, M310	-3.9*	-5.1*	-7.8*	-2.5
81 mm, M43A1 (charge 8)	-2.7	-3.5*	-5.4*	-2.8
83 mm SMAW Mk 3	-2.8	-3.6*	-5.6*	-2.9
84 mm, M136 (AT-4)	-2.5	-3.7*	-5.0*	-2.9
3.5" Rocket, M28	-0.8	-1.1	-1.7	-3.2
90 mm, M371A1	-2.0	-2.7	-4.1*	-3.2
25 lb Frag Bomb ²	-2.1	-2.8	-4.3*	-3.2
105 mm, M1 (charge 7)	-7.7*	-10.1*	-15.4*	-4.0
106 mm, M344A1	-6.5*	-8.5*	-13.0*	-4.0
Dragon Rocket	-0.9	-1.1	-1.7	-4.3
106 mm, M344A1	-6.5*	-8.5*	-13*	-4.0
4.2", M3 (max charge)	-4.1	-5.4*	-8.3*	-4.1
155 mm, M107	-14.0*	-18.4*	-28.0*	-6.7
8", M106 (charge 8)	-18.4*	-24.2*	-36.9*	-9.7

¹Maximum detection depth using a magnetometer.

²Maximum depth of penetration assuming a velocity of 500 fps.

*Indicates that maximum penetration depth exceeds maximum detection depth. In such cases it may be necessary to implement institutional controls at a site since a complete ordnance removal cannot be assured.

FT ORD MUNITION PENETRATION ANALYSIS

	Range Number	Range Name	Design UXO ¹	Information Source	Maximum Munition Penetration Depth	Maximum Munition Detection Depth
1.	1	Flame Thrower Range	Landmine	HFA	n/a	-
2.	2	Pete's Pond	2.36" Rocket	ASR	0.4 ft	1.9 ft
3.	3	Old Demo Tng Area Range 49	81mm Mortar	HFA	2.7 ft	2.8 ft
4.	4A	CBR Area	35mm Subcal M73	HFA	0.5 ft	0.9 ft
5.	4B	CBR Area	40mm grenade	HFA	0.2 ft	1.1 ft
6.	4C	CBR Area	Rifle Grenade	HFA	0.1 ft	1.7 ft
7.	5	South of East Garrison	3.5" Rocket	ASR	0.8 ft	3.2 ft
8.	6	Booby Traps & Landmines	Landmine	HFA	n/a	-
9.	7	Booby Traps & Landmines	Rifle Grenade	HFA	0.1 ft	1.7 ft
10.	8	Booby Traps & Landmines	Rifle Grenade	HFA	0.1 ft	1.7 ft
11.	9	Booby Traps & Landmines	57mm RR Ctg Case	HFA	surface	-
12.	10	Leary Hill & Elliot Hill Region	81mm Mortar	UXB/CMS	3.5 ft	2.8 ft
13.	11	Demolition Training Area	Hand Grenade	HFA	surface	-
14.	12	Picnic Canyon	40mm AA Projectile	ASR	2.3 ft	1.1 ft
15.	13A	Practice Mortar Range	81mm Mortar, Practice	ASR	2.7 ft	2.8 ft
16.	13B	Practice Mortar Range ^{See note 2}	Landmine	HFA	n/a	-
17.	14	Pilarcitos Canyon & Lookout Ridge	8" Naval Projectile	ASR	18.4 ft	9.7 ft
18.	14 SE	14 SE	Rifle Grenade	UXB	0.2 ft	1.7 ft
19.	16	2.36" Rocket Moving Target Range	2.36" Rocket	ASR	0.4 ft	1.9 ft
20.	17	Anti-Tank Practice Mine Area	Landmine	ASR	n/a	-
21.	18	100lb Bomb ^{See Note 3}	concrete fill/unfuzed	HFA	surface	-
22.	19	Rifle Grenade Range	Rifle Grenade	HFA	0.1 ft	1.7 ft
23.	20	Recoilless Rifle Training Range	None	ASR, HFA	n/a	-
24.	21	Mudhen Lake	Rifle Grenade	UXB	0.2 ft	1.7 ft
25.	22	Beach Ranges Trainfire Ranges ^{See Note 4}	60mm Mortar	HFA	1.1 ft	1.9 ft
26.	23	Demolition Area	M49 Tripflare	SASR	surface	-
27.	24A	Practice Rifle Grenade Range	Rifle Grenade	SASR	0.1 ft	1.7 ft
28.	24B	Practice Rifle Grenade Range	None	SASR	n/a	-
29.	24C	Live Grenade Range	None	SASR	n/a	-
30.	24D	Booby Traps	None	SASR	n/a	-
31.	24E	Practice Rifle Grenade Range	None	SASR	n/a	-
32.	25	Firing Point	None	ASR, SASR	n/a	-
33.	26	Hilltop within P-5	Booby Trap Simulator	SASR	surface	-
34.	28	MOUT Site	Simulators	Bayuga	surface	-
35.	LS BT	Laguna Seca Bus Turn Around	Rifle Grenade	UXB	0.2 ft	1.7 ft

Aug 19, 1997
rev 2

	Range Number	Range Name	Design UXO ¹	Information Source	Maximum Munition Penetration Depth	Maximum Munition Detection Depth
36.	LS OS	Laguna Seca Open Spaces	None		n/a	-
37.	LS T11	Laguna Seca Turn 11	75mm Projectile	UXB	5.1 ft	2.5 ft
38.	CSU Footprint	CSU Footprint	Rifle Grenade	HFA	0.1 ft	1.7 ft
39.	OWR 1	Oil Well Road 1	Signal, Illumination	UXB	surface	-
40.	OWR 2	Oil Well Road 2	Smoke Grenade	UXB	surface	-
41.	OWR 3	Oil Well Road 3	81mm Mortar	UXB	3.5 ft	2.8 ft
42.	TS24	Training Site 24	Rifle Grenade	UXB	0.1 ft	1.7 ft
43.	TS25	Training Site 25	Signal, Illumination	UXB	surface	-
44.	FRC	Range Control	Signal, Illumination	UXB	surface	-
45.	LOR 2	Lookout Ridge II	22mm subcal	HFA,UXB	1.9 ft	0.5 ft
46.		Wolf Hill	75mm Projectile	UXB	5.1 ft	2.5 ft
47.		Fritzsche AAF	2.36" Rocket	UXB	0.4 ft	1.9 ft

NOTES:

1. "Design UXO" is the deepest penetrating UXO found by on-site investigators or previous studies. However, the Design UXO used for this analysis may not be used as the Design UXO in the EE/CA if it is determined that the item was placed on the site, rather than fired, and represents a unique event.
2. This site contained a 220 lb Fragmentation Bomb which was inert and was most likely a training aid; therefore, the landmine was used for the deepest UXO.
3. This bomb contained no hazards and was most likely a training aid; therefore, the landmine is used for the deepest UXO.
4. Only one set of fins from the 60mm mortar were found. If this area were actually a mortar range more residue should have been found.

ATTACHMENT 15

**Email: Regulators and Developer
discussing cleanup policy**

compliant with CERCLA?

From: <Johnson.Kathleen@epamail.epa.gov>
To: <Chesnutt.John@epamail.epa.gov>, <Trombadore.Claire@epamail.epa.gov>, <S...>
Date: 11/21/2006 9:01 AM
Subject: Fw: DRO

Kathleen H. Johnson
 Chief, Federal Facility and Site Cleanup Branch
 Superfund Division
 U.S. EPA Region IX
 75 Hawthorne Street, SFD - 8
 San Francisco, CA 94105
 johnson.kathleen@epa.gov
 415/972-3873

----- Forwarded by Kathleen Johnson/R9/USEPA/US on 11/21/2006 08:50 AM -----

Keith
 Takata/R9/USEPA/
 US To

11/17/2006 12:26 PM Kathleen Johnson, John Chesnutt,
 Claire Trombadore/R9/USEPA/US@EPA
 cc

Subject
 Fw: DRO

I haven't read this yet, but here it is. Let's discuss next week before I respond.

From Keith Takata
 Email: takata.keith@epa.gov
 Phone: 415-947-8709
 Fax: 415-947-3528
 ----- Forwarded by Keith Takata/R9/USEPA/US on 11/17/2006 12:24 PM -----

Ray Clark
 <rayclark@clarkg
 rouplic.com> To
 Keith Takata/R9/USEPA/US@EPA

11/17/2006 10:32
AM

cc

Subject

Re: DRO

Please respond
to
Ray Clark
<rayclark@clarkg
rouplic.com>

Keith,

To help prepare for the potential meeting, it would be helpful if we could all get on the same page with respect to the vocabulary that we are using for this site.

From the developer's perspective, we are anticipating implementing the MEC clearance protocol for planned residential sub-areas. The protocol was negotiated with DTSC, and we understand is technically accepted by EPA. It includes a new scan, and then removal of MEC-impacted soils, and then another scan to confirm that enough was removed, and if more MEC is discovered then the process has to be repeated until we have a "clean" scan of all residential areas of the site. (There is no "sifting" process - this was infeasible for various reasons.)

This protocol would be implemented as the first phase of the mass grading program - a program that will not begin until the whole of the development project is reviewed and approved under CEQA. Our team understood and agreed that this protocol would be endorsed by DTSC and commented on by EPA, before the Army amended the CRUP and authorized residential uses on cleared areas. The CRUP amendment would follow completion of the work, but DTSC/EPA acceptance of the protocol is needed now for a CEQA and public review process that has long been scheduled to start next week - a process now in limbo based on the current confusion.

We also understood that eventually the Army would complete a ROD, and that this would occur in tandem with de-listing this area or the whole of the base from the NPL. The ROD process was not required by the FOSET or CRUP to occur in tandem with DTSC's acceptance (and EPA's comment role) on the residential clearance protocol. We continue to believe this approach will satisfy everyone's needs, and no deviation from this approach (including an Army ROD) is required nor does it seem appropriate.

From the Army, however, we understand that a compromise position may be available that would work for everyone: the Army is willing to do a ROD that

approves the protocol now as the required activity that must be completed before the Army modifies the CRUP. We can potentially accept this compromise approach, and would like to work with the City and other interested parties to encourage everyone to accept it.

Any process that requires the protocol to be implemented now, or before the ROD is issued, would postpone the final remedial requirements to after implementation of the protocol and jeopardizes the project. This would be unacceptable for the financing of the project and the developer would find unacceptable. Both the procedural pre-requisites to undertaking this activity under state law, including most importantly CEQA's prohibition on piecemealing projects, and the financial costs of implementing this protocol with no assurance that it will - finally - be the accepted "final" remedial activities required by EPA or DTSC for the residential reuse of this site. make this "protocol-first. then ROD"

Ray

<Takata.Keith@epamail.epa.gov> wrote:

Ray, Kathleen will organize a meeting at her level which will include DTSC, the Army, DRO, and the developer in the next month. I think this meeting will go a long way in clearing up any misconceptions and who said what confusion. We should use that meeting to identify what we agree on and what needs to be elevated to a higher level. If we have to meet, Dec 18 works for me but it may be too close to the holidays for some people.

Keith

Keith Takata
US EPA, Region 9, Superfund
takata.Keith@epa.gov
415-947-8709

----- Original Message -----

From: Ray Clark [rayclark@clarkgroupllc.com]
Sent: 11/14/2006 04:26 PM
To: Keith Takata
Subject: DRO

Keith,

Thanks so much for taking the time to talk with me today. I think we are on the right track to making the DRO property work. Kathleen has been helpful as has Rick Newsome at the Army. The important point is that we meld all the documentation in a parallel process as Kathleen has suggested and we get a ROD as soon as possible and then move toward clean up. The developer is willing to do the work necessary and is not complaining about getting it right. And as you and Kathleen said, we ought to be able to get this done quickly. However, I was told by Army today that someone at your office is talking about scanning, which our people take to mean scanning over the earth, when you find metal, you dig it up and clean up the area. I hope I or Rick misunderstood that.

I do think this will take your leadership Keith. I believe that Rick Newsome is willing to invest some leadership and effort into it as well. I suggest that we pick a date (Dec 18th as an arbitrary start) and sit around a table focused on principles and outcomes, not process.

Thanks for all your help and advice.

Ray

ATTACHMENT 16

Group 2 RI/FS Work Plan SEDR CSUMB MRA MEC found

The FORA ESCA Remediation Program omits large quantities of dangerous munitions from its Reports. The Administrative Record shows 247,585 live and inert munitions were found on-site

Section 6 – CSUMB MRA Conceptual Site Model

Table 6.3-2
CSUMB MRA – Types of MEC Removed and Hazard Classification

MEC ITEMS	UXO	DMM	ISD	Hazard Classification
106mm Recoilless Training Round (Projectile, Fuze, and Canister) (Model Unknown)	0	0	1	0
3.5-inch Rocket (Model Unknown)	0	0	1	0
40mm Airburst Flare (Model Unknown)	0	0	2	0
40mm Base Fuze (Model Unknown)	0	0	1	0
40mm Flare (Model Unknown)	0	0	3	0
40mm Flare Pistol (Model Unknown)	0	0	3	0
40mm Illuminating (Model Unknown)	0	0	5	0
40mm Illuminating M58 (Model Unknown)	0	0	1	0
40mm Pistol Flare (Model Unknown)	0	0	1	0
40mm Signal Ground Flare (Model Unknown)	0	0	1	0
40mm Smoke (Model Unknown)	0	0	2	0
40mm, Illuminating (Star only) (Model Unknown)	0	0	1	0
60mm Illuminating (Model Unknown)	0	0	12	0
81mm, M3, Prop Charge (Model Unknown)	0	0	1	0
Activator, mine, antitank, practice, M1	0	0	7	1
Air Illuminating (Slap Flare) (Model Unknown)	0	0	1	0
Aircraft Signal (Model Unknown)	0	0	1	0
Base Compound (Model Unknown)	0	0	1	0
Base, coupling, firing device	2	0	2	1
Bulk, HE (model unknown) *	0	0	0	NS
Cap, blasting, electric, M6	19	0	25	1
Cap, blasting, non-electric, M7	1	0	0	1
Cart M3 (Model Unknown)	0	0	60	0
Cart M6 (Model Unknown)	0	0	18	0
Cart M7 (Model Unknown)	0	0	50	0
Charge, 0.25 pound, demolition, TNT	1	0	0	2
Charge, 0.5 pound, demolition, TNT	77	0	26	2
Compound Slag and OEW (Model Unknown) *	0	0	0	0
Dragon Simulators (Model Unknown)	0	0	2	0
Electrical, Booby Trap, Simulators (Model Unknown)	0	0	1	0
Firing Device, M10 (Model Unknown)	0	0	5	0

Table 6.3-2
CSUMB MRA – Types of MEC Removed and Hazard Classification

MEC ITEMS	UXO	DMM	ISD	Hazard Classification
Firing Device, M57 (Model Unknown)	0	0	1	0
Firing device, multi-option, M142	0	0	1	1
Firing device, pull friction, M2	0	0	6	1
Firing device, pull, M1	0	0	62	1
Firing device, release, M1	0	0	2	1
Firing device, release, M5	2	0	84	1
Firing device, tension and release, M3	0	0	38	1
Flare Motor (Model Unknown)	0	0	8	0
Flare Part (Model Unknown)	0	0	1	0
Flare Rocket Motor (Model Unknown)	0	0	41	0
Flare Signal (Model Unknown)	0	0	1	0
Flare, parachute, trip, M48	1	0	11	2
Flare, Signal, M18A1 (Model Unknown)	0	0	44	0
Flare, surface, trip, M49 series	3	0	31	1
Flash Bang (Model Unknown)	0	0	1	0
Flash, Bang, M47 (Model Unknown)	0	0	2	0
Frag Bomb Fuze (Model Unknown) *	0	0	0	0
Fuze, grenade (model unknown)	0	0	39	1
Fuze, grenade, hand, M10 series	2	0	10	1
Fuze, grenade, hand, practice, M205 series	0	0	74	1
Fuze, grenade, hand, practice, M228	1	0	3	1
Fuze, M12 (Model Unknown)	0	0	3	0
Fuze, mine, antitank, practice, M604	0	0	15	1
Fuze, mine, combination, M10 series	0	0	4	1
Fuzes (Model Unknown)	0	0	14	0
Grenade, hand, fragmentation, MK II	0	0	4	3
Grenade, hand, Illumination, MK I	2	0	21	1
Grenade, hand, incendiary, TH3, AN-M14	0	0	1	1
Grenade, Hand, Practice (Model Unknown)	0	0	1	0
Grenade, hand, practice, M21	0	0	1	1
Grenade, hand, practice, M30	0	0	4	1

Section 6 – CSUMB MRA Conceptual Site Model

Table 6.3-2
CSUMB MRA – Types of MEC Removed and Hazard Classification

MEC ITEMS	UXO	DMM	ISD	Hazard Classification
Grenade, hand, practice, MK II	3	0	14	1
Grenade, hand, riot, CS, M7A3	1	0	13	1
Grenade, hand, riot, CS-1, ABC-M25A2	0	0	2	1
Grenade, hand, smoke, HC, AN-M8	0	0	4	1
Grenade, hand, smoke, M18 series	4	0	36	1
Grenade, hand, smoke, WP, M15	0	0	2	3
Grenade, M33, Practice, WP (Model Unknown)	0	0	1	0
Grenade, rifle, antitank, practice, M11 series	0	0	6	0
Grenade, Rifle, Flare (Model Unknown)	0	0	10	0
Grenade, rifle, smoke (model unknown)	0	0	3	3
Grenade, rifle, smoke, M22 series	18	0	0	1
Grenade, rifle, smoke, M23 series	1	0	3	1
Grenade, rifle, smoke, WP, M19A1	1	0	3	3
Grenades Simulator (Model Unknown)	0	0	2	0
HE (Model Unknown) *	0	0	0	0
Igniter, time fuse, blasting, M60	0	0	1	1
Illuminating Grenade (Model Unknown)	0	0	7	0
Illuminating Material Flash Ground (Model Unknown)	0	0	7	0
M1 Rifle Smoke Partial (Model Unknown)	0	0	1	0
M2 Practice Mine (Model Unknown)	0	0	2	0
M8 Electric Cap (Model Unknown)	0	0	1	0
Material Flash Sound (Model Unknown)	0	0	13	0
Mine, antipersonnel, practice, M2A1B1	0	0	11	1
Mine, antipersonnel, practice, M68 (claymore)	0	0	6	0
Mine, antipersonnel, practice, M8 series	0	0	8	1
Mine, antitank, practice (model unknown)	0	0	9	1
Mine, antitank, practice, M1	2	0	0	1
Mine, antitank, practice, M10	0	0	1	1
Mine, antitank, practice, M12 series	0	0	9	1
Mine, antitank, practice, M1A1	0	0	2	1
Mine, antitank, practice, M20	0	0	11	1

Table 6.3-2
CSUMB MRA – Types of MEC Removed and Hazard Classification

MEC ITEMS	UXO	DMM	ISD	Hazard Classification
MK2 Grenade (Model Unknown)	0	0	1	0
MK2 Hand Grenade (Model Unknown)	0	0	1	0
Ordnance Components	4	0	1	NS
Parachute Flare Rocket Motor (Model Unknown)	0	0	105	0
Pistol Flare (Model Unknown)	0	0	1	0
Pot, 2.5 pounds, smoke, HC, screening, M1	0	0	1	1
Practice Grenade (Model Unknown)	0	0	3	0
Practice Grenade Red Filler (Model Unknown)	0	0	1	0
Primer (Model Unknown) *	0	0	0	0
Primer, Percussion (Model Unknown)	0	0	7	0
Projectile, 105mm, with Fuze (Model Unknown)	0	0	1	0
Projectile, 20mm, TPT (Model Unknown)	0	0	1	0
Projectile, 22mm, subcaliber, practice, M744	2	0	0	1
Projectile, 37mm (Model Unknown)	0	0	1	0
Projectile, 37mm, armor piercing tracer, M80	1	0	1	0
Projectile, 40mm, parachute, illumination, M583 series	0	0	2	1
Projectile, 40mm, parachute, star, M662	1	0	1	1
Projectile, 40mm, practice, M382	2	0	0	1
Projectile, with Fuze MK2/Mod12, 1.1-inch (Model Unknown)	0	0	1	0
Pull Flare Device (Model Unknown)	0	0	2	0
Pyrotechnic mixture, illumination	0	0	3	1
Pyrotechnic mixture, smoke	1	0	9	1
Rifle Flare (Model Unknown)	0	0	2	0
Rifle Grenade Detonation (Model Unknown)	0	0	6	0
Rifle Grenade Illumination (Model Unknown)	0	0	1	0
Rifle Grenade Red Smoke (Model Unknown)	0	0	2	0
Rifle Grenades (Model Unknown)	0	0	16	0
Rocket, 2.36-inch, high explosive antitank, M6	0	0	2	3
Rocket, 2.36-inch, practice, M7	0	0	5	0
Rocket, 3.5-inch, practice, M29 series	0	0	5	0
Rocket, 35mm, subcaliber, practice, M73	0	0	6	1

Section 6 – CSUMB MRA Conceptual Site Model

Table 6.3-2
 CSUMB MRA – Types of MEC Removed and Hazard Classification

MEC ITEMS	UXO	DMM	ISD	Hazard Classification
Signal Flash Sound (Model Unknown)	0	0	10	0
Signal, Illumination (Model Unknown)	0	0	5	0
Signal, illumination, aircraft, AN-M37 series	2	0	0	1
Signal, illumination, comet 1260	0	0	5	1
Signal, illumination, ground, M125 series	19	0	21	2
Signal, illumination, ground, parachute, rifle, M19 series	0	1	2	1
Signal, smoke, ground, M62 series	0	0	1	1
Simulator, detonation, explosive, M80	0	0	2	1
Simulator, explosive booby trap, flash, M117	0	0	1	1
Simulator, flash artillery, M110	0	0	1	1
Simulator, grenade, hand, M116A1	0	0	12	2
Simulator, launching, antitank guided missile and rocket, M22	5	0	3	1
Simulator, projectile, airburst, M74 series	11	0	40	1
Slap Flare Motors (Model Unknown)	0	0	29	0
Slap Flare Tail Assembly (Model Unknown)	0	0	35	0
Smoke Grenade (Model Unknown)	0	0	10	0
Smoke Grenade Fuze (Model Unknown)	0	0	1	0
Smoke Pot (Model Unknown)	0	0	4	0
Smoke Rifle (Model Unknown)	0	0	1	0
Smoke, Grenade, Incendiary (Model Unknown)	0	0	1	0
Squib, Electric	1	0	31	1
Tow Spotting Charge (Model Unknown)	0	0	1	0
Trip Flare (Model Unknown)	0	0	8	0
MRA TOTAL	190	1	1,362	

Note: NS – Not Specified

* - MMRP database identified item as either UXO or ISD with a quantity of zero.

Reference: Fort Ord MMRP Database

Please note: Munitions descriptions have been taken directly from the Army's MMRP Database and/or other historical documents. Any errors in terminology, filler type, and/or discrepancies between model number and caliber/size are a result of misinformation from the data sources.

Table 6.3-3
CSUMB MRA – Summary of Recovered MEC and MD

Type	Summary
UXO	190 items
DMM	1 item
ISD	1,362 items (potential MEC that could not be classified as either MEC or MD)
MD	19,590 pounds (includes MD-E and MD-F items if weights were documented)
Aerial Extent	<ul style="list-style-type: none"> The majority of the MD reported during previous removal actions were in the easternmost portion of the MRA, with most grids containing 10 or more pounds of MD (Figure 6.3-3). MD was likely encountered in the western portion of the MRA, but not documented, during previous investigations. Nearly all of the grids in the western portion of MRS-31 indicate that no MD was encountered. The MD identified on Figures 6.3-1 and 6.3-3 includes SAS but not SAA.
Vertical Extent	<ul style="list-style-type: none"> All of the MEC items removed from the MRA were located within 4 feet bgs, with the MMRP database indicating that a majority of the MEC items encountered on the surface. Figure 6.3-4 shows the distribution of MEC recovered at specified depth intervals. No burial pits were reported in the MMRP database. However, an after action report indicates that burial pits containing training devices were removed from this area (HFA 1994).

ATTACHMENT 17

Perchlorate summary DOD 16-106 ppb Fort Ord Site 39

Perchlorate Summaries



Fort Ord, CA

Facility & Location

Fort Ord is located near Monterey Bay in central California, approximately 80 miles south of San Francisco. Since 1917, the installation has served primarily as training and staging facility for infantry troops. In 1940, the 7th Infantry Division (ID) was activated, then 4th, 5th and 6th Divisions as well. In 1957, Fort Ord became a United States Army Infantry Training Center. In 1974, the 7th ID was reactivated at Fort Ord. In 1983, the 7th ID was converted to a light division, operating without heavy tanks or armor. Fort Ord was selected in 1991 for closure under the Base Realignment and Closure (BRAC) process. Troops were reassigned in 1994 when the post formally closed. Although Army personnel still operate a small portion of the post, active Army divisions are not stationed at Fort Ord.

EPA identified Fort Ord as a Superfund site in 1990 due to groundwater contamination. A Multi-Range Area (MRA) located in the south-central portion of Fort Ord is expected to have the highest density of munitions and explosives of concern such as artillery and mortar, containerized and uncontainerized explosives and propellants.

Media Sampled

The Army has tested soil at Fort Ord for perchlorate.

Soil -- The Army tested 442 samples from the Site 39 - Multi-Range Area. Of these, 41 samples detected perchlorate ranging from 13 ppb to 106 ppb. The Army also tested ten soil samples from Site 39-Range 36A. Perchlorate was not detected in any of these samples.

Appropriate Action

Not applicable

POC Information

Malcolm Garg, Army Cleanup Programs, Emergent Contaminant Issues

malcolm.garg@us.army.mil

Created: 01-MAR-08

Updated: (null)

ATTACHMENT 18

OE-0012 SOW Phase 1 Removal FEB 1994

SCOPE OF WORK
ORDNANCE AND EXPLOSIVE WASTE (OEW)
PHASE I, REMOVAL ACTION
FORT ORD, CALIFORNIA

12 FEBRUARY 1994

1.0 BACKGROUND AND GENERAL STATEMENT OF WORK. The work required under this Scope of Work (SOW) falls under the Base Realignment and Closure Act (BRAC). Ordnance and Explosive waste (OEW) contamination exists on property presently owned by the Department of the Army and scheduled for excessing.

1.1 OEW is a safety hazard and constitutes an imminent and substantial endangerment to the local populace and site personnel. During this removal action, it is the Government's intent that the contractor shall destroy all unexploded ordnance (UXO) encountered, on-site. This action will be performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 104 and the National Contingency Plan, Sections 300.120(c) and 300.400(e). In accordance with the above, no Federal, State, or Local permits are required nor will be obtained for this on-site disposal of UXO.

1.1.1 In addition, this action is being completed under Chapter 12, DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards. DoD real property that is known to be contaminated with ammunition and explosives that may endanger the general public may not be released from DoD custody until the most stringent efforts have been made to ensure appropriate protection to the public.

1.1.2 Due to the inherent risk in this type of operation, the contractor shall be limited to a 40-hour work week; either five 8-hour days or four 10-hour days.

1.2 This SOW pertains to those areas known as Sites 4C, 7, 13B, and 18, in the designated California State University footprint and other sites determined to be contaminated as the result of ongoing OEW sampling on Fort Ord; as many as 545 acres may be remediated under this SOW. (Reference Map CALIFORNIA 1:25,000; Edition 5-DMATC, Series V895S, Grids 0856 and 0956)

DACA87-92-D-0133
Delivery Order 0015, Mod 6

1.3 GENERAL DESCRIPTION.

1.3.1 Fort Ord consists of approximately 28,000 acres, which is located along the Pacific Ocean in northern Monterey County CA. During sampling operations at the project site, the following OEW was encountered:

1.3.1.1 Site 4C - M9-series Rifle Grenades (Smoke); Pyrotechnic simulators; assorted landmine warfare initiating devices with live detonators.

1.3.1.2 Site 7 - Tripflares; activators; assorted landmine warfare initiating devices with live detonators.

1.3.1.3 Site 13B - Training AT/AV/AP landmines with live fuzes; M18 smoke grenades; Flash simulators; assorted landmine warfare initiating devices with live detonators.

1.3.1.4 Site 18 - M18 Smoke grenades; Training AT/AV/AP landmines with live fuzes; assorted landmine warfare initiating devices with live detonators.

1.3.2 Some of the items listed in Paragraph 1.3.1 were in their original shipping containers and were obviously discarded and buried. The landmines were emplaced, some with pressure-release booby-trap devices with live activators.

1.3.3 Other sites determined to be contaminated as the result of on-going OEW sampling on Fort Ord can be added as information becomes available.

1.4 DEFINITIONS. See Section C, subsection 2.3 of basic contract.

2.0 OBJECTIVE. The contractor shall safely conduct surface and subsurface OEW removal operations in an effort to locate and dispose of all OEW in the project site.

3.0 DESCRIPTION OF SERVICES.

3.1 TASK 1: PREPARE WORK PLAN (WP). This task is being accomplished under Mod 5, DO 15.

3.1.1 Site Visit. Present team has already accomplished this task. An additional site visit by the contractor is not required.

3.1.2 Work Plan (WP). Work plan task has already been funded under Mod 5, DO 15.

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3.1.2.1 UXO Operational Plan

3.1.2.2 Deleted

3.1.2.3 Surveying and Mapping Plan

3.1.2.4 Environmental Protection Plan

3.1.2.5 Quality Control Plan

3.1.2.6 Equipment Plan (EP). The contractor shall prepare and submit a detailed EP, as a work plan subplan, describing the equipment to be employed to perform all necessary operations.

3.1.2.6.1 Demolition Materials Accountability Procedures

3.1.2.7 Work, Data, and Cost Management Plan

3.1.3 The contractor shall submit a draft WP and final WP for review and approval in accordance with paragraph 4.1 of this SOW.

3.1.4 The contractor may be required to provide information for the Land Disposal Site Plan. This will be coordinated through the CEHND Safety Specialist or the PM. Installation has the responsibility for submitting the Plan.

3.2 TASK 2: PERFORM COMMUNITY RELATIONS. The contractor when requested shall accomplish this task in accordance with Section C, subsection 3.2.3, of the basic contract.

3.2.1 All press releases and media appearances shall be coordinated with and approved by the Public Affairs Officer, Fort Ord.

3.3 TASK 3: PERFORM LOCATION SURVEYS AND MAPPING. Surveying and mapping will be IAW Task 3, Mod 05, DO 15. Additionally, Global Positioning System (GPS) mapping will be accomplished. GPS mapping will be accurate to +/- five (5) meters and be able to be converted to State Plane Grid References.

3.4 TASK 4. PERFORM OEW REMOVAL. This task shall be accomplished in accordance with Section C, subsection 3.2.4 and Section J, Attachment 1, of the basic contract.

3.4.1 The contractor shall provide the necessary personnel and equipment to perform surface and subsurface OEW clearance and mapping of the project site and dispose of, on-site, all OEW encountered. This action shall include all UXO-related scrap. Non-UXO related scrap shall remain where found.

3.4.1.1 The contractor shall mobilize on-site as directed by the Contracting Officer in the letter approving the Contractor's WP.

3.4.2 The contractor shall propose a planned, systematic approach to the removal action that shall result in optimum search effectiveness. This methodology shall be outlined in the WP.

3.4.2.1 During subsurface operations, the contractor shall utilize a magnetometer capable of detecting a 2.36" Rocket at a depth of 3-feet. The contractor shall excavate to a depth of 3 feet to determine the identity of the magnetic anomaly. The on-site USAEDH Safety Specialist may approve deeper excavation if he determines it necessary for future land use.

3.4.2.1.1 Magnetometers shall be field tested daily to ensure they are operating properly. This shall be accomplished by planting a similar magnetic inert item to a depth of 3 feet and determining the standard indication. If a magnetometer does not meet the standard during the daily check, it shall be calibrated, repaired, or replaced.

3.4.2.2 All access/excavation/detonation holes shall be back filled. The contractor shall seed the backfilled areas as prescribed by the Fort Ord Environmental Office.

3.4.3 If excavation is required in an areas of endangered/protection plants/animals, excavation shall proceed only after approval by the Fort Ord Environmental Office and the USAEDH Safety Specialist. Should the contractor not be allowed to excavate a magnetic anomaly because of endangered/protected plants/animals, that anomaly shall be marked on the site map as a suspected UXO.

3.4.4 The contractor shall have an evacuation and security contingency plan in place should a blow-in-place UXO be encountered.

3.4.4.1 Unless approved the CEHND Safety Specialist, all recovered UXO shall be disposed of daily.

3.4.5 The contractor shall maintain a daily journal of all site activities and a detailed accounting of all OEW items/components/scrap encountered. This accounting shall include the amounts of OEW, identification and condition, depth located, disposition, and location/mapping. This daily journal and accounting shall be a part of the Removal Report.

3.4.5.1 The accounting system shall account for the government-furnished and any non-government furnished demolition materials utilized to detonate the OEW.

3.4.5.2 The contractor shall have a contingency plan in place should the government furnished demolition materials not be available.

3.4.6 The USAEDH Safety Specialist will request EOD Support if any of the following are encountered:

3.4.6.1 A scenario that precludes a blow-in-place, requiring a render-safe-procedure.

3.4.6.2 A suspect chemical warfare munition.

3.4.6.3 An unknown UXO.

3.5 TASK 5: TURN-IN OF RECOVERED UXO RELATED SCRAP. This task shall be accomplished as per Section C, subsection 3.2.5 of the basic contract and Fort Ord DRMO policy. The contractor shall have a contingency plan in place in the event that turn-in of UXO related scrap to DRMO is not possible. This contingency plan shall be accomplished IAW the before mentioned section of the basic contract.

3.5.1 The contractor shall complete a DD Form 1348-1 as turn-in documentation. Instructions for completing this form are contained in the Defense Utilization and Disposal Manual, DoD 4160.21-M. The Senior UXO Supervisor shall sign a certificate as follows:

"I certify that the property listed hereon has been inspected by me and, to the best of my knowledge and belief, contains no items of a dangerous nature."

3.5.2 Venting of inert UXO items shall be accomplished.

3.5.3 DRMO turn-in documentation receipts shall be submitted as a component of the Removal Report if OEW-related scrap is turn-in through DRMO.

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3.6 TASK 6: PERFORM QUALITY CONTROL.

3.6.1 The contractor shall administer a Quality Control (QC) Program to manage, control, and document this own and his subcontractors activities. The methodology to accomplish this shall be proposed in the WP/QC Plan. The QC activities shall be documented and included in the Removal Report.

3.6.2 The individual performing the UXO QC shall not be involved in the performance of Task 4 above. UXO QC shall be a separate function and is not envisioned as a full-time position. The UXO QC Specialist shall meet the minimum prerequisites as outlined in Section C, Subsection 3.2.4.2.5 of the basic contract.

3.7 TASK 7: PREPARE AND SUBMIT REMOVAL REPORT. ~~Funding provided under Mod 05, DO 15.~~ The contractor shall accomplish this task in accordance with Section C, subsection 3.2.7 of the basic contract. At the conclusion of all field activities, the Contractor shall submit the Final Report which consist of the following:

3.7.1 All original Surveying and Mapping Data from Task 3.

3.7.2.1 Detailed accounting of all UXO and UXO-related materials located and disposed of.

3.7.2.2 A system of daily journals of all activities associated with this SOW.

3.7.2.3.2 A daily journal for the site shall be opened upon first arrival for field operations and closed after contractor demobilization at the project site.

3.7.2.4 A recapitulation of exposure data. This shall include total number of man-hours worked on-site, total motor vehicle mileage, total number of flying hours, and number of flights.

3.7.2.5 QC documentation.

3.7.2.6 All DRMO turn-in documentation.

3.7.2.7 A minimum of 20 3" X 5" (10 X 15cm) color photographs shall be included in the report depicting major action items and UXO discoveries. The original, Final Report furnished to USAEDH shall include original photographic prints. Photographs contained in draft submissions and copies of final submissions shall be color reproductions. Further, a minimum of 15 minutes of all activities will be videotaped at each site. Three copies of all videotapes shall be provided to CEHND.

3.7.2.8 Public meeting written record (if public meeting is required).

3.7.2.9 A financial breakdown by area and task of all costs and labor hours used to perform this SOW.

3.8 Personnel Qualifications and Job Descriptions. The contractor shall furnish a staff that is qualified through training and pertinent experience to accomplish the objective and tasks of this SOW. See Section C, subsection 3.2.4.2, 4.6 and 4.9, of the basic contract.

4.0 SUBMITTALS. The contractor shall furnish copies of the plans, maps, and reports as identified in paragraph 3.7 to each addressee listed below in the quantities indicated. The contractor shall use express mail services for delivering these documents. Following each submission, comments generated as a result of the review shall be incorporated.

<u>ADDRESSEE</u>	<u>COPIES</u>
US ARMY ENGINEER DIVISION, HUNTSVILLE ATTN: CEHND-PM-OT (R.LEONE) 106 WYNN DRIVE HUNTSVILLE, AL 35805-1957	5
US ARMY ENGINEER DISTRICT, SACRAMENTO 1325 J. STREET, 12TH FLOOR (S) ATTN: CESPKE-ED-M (D.JONES) SACRAMENTO, CA 95814-2922	2
HQS, US ARMY GARRISON, FORT ORD ATTN: AFZW-DE-ED (L.TEMPLE) FORT ORD, CA 93941-5777	10
COMMANDER HQ, FORCES COMMAND ATTN: FCJ8-BD (V.BONILLA) FORT MCPHERSON, GA 30330-6000	2

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COMMANDER
548TH ORDNANCE DETACHMENT (EODCT)
FORT LEWIS, WA 98433

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4.1 Submittals and Due Dates

<u>SUBMITTAL</u>	<u>DUE DATES</u>
Draft Work Plan and Final Work Plan	Specified under Mod 05, DO 15
Weekly Activities Report	Weekly; faxed to PM
Draft Removal Report	30 calendar days after completion of removals
Final Removal Report	75 calendar days after completion of removals

4.2 Data item A005, Status Report and data item A006, Telephone/Conversation Report are due monthly. The original of each of these reports shall be sent within 10 working days of the end of the reporting period by normal mail to:

US ARMY ENGINEER DIVISION, HUNTSVILLE
ATTN: CEHND-PM-OT (Mr. Leone)
106 Wynn Drive
Huntsville, AL 35805-1957

4.3 Project Manager. The designated USAEDH Project Manager for this delivery order is Mr. Raymond Leone, Ordnance & Technical Programs Division, Directorate of Programs & Project Management; telephone 205-955-1243; fax 205-955-5788.

5.0 APPLICABLE REGULATIONS. See Section C, subsection 3.2.4.4 of the basic contract, plus the following regulation: Fort Ord Regulation 385-1, Installation Safety Manual.

5.1 Fort Ord Regulation 385-1, Installation Safety Manual.

5.2 AR 385-40 with USACE Supplements, Accident Reporting and Records.

6.0 GOVERNMENT FURNISHED

6.1 USACE prepared OEW Archive Search Report.

6.2 Phases I & II Sampling Results Report

6.3 Administrative/Supply space (Bldgs 13,14,15)

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6.4 Explosive Storage Location

6.5 Right-of-entry

6.6 Pertinent UXO Technical publications as required.

6.7 Availability of government furnished equipment shall be coordinated through Mr. Pete Stillson, Property Manager, CEHND-ED-SY Safety, phone (205) 955-5858.

7.0 SPECIAL INSTRUCTIONS.

7.1 During field activities on ordnance projects, hard-hats need not be worn unless a head injury threat is present.

7.2 If a UXO is located within a grid during the final UXO QA search, the contractor will be required to, again, search the entire grid.

7.3 Public Affairs: The contractor shall not make available or publicly disclose any data generated or reviewed under this contract or any subcontract unless specifically authorized by the contracting officer and the Fort Ord PAO. When approached by any person or entity requesting information about the subject of this contract, the contractor shall defer to the Fort Ord PAO or the USAEDH Safety Specialist for response. Reports and data generated under this contract shall become the property of the Government and distribution to any other source by the contractor is prohibited unless authorized by the contracting officer.

ATTACHMENT 19

Fort Ord History

Fort Ord

<http://nimst.tripod.com/cgi-bin/FtOrd.html>

HISTORY

What remains of Fort Ord, is located on the historically rich Monterey Bay Peninsula in central California. In it's hey-day, Fort Ord covered over 28,600 acres. The local topography made it ideal as an infantry training center. This would become it's primary mission. It began during the Mexican-American War in 1846. Com John D. Sloat claimed the Monterey area along with the rest of California for the United States. From 1852 to 1898 the fort was in disuse. While visiting the area in 1879. Writer Robert Lewis Stevenson wrote, "The beaches are white with weathered whale bones." The inland area was mission property. This would become the extensive training areas of Fort Ord. In 1917 the US Army purchased from a Mr. David Jacks the title to what is known today as the East Garrison. As it developed Fort Ord was considered one of the nation's permanent Army posts.

It is bordered on the North by the city of Marina and on the South by Sand City. It's just a few minutes from Seaside, Monterey, Pacific Grove and beautiful Carmel. The agricultural community of Salinas is 14 miles to the East. San Francisco is 115 miles further to the North and Los Angeles is 340 miles to the South.

The post was named after Major General Edward Cresap Ord. General Ord's fame in the history books includes some information on being an Indian fighter. In 1847 He was a lieutenant with Maj Gen J C Fremont's Army when the present site of the nearby Presidio of Monterey was brought into existence. But His actions as a Civil War commander established His military career. He distinguished himself during the Civil War in the Battle of Iuka, Mississippi, operations against Petersburg, Virginia, and the capture of Fort Harrison, Virginia. General Ord is buried at the Arlington National Cemetery.

Army troops occupied the fort for a few months at the end of the Civil War when it was known as Ord Barracks. From 1865 to 1902 the post was inactive. It was not until after the Spanish-American War, {Remember The Maine} that a force of significant size would garrison the fort once again. The 15th Infantry Regiment and the 9th "Buffalo Soldiers" Cavalry returning from duty in the Philippines were assigned to the fort in 1902. Some small refinements were made to the fort during that period. But Fort Ord's true origin of development dates back to the year 1917. In August of that year the US government purchased 15,000 acres next to the area known today as the East Garrison, for the amount of 160,000 dollars. At that time the property was known as the Gigling Military Reservation. The name Gigling originated from a German family that had once held title to the property in that general area. So the fort's official title became Camp Gigling. Between the end of World War I and pre-World War II. Camp Gigling was primarily used as a maneuver area for the 11th "Black Horse" Cavalry and a artillery target range for the 76th Field Artillery. Both units were stationed at the Presidio of Monterey. During the summertime the 30th Infantry Regiment came down from the Presidio of San Francisco to use the reservation for maneuvers as did other Reserve and National Guard units.

By 1933 when the reservation's name was changed to Camp Ord. It's landscaping was brush covered and almost impenetrable in many places. A simple dirt and gravel road

connected the East Garrison and Gigling railroad spur located on Highway #1. There was a water well, a caretaker's house in the center of the reservation and a few bivouac sites. But other than these limited improvements. No additional changes were made at Camp Ord until 1938.

The major changes of 1938 marked the excellent growth of the post. Colonel Homer M. Groninger, who was promoted to Major General at a later date, was in charge of the work and renovation. Utilizing the benefits of President Franklin D. Roosevelt's Works Projects Administration program. Col. Groninger supervised the expansion of the post into a large camp about a mile from the Gigling railroad spur and saw to it that the dense brush areas were cleared for future construction. Col. Groninger was working with an original WPA appropriation of \$800,000. That amount would grow to over \$6,000,000 for additional construction at the post.

On Jan 4th 1940 the first joint Army and Navy maneuvers were held at the fort. A total of 10,000 troops and 1000 vehicles, boats, and horses took part in the maneuvers. Later in 1940 Col. Groninger gave instructions to build the first wooden barracks and mess halls. He included the tent city slabs in the East Garrison. The wooden barracks were suppose to be temporary. Not to last much longer than 5 years. The construction was so well done. They are still there today. The 7th Infantry Division was re-activated on the 1st of July that year. War was becoming a real threat. As a result Congress approved a peace time draft. As fall approached Camp Ord was filling up with new recruits. The plans for a million dollar Soldiers Service Recreation Complex was the result of this large population growth and was beginning to take shape. Its frame work was the brain child of the 7th Infantry's divisional commander, General Joseph W. Stilwell. His nickname was "Vinegar Joe," because of His strong personality. It was His belief that the soldiers should have someplace to go and relax. "This project was started on the basis that it was high time to stop talking about suitable recreational facilities for enlisted men....and doing something about it." Gen Stilwell picked the site and the engineers to construct the buildings. The first to be constructed in the complex was the Soldiers' Club. It was designed by 1LT Savo Stoshitch, 13th Engineers and 2LT Orville W. Pierce 74th Field Artillery. With multiple donations from US soldiers and some additional WPA grants. The building was finally completed in September 1943. It would turn out that the \$500,000 enlisted men's club was the only building to be completed in the proposed post recreation complex which originally called for a gymnasium, stadium, NCO's Club, tennis courts and athletic fields, as well as a chapel. When it first opened it's doors. It was known as the Soldiers' Club. Later the club's name was properly changed to, "Stilwell Hall." Fort Ord held a special place in Gen Stilwell's heart. He delegated that his ashes be scattered along the scenic Monterey Peninsula beaches.

Growth of the Camp's boundaries continued in 1940 to the size of 20,000 areas. In the fall of that same year, Camp Ord became known as Fort Ord. It was also established as a permanent Army installation. More than \$12,000,000 worth of improvements were contracted by the end of 1941. The continued growth of Fort Ord's Main Garrison took place over the next twenty years, between 1940 and the 1960s. The construction started in the northwest corner of the post and then it expanded southward and then finally eastward. When World War II broke out. Ft Ord became a jumping off point for other training areas

like, Camp Roberts, and Fort Hunter Liggett. Fort Ord was also a staging area for many famous fighting divisions and units. Fort Ord's honorable alumni included the 3rd Inf Div,

6th Inf Div, 7th Inf Div, 27th Inf Bde, 32nd Inf Div, 35th Inf Div, and 43rd Inf Div. The 738th Field Artillery Battalion was activated at Fort Ord on June 25, 1943. They were assigned to Gen George S. Patton's 3rd Army. Other units that were not well known. But just as important to the war effort. Were the 2nd Engineer, the 3rd Engineer and the 4th Engineer. As well as the 593rd Amphibian and the 533rd Amphibian, These five engineer and amphibian groups had trained at Fort Ord before being shipped to the Pacific theater. World War II demanded new innovative tactical training with weapons, artillery, air defense and amphibian landings. The concept of combat readiness training was first introduced at Fort Ord. In 1942 the WACs were formed to handle the administrative and non combat duties. After the D-Day invasion many German soldiers were taken prisoner and were interned at the fort's east garrison. The POWs were used to make improvements around Fort Ord. So American troops could concentrate on their training for overseas duty. The largest congregation of troops at any one time was totaled at 50,000. But the average population of soldiers was closer to 35,000.

Once the allies defeated the axis and World War II came to its conclusion. Fort Ord took on a much slower pace. 1946 was the year that Fort Ord officially became a training facility for basic combat and advanced infantry training. This would be its main objective for the next 30 years. In 1947 it became home to the 4th Replacement Training Center. Then on July 15, 1947 the 4th Infantry Division was reactivated and took up residence at the fort. The 4th Inf became responsible for the training of troops who were headed for the Korean conflict which began in June 1950. The 4th Infantry Division moved to Fort Benning, GA on September 22, 1950. It was replaced by the 6th Infantry Division who took over the mission of training troops for assignment in Korea. The 6th infantry continued this task until January 1956. There was continued growth at Fort Ord. The concrete barracks were constructed on 'The Hill.' The airfield was built. The 5th Division being reassigned from Germany moved in until it was deactivated on June 5, 1957. It was re-activated during the 1960s to fight in Southeast Asia. Civilian employees were hired during the 1950s. Many of them ex-military personnel. This created a housing demand that resulted in the creation of the cities Marina, Sand City and Seaside.

It was sometime during the 1950s that the US 6th Army took up quarters at the fort. {I've been informed by veterans via email. That the patch was worn as early as 1952.} Fort Ord became known as the United States main Army Infantry Training Center. Its activity increased with the training of troops headed for Southeast Asia. During the Vietnam conflict it became the major training center in the nation. In 1964 a Drill Sergeant School was opened. It once again was home to basic combat, advanced infantry, and basic unit training for over half a million soldiers. It was the highest overall training of combat ready troops in the fort's history. In 1973 the last American troops departed Vietnam. Another training era had ended. The total number of soldiers trained at Fort Ord from 1940 to 1975 is estimated at 1.5 million.

The defense department first considered an all volunteer Army in 1971 with Project VOLAR. The WACs were abolished. Women were allowed the same advantages as men. It was Oct 25, 1974, when the 7th Infantry Division (Light) occupied Fort Ord. Light infantry troops

operate without heavy tanks, armor, or artillery. The fort officially curtailed all training archives in 1976. In 1985 the 7th IDL became the Army's premier light infantry division. The Cold War ended in 1989. During 1988 'The Base Realignment and Closure Act' had already been passed. Fort Ord was being considered as 'Property In Excess.' In 1989 the 7th IDL was deployed to Panama to restore order and captured dictator Manuel Noriega. In 1990 the 7th IDL joined the coalition troops sent to the middle east to defeat Iraq during Desert Storm. One of their last deployments was to the 1992 Los Angeles riots. Two years later on 15 Jun 1994. The 7th Infantry Division Light was deactivated. In September of 1994 Fort Ord closed it's gates and became part of US military history. 121 military bases have closed since the passing of the 1988 B.R.& C. Act.