

APPENDIX H
RESPONSE TO AGENCY COMMENTS

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DRAFT BASEWIDE REMEDIAL INVESTIGATION/FEASIBILITY STUDY
VOLUME III - BASELINE HUMAN HEALTH RISK ASSESSMENT
FORT ORD, CALIFORNIA

The following are the Army's responses to the comments of the regulatory agencies on the Draft Basewide Remedial Investigation/Feasibility Study. All comments and the associated responses pertaining to Volume III of the Basewide Remedial Investigation/Feasibility Study are provided below.

I. U.S. ENVIRONMENTAL PROTECTION AGENCY GENERAL REVIEW COMMENTS

Comment 17: **Attached please find Attachment C, which includes EPA comments dated October 13, 1994, on Volume III, provided by Jeffrey Paull, EPA Region 9 Toxicologist.**

Response: This comment is acknowledged. The document was not changed in response to this comment.

Comment 18: **Fate and Transport. As discussed in comments on Volume II, the fate and transport of contaminants in soil and groundwater must be evaluated before an adequate baseline risk assessment can be completed. With respect to contaminants found in soils, for instance, the fate and transport analysis should determine at what levels, if any, these contaminants would be at is they migrated to groundwater [this appears to have been done at most RI sites]. Then, if the BRA considered exposure to groundwater as a pathway, the risk from exposure to those levels, if any, should be factored into the BRA.**

Response: Potential migration of contaminants in soil to groundwater is addressed in Volume II, Remedial Investigation, for each of the RI Sites. Fate and transport analysis (using the VLEACH model) was performed as necessary. No impacts to groundwater were identified.

Comment 19: **Please provide additional details to document the certainty of the proposed future reuse scenarios with which the risk assessments are based. For instance, documents, interviews, understandings, etc that form the basis for these scenarios should be further discussed. If uncertainty exists (ie, Site 31,), it may be most prudent to consider the future reuse to be residential in order to be conservative.**

Response: The land use scenarios used in the baseline risk assessment were based on the Fort Ord Reuse Group (FORG) *Summary of Base Reuse Plan* dated January 14, 1994. These scenarios were confirmed for this draft final report by reviewing the Fort Ord Reuse Authority (FORA) *Fort Ord Base Reuse Plan* dated October 14, 1994, and in telephone conversations with Mr. David Salazar of California State University and Ms. Gail Youngblood of Fort Ord. Additionally, the Army has indicated it is willing to accept requirements that land use restrictions be incorporated into deeds and lease agreements for specific areas at Fort Ord.

Comment 20: **Most of the BRA calculations are based on non-residential future scenarios, some of which are quite similar to a standard residential scenario. The BRA showed that the majority of these sites have risk calculations that do not exceed EPAs 10⁻⁶ "point of departure" cancer risk level, are significantly below 1 of the**

non-carcinogen Hazard index, and do not exceed the blood-lead level for lead. Are there any sites for which the Army thinks a BRA calculation based on a residential scenario would meet the protective standards mentioned above? If so, the site would qualify for No Action without triggering the need to comply with ARARs. This would be a calculation that, despite the fact that it does not represent the future cleanup scenario, could alleviate the need for an unnecessary cleanup and save taxpayers' money.

Response: For all of the Fort Ord sites, screening risk evaluations (SREs) were performed using preliminary remediation goals (PRGs) based on a residential scenario. The five RI sites were selected for evaluation in the BRA because the SREs indicated that exposure at these sites is expected to exceed acceptable levels. Therefore, although BRA calculations based on a residential scenario were not performed for some of the RI sites, these sites are not expected to meet the protective standards mentioned above (e.g., 10^{-6} cancer risk level).

II. U.S. ENVIRONMENTAL PROTECTION AGENCY TECHNICAL REVIEW COMMENTS, VOLUME III - BASELINE HUMAN HEALTH RISK ASSESSMENT

General Comments

Comment 1: Selection of Receptors and Exposure Pathways: As noted under our specific comments, the potential future receptors considered at each site, are very narrowly defined based upon very specific reuse plans. There is a concern that where reuse plans are subject to change, the risk assessment may not account for all possible receptors and pathways. In particular, the residential setting is the customary default exposure scenario for baseline risk assessments at Superfund sites, and should always be considered wherever reuse plans for a site have not been finalized. The risk assessment should be flexible enough to allow for different types of receptors, and for future changes in reuse plans.

Response: As discussed between EPA, Cal/EPA, RWQCB, COE, and HLA, future land use plans from the Fort Ord Reuse Group (FORG) were used as the basis of the future exposure scenarios in the Baseline Risk Assessment (BRA). The use of these plans is considered to represent a reasonable approach for assessing potential future impacts. Additionally, the Army has indicated it is willing to accept requirements that land use restrictions be incorporated into deeds and lease agreements for specific areas at Fort Ord.

A residential exposure scenario was conservatively evaluated for all sites in which there was not definitive future land use information. EPA guidance was followed in evaluating those sites not expected to be used as residential property in the future; this guidance clearly indicates that residential land use should not be evaluated in cases where it is not expected (EPA, 1989b, 1990f). In addition, the toxicity assessment and exposure scenarios evaluated in the BRA are conservative in nature and provide estimates of potential health risks from long- and short-term reasonable maximum exposures. As demonstrated in the Uncertainty Analysis in Section 8.0, it is expected that the results of the BRA overestimate, rather than underestimate, potential health risks.

Although they are not expected to occur, significant changes in proposed land uses (e.g., change of commercial/industrial use to residential property) in the future may warrant reevaluation of the potential for health impacts, if exposures associated with the change in land use status are expected to be greater than those evaluated in the BRA. For land uses with expected exposures equal to or less than those evaluated in the BRA, the analysis provides a conservative framework for health-protective management of the properties in the future.

Comment 2: **Site Conceptual Models: The inclusion of diagrams of conceptual models which illustrate exposure sources would greatly clarify the site descriptions and data tables provided in the risk assessment.**

Response: Schematic diagrams presenting the Conceptual Site Model (CSM) for each site have been added to the document as Figures 2.1 through 2.5 in the Draft Final BRA. These CSMs are discussed in Volume II, Section 1.0, and in the Exposure Assessment sections for each site of Volume III (Sections 3.4.1, 3.4.2, 4.4.1, 4.4.2, 5.4.1, 5.4.2, 6.4.1, 6.4.2, 9.4.1, and 9.4.2).

Comment 3: **Site Characterization: We strongly recommend that the target ranges be characterized separately from the rest of Site 3, and that human health risk be assessed independently for them. Their unique topographical features, deposits of spent ammunition, high lead surface soil concentrations, restricted access, and sensitive ecological habit make them qualitatively different from the rest of the site.**

Response: Section 5.0 of the BRA has been revised to provide separate risk estimates for areas with less than 1 percent, between 1 and 10 percent, and greater than 10 percent bullet cover, in addition to the evaluation of weighted surface area exposures presented in the draft report.

Comment 4: **Hazard Identification/Data Analysis: There are many references in the text and tables to samples analyzed for hexavalent chromium, but the results of these analyses were not presented in the document. In order to evaluate total chromium as the trivalent form, representative monitoring and analytical data for hexavalent chromium, with the corresponding limits of detection, are required.**

Response: The statistical summary tables for each site have been revised to include the available data for hexavalent chromium. The number of samples collected and the corresponding range of detection limits for the metal are also presented; no hexavalent chromium was detected in any of the samples from the RI sites.

Comment 5: **Health-Based Soil Threshold Level for Lead: The health-based soil threshold level of concern of 1,925 mg/kg estimated for the resident child is significantly higher than the USEPA Region IX Pre-Remedial Goal (PRG) for lead of 400 mg/kg, and appears to be the result of non-standard inputs into the UBK lead exposure model (see specific comments below).**

Response: The LEAD6 uptake/biokinetic (UBK) model was used to evaluate offsite child residents visiting or trespassing at Sites 3 and 31. Several modifications have been made to the analysis (see Appendix F of Volume III) to address concerns raised by EPA and DTSC regarding the UBK modeling. A revised health-based threshold soil concentration for the visitor/trespasser resident receptor of

1860 mg/kg has been developed. This threshold concentration was derived on the basis of site-specific exposure assumptions about a possible child visitor/trespasser receptor. The Region IX Preliminary Remediation Goal (PRG) of 400 mg/kg is a screening concentration based on onsite residential exposures. It is therefore not directly comparable to this threshold soil concentration.

Comment 6: **Background Concentrations and Risk Characterization:** The risk assessment utilizes background concentrations in the process of screening for chemicals of potential concern (COPCs), and in estimating the site-related contribution to health risk. However, it is inappropriate to subtract background when characterizing the probability of non-cancer toxicity. Doing so could lead to erroneous conclusions about the potential for adverse health effects to occur.

Response: The comment is acknowledged. The text and tables have been revised as suggested.

Specific Comments

Comment 1: **Table 2.9, Reference Doses and Slope Factors for Chemicals of Potential Concern:** A random check of the values listed in this table revealed numerous departures from current USEPA Region IX toxicity values. The current USEPA toxicity values are listed in Table 1. The last column in the table indicates that the current EPA toxicity values will result in the calculation of a decreased cancer risk for most substances, but an *increased risk* for bis(2-ethylhexyl)phthalate, and pentachlorophenol.

Please consult and use current USEPA toxicity values, available on-line, and updated monthly, from the USEPA Integrated Risk Information System (IRIS) Database. Where current Cal/EPA toxicity values are more conservative (result in higher calculated risks) they should be used in place of USEPA values. The reference and date for the toxicity values used, whether USEPA, or Cal/EPA, should be specified in the document. Risks for all chemicals of potential concern (COPCs) should be calculated using the most current toxicity values.

Table 1. Current USEPA Region IX Toxicity Values

Chemical	Oral RfD Chronic (mg/kg-day)	Inhalation RfD Chronic (mg/kg-day)	Oral SF (mg/kg-day) ⁻¹	Inhalation SF (mg/kg-day) ⁻¹	Magnitude of Recalculated Risk
VOCs					
Carbon tetrachloride		5.7E-04	1.3E-01	5.3E-02	decrease**
Chloroform		1.0E-02	6.1E-03		decrease**
Methylene chloride		8.6E-01	7.5E-03	1.6E-03	decrease
Tetrachloroethene		1.0E-02	5.2E-02	2.0E-03	decrease**
Trichloroethene	6.0E-03	6.0E-03	1.1E-02	6.0E-03	decrease**
SOCs					
Benzo(a)pyrene			7.3E+00	7.3E+00	decrease
Bis(2-ethylhexyl)phthalate		2.2E-02		1.4E-02	increase
Pentachlorophenol		3.0E-02		1.2E-01	increase
Pesticides					
4,4'-DDT		5.0E-04			unchanged**
Metals					
Cadmium				6.3E+00	decrease
Manganese	5.0E-03				decrease
Mercury		8.6E-05			decrease
Nickel				8.4E-01	decrease

* From Region IX Preliminary Remediation Goals (PRGs) Second Half 1994, dated August 1, 1994.

** Noncancer risk may increase.

Response : The toxicity values used in the draft BRA report are consistent with the hierarchy and suggestions made in this comment. The BRA was revised to use additional toxicity values as discussed in the October 5, 1994 meeting between the Army, EPA, and HLA. Specifically, ingestion reference doses have been used as inhalation reference doses when no EPA or Cal/EPA value is available. Section 2.3 has been revised to present those values, and to present more information on the basis for the toxicity values used.

Comment 2: **Soil to Skin Adherence Factor, Sec. 2.2.5.3, p. 13:** As noted in the document, EPA's dermal absorption guidance recommends a soil-to-skin adherence factor of 1.0 mg/cm²-day for upper-bound exposures. The adherence factor of 0.4 mg/cm²-day utilized in the risk assessment is inconsistent with this guidance, and with the default value of 1.0 used for estimating alternative PRGs for Fort Ord (Second Addendum to the Technical Memorandum Preliminary Remediation Goals,

Alternate PRGs for Site 33, HLA, April 7, 1994). When alternative exposure factors are utilized in place of standardized EPA default exposure assumptions, particularly in the RME scenario, the document needs to present supporting documentation, and reference(s) to the literature which supports the proposed value.

Response:

A RME soil-to-skin adherence factor (AF) of 0.4 milligrams per square centimeter (mg/cm²) was developed based on information presented in the *Dermal Exposure Assessment: Principles and Applications* (EPA, 1992m). The RME AF was developed using the assumption that not all of the skin is exposed at upper-bound levels. The heaviest soiling occurs on the palms of the hands and inner forearms, and the balance of the arms, and the face and neck are less exposed. Specific EPA information that resulted in an RME AF of 0.4 mg/cm²-day is presented below:

- The AF of 0.5 mg/cm² to 1.5 mg/cm² based on two studies of skin soiling measured on the palms of the hands of children in playgrounds "may be high for other parts of the body that probably have less contact"
- The contact rates measured in the other study upon which the default AFs were based "may not be representative of normal behavior. Parts of the body that have less intimate contact with the soil will likely have lower values"
- The range of values considered in developing the default AFs "is derived from hand measurement only; it may overestimate average adherence for the entire exposed skin area"
- "the lower end of this range (0.2 mg/cm²) may be the best value to represent an average overall exposed skin", which apparently includes heavily soiled skin.

Therefore, the upper-bound AF of 1.0 mg/cm² was used to estimate exposure at the most heavily soiled skin areas, and the AF of 0.2 mg/cm² was used to estimate exposure to other skin areas. These AFs were used with 50th percentile values for the areas of the surfaces considered to develop an area-weighted AF of 0.4 mg/cm² (See table below).

Description	Adherence	Area (A) (cm ²)	Adhered
	Factor (AF) (mg/cm ²)		Soil (AS) (mg)
hands (front)	1	420	420
hands (back)	0.2	420	84
forearms (front)	1	570	570
forearms (back)	0.2	570	114
upper arms	0.2	1430	286
face and neck (head)	0.2	1180	236
Sum		4590	1710

Area values obtained from *Exposure Factors Handbook (EPA 1990b)* Table 4-1

^aAS = AF x A

^bArea-weighted AF = Sum of areas divided by the sum of adhered soil

Additionally, day-to-day exposure generally involves a variety of different activities. Activities resulting in heavy soiling are unlikely to occur at every exposure opportunity. This analysis indicates that an AF of 0.4 provides a very conservative estimate of day-to-day soiling of exposed skin areas. This justification has been added to Section 2.2.5.3.

Comment 3: **Methods for the Uptake Biokinetic Model, Sec. 2.2.9.1, p. 18: Certain default values selected as inputs to the UBK model appear to be incorrect, resulting in an underestimate of blood-lead concentrations, and an overestimate in the health-based soil threshold level of concern (see comment on Lead Model Output, Appendix F).**

Response: The UBK modeling and associated text have been revised in response to this comment. See responses to EPA General Comment 5 and Specific Comment 41 for more details on the revised approach.

Comment 4: **Data Evaluated, Site 2, Sec. 3.2.1, p. 24: The text states that the following 13 metals were detected in at least one soil surface sample: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. However, as shown in Table 3.1a, there were only three analyses for each of these metals, and for seven of them, they were detected in only one sample. The document did not offer an explanation as to why so few surface soil samples were taken for these metals, or relate the sampling locations back to the site conceptual model.**

To find an explanation for this lack of monitoring data, Volume II of the Remedial Investigation was examined. Based on the description presented in Sec. 2.1.2.2, p. 13, of that document, it appears that the two soil samples were collected from within the sludge of one sludge bed, and immediately below the asphalt liner of the other sludge bed. The third surface sample appears to have been collected near the drain pipe outlet in the southeast corner of the site. Apparently no surface soil samples were collected from either of the two ponding areas.

The limited number of monitoring sites, and distribution of the surface soil monitoring data appears to be insufficient to adequately represent site 2 surface soil concentrations, particularly in the presence of significant background concentrations of many these metals.

Response: No chemical discharges to surface soils were suspected at Site 2. Soil sampling was initially performed to evaluate the potential for contamination of soils by sludges in drying beds. No substantial contamination was detected and additional sampling was therefore not performed as part of the RI/FS. Additional surface soil sampling at the site was recently conducted as part of the Ecological Risk Assessment (ERA). These data were incorporated into the Draft Final BRA data set, and potential health risks were recalculated for the site. These changes are reflected in Sections 3.0, 3.2, and 3.3.1, and Tables 3.1a, 3.5, 3.10, and 3.15.

Comment 5: Selection of Chemicals of Potential Concern (COPCs), Soil, Sec. 3.3.1, p. 25: The document states that the maximum concentration of each metal was first compared to the depth-specific Fort Ord NQTP soil background concentration for the metal, and eliminated as COPCs if their concentrations did not exceed background. However, it may be statistically inappropriate to compare the maximum detected value from limited monitoring consisting of three samples, with either the maximum concentration, or the 95 percent UCL of the mean concentration from more extensive background monitoring, as is done in Table 3.5 of the risk assessment.

An explanation of how background concentrations were determined needs to be incorporated into the document. This explanation should present the number of samples analyzed at each depth, and for each soil type, and descriptive statistics for soil sample background concentrations, including the frequency of detection, sample mean, standard deviation, variance, and 95 percent upper tolerance limit. If this data is presented elsewhere, it should be referenced, and clearly summarized in the document.

Response: The maximum detected concentration was used because calculation of an upper 95 percent confidence level for a set of three samples for which there is no expectation that the population is normally distributed does not provide a meaningful or useful concentration estimate. If a metal did not exceed the maximum background concentrations in any sample analyzed, the metal was not considered to be present as the result of a release at the site and was not selected as a COPC. Using the maximum concentration in the COPC screen is conservative. No changes were made in the document in response to this comment.

Descriptive statistics of background concentrations of metals in soil at Fort Ord are presented in Appendix A. The development of these background values follows the consensus approach reached in meetings between the COE, EPA, Cal/EPA DTSC, RWQCB, and HLA, and described in detail the *Draft Final Basewide Background Soil Investigation, Fort Ord, California* (BBSI) dated March 15, 1993 (HLA, 1993e). The use of background soil concentrations in the BRA are discussed in Section 2.1.2.1. The text of Section 2.1.2.1 has been revised to refer the reader to the BBSI for further information. In addition, Appendix G has been added to present the background concentrations used.

Comment 6: Leaching, Sec. 3.4.1.4, p. 28: The document states that "the chemicals identified as COPCs in soil at Sites 2 and 12 have limited water solubilities and high soil sorption tendencies." Supporting data for this statement should be presented.

Response: The comment is acknowledged. Chemical properties pertaining to chemical fate and transport are presented in Section 3 of the Introduction to Volume II of the RI/FS report (i.e. Binder 2). The text of Section 3.4.1.4 was revised to identify the basis for statements about chemical mobility.

Comment 7: Possible Noncancer Health Effects, Site 12, Sec. 3.6.1.2, p. 30: The total multipathway hazard index (HI) of 2 for a resident child, indicates the potential for noncarcinogenic health effects under RME conditions. There should be no "correction" made for background by subtracting the multipathway RME HI for exposure to the background concentration of arsenic in soil. It is important for

the risk manager to recognize that a child might receive a dose of arsenic in excess of the threshold for toxicity at Site 12, regardless of the fact that some fraction of the dose arises from background arsenic.

Response: Discussion of correcting hazard indices to account for background exposures has been removed from the text throughout the document.

Comment 8: **Statistical Data Summary of Chemicals Detected in Surface Soil, Subsurface Soil, Deep Soil, and Groundwater, Tables 3.1, 3.2, 3.3, and 3.4: These data tables do not indicate which chromium samples were analyzed for hexavalent chromium. Note (f) to Table 3.5 states that chromium was evaluated as chromium III and that chromium VI was not detected, but nowhere in the document are the sampling results for chromium VI presented. Without this data, chromium VI cannot be eliminated as a COPC.**

Response: See the response to EPA General Comment 4.

Comment 9: **Possible Cancer Risk, Site 12, Sec. 3.6.2.2, p. 31: It is not clear why, in characterizing the risk associated with carcinogenic PAH, only data for two surface samples analyzed by EPA Method 8310 were used, and why the data from 35 surface soil samples analyzed by EPA Method 8270 were rejected. Although the detection limit for the Method 8270 samples is higher, these 35 sample results (using one-half the detection limit of 0.3 mg/kg for non-detects) provide a better statistical representation of actual site PAH concentrations than does the single data point of 1.25 mg/kg detected using the 8310 method.**

Response: The text and tables to Section 3.0 were changed to reflect a dataset including PAH analyses from both EPA Methods 8310 and 8270.

Comment 10: **Uncertainty Analysis, Sec. 3.7, p. 31: This section refers to maximum intake rates for drinking water (i.e., 2 liters per day for adults) as unrealistic, and that it "most likely overestimates actual exposure, particularly in light of the probability distributions for tap water ingestion rates recently presented in peer-reviewed literature." Although there is no need to present reference(s) to the literature which support this assertion, since 2 liters/day is used in the RME scenario, in the absence of such references, this assertion stands as an unsupported editorial comment, and should be deleted.**

Response: The subject statement has been deleted from Section 3.7.

Comment 11: **Groundwater, Sec. 4.2.6, p. 38: In evaluating the groundwater data, the criteria used to select the dataset collected from August 1993 to February 1994, as representative of current groundwater conditions, needs to be explicitly stated.**

Response: The text of Section 4.2.6 has been modified to clarify the rationale for selecting the groundwater dataset used in the BRA.

Comment 12: **DOL Maintenance Yard, Sec. 4.3.1, p. 38: An explanation is needed for why no surface soil samples were collected in this area, particularly when 16 chemicals were detected in subsurface soil. Without data for surface soil samples, it is inappropriate to omit this area from the quantitative risk evaluation.**

Response: Additional surface soil samples at the DOL Maintenance Yard were recently collected and analyzed as part of the Fort Ord Basewide Ecological Risk Assessment. The resultant data have been incorporated into the Draft Final BRA dataset, and potential health risk estimates have been recalculated using the new dataset. Additional surface soil samples have also been recently collected for site characterization purposes; however these data are not available for inclusion in the Draft Final BRA. The results of this additional soil sampling will be qualitatively evaluated at a later date to assess the potential impact (if any) on the results of the BRA.

Comment 13: **Pete's Pond, Surface Soil, Sec. 4.3.2.1, p. 39: Beryllium, which exceeded surface soil background concentrations, was eliminated as a COPC based on noncancer risk. This is not consistent with EPA cancer risk assessment guidelines, which considers beryllium potentially carcinogenic through the oral as well as the inhalation route, with an oral slope factor of 4.3 (mg/kg-day)⁻¹.**

A random check of the toxicity screen evaluation, using standard EPA exposure assumptions for residential soil, as listed in the Region IX Preliminary Remediation Goals (PRGs) showed that two metals detected above background concentrations in surface soil, copper and mercury, exceeded the screening hazard quotient of 0.01, and should be retained as COPCs.

Response: The oral SF for beryllium was not included in the Draft BRA on the basis of Cal/EPA guidance indicating that the chemical is not carcinogenic via oral exposures. However, to address EPA's concern with this approach, oral exposure to beryllium has been added to the toxicity screening analysis (Appendix C) and subsequent risk estimates to evaluate possible cancer risks from such exposure. Also, see the response to EPA specific Comment 1.

The toxicity screening approach used in the Draft BRA was discussed with EPA and Cal/EPA representatives and agreed upon prior to submittal of the document. Although the screening assessment did not specifically use Region IX PRGs, the methods used are conservative and provide a reasonable basis for COPC selection. The use of a target hazard index of 0.01 and a target cancer risk of 10⁻⁸ provides a substantial margin of conservatism to the analysis. Also see the response to EPA Specific Comment 1.

As discussed in the October 5, 1994 meeting of EPA, the Army, and HLA, the toxicity screening methods have been revised to include evaluation of potential inhalation exposures for carcinogenic metals. The text and tables in Appendix C have been revised to reflect this change; the selection of COPCs and risk characterization results have also been revised accordingly.

Comment 14: **Pete's Pond Extension, Sec. 4.3.3, p. 40: A random check of the toxicity screen evaluation, using standard EPA exposure assumptions for residential soil, as listed in the Region IX PRGs showed that two metals detected above background concentrations in surface soil, cadmium and mercury, exceeded the screening hazard quotient of 0.01, and should be retained as COPCs.**

Response: See the response to EPA Specific Comment 13.

Comment 15: **Site 17 Disposal Area, Subsurface Soil, Sec. 4.3.4.2, p. 41: As indicated in Table 4.11b, copper, with a calculated screening hazard quotient of 0.01, should be retained as a COPC.**

Response: The analysis (Section 4.3.4.2, and Table 4.11b) has been modified to include copper as a COPC.

Comment 16: **Site 17 Disposal Area, Groundwater, Sec. 4.3.5, p. 42: Toluene, detected at a maximum concentration of 1.1 mg/liter in the A-aquifer, exceeds the USEPA Region IX PRG of 0.72 mg/liter. This indicates that the use of standard EPA exposure assumptions would result in a hazard quotient exceeding 1.0, and that toluene should be retained as a COPC.**

Response: The groundwater concentrations presented in Table 4.12 were erroneously presented in units of mg/l; toluene was actually detected at 1.1 ug/l. Table 4.12 has been revised to reflect the correct units. Toluene remains a non-COPC at Site 17 Disposal Area.

Comment 17: **Exposure Assessment, Chemical Vapors, Sec. 4.4.1.1, p. 43: As noted in the comment on Section 3.4.1.4 above, rather than making general statements concerning the physical properties of each COPC, specific data, including solubility, molecular weight, vapor pressure, Henry's Law constant, and organic carbon partition coefficient should be provided in a table, and a screening risk calculation for a representative COPC (e.g., TCDD-TE) should be performed, before the volatilization pathway is eliminated for all COPCs detected.**

Response: See the response to EPA Specific Comment 6. In addition to providing table of chemical properties in the Draft Final RI (Volume II) which indicates TCDD is unlikely to significantly volatilize, screening calculations based on these chemical properties were performed and indicate that volatilization of TCDD from Site 16/17 soils would not result in cancer risk estimates greater than 10^{-6} .

Comment 18: **Potential Receptors and Exposure Pathways, DOL Maintenance Yard, Sec. 4.4.2.1, p. 44: As noted in the comment on Section 4.3.1 above, the lack of any surface soil samples for the DOL Maintenance yard is a serious data omission, particularly in view of the fact that possible future onsite receptors include construction workers. The statement that no COPCs were identified in subsurface soils does not provide adequate justification for not quantitatively evaluating exposures of potential future receptors in the DOL Maintenance Yard, particularly when 16 chemicals were detected in subsurface soil, and the potential for leaching is considered to be low (as stated on the same page of the document, in Section 4.4.1.4). Without data for surface soil samples, it is inappropriate to omit this area from the quantitative risk evaluation in the Baseline Risk Assessment.**

Response: See the response to EPA Specific Comment 12.

Comment 19: **Potential Receptors and Exposure Pathways, Site 17 Disposal Area, Sec. 4.4.2.4, p. 46: The assumption that student residents are likely to be on campus more frequently and for longer periods of time than other potential receptors is subject to doubt. Faculty and administrative staff may be present on campus over**

periods of time that spans decades, while students average 5 years or less. It is also entirely possible that some faculty and administrative staff, like some students, would choose to live in on-campus housing. The potential receptors for Site 17 should therefore include resident faculty and their families; account for exposure to sensitive subgroups (e.g., pregnant women, infants, children); and include the relevant exposure pathways (e.g., breast milk, homegrown vegetables).

Response: As agreed during discussions between the EPA, Fort Ord, and HLA, review of the site reuse plans for the Site 17 Disposal Area indicates that unrestricted residential development of the site is unlikely. Accordingly, possible health risks associated with Site 17 were evaluated using a student resident receptor residing at the Site 17 Disposal Area to address RME.

Comment 20: **Potential Receptors and Exposure Pathways, Groundwater, Sec. 4.4.2.5, p. 46: See comment on Section 4.4.2.4 above. In addition, the statement, "Other groundwater COPCs exceed either the screening HQ or the cancer screening risk, but not both" is not an adequate explanation for why only carbon tetrachloride is mentioned for evaluation as a COPC in the upper 180-foot aquifer, and not the other two COPCs, tetrachloroethylene, and trichloroethylene that were detected there.**

Response: The text (Section 4.4.2.5) has been modified to clarify the COPC selection process for groundwater at Sites 16 and 17. Also, see the response to EPA specific Comment 19, above.

Comment 21: **Exposure Scenarios, Student Resident, Sec. 4.4.3.1, p. 47: The basis for the assumption that student residents spend only 2.5 hours per day outdoors should be provided. For students who engage in sports, or other outdoor activities (e.g., bicycling, hiking, jogging) this estimate would appear to be low.**

Response: The analysis has been revised to include a student resident receptor with an exposure time of 20 hours per day. The text of Section 4.4.3 has been revised to include the rationale for this assumption.

Comment 22: **Exposure Scenarios, Construction Worker, Sec. 4.4.3.3, p. 48: The soil ingestion rate of 50 mg/day suggested as the upper-bound value for the commercial/industrial worker in Section 2.2.5.1, is not appropriate for the construction worker that is directly exposed to soil while working onsite. For this exposure scenario, a soil ingestion rate of 480 mg/day should be used (Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors, OSWER Directive 9285.6-03, March, 1991).**

Response: The reasonable maximum exposure (RME) scenarios for the utility and construction workers evaluated in the BRA utilized a soil ingestion rate of 100 mg/day (not 50 mg/day), as indicated in Table 2.5. However, the BRA has been revised to use the recommended RME soil ingestion rate of 480 mg/day for these receptors in response to this comment; 50 mg/day has been retained in the average exposure scenario. The appropriate changes have been made in Section 2.2.5.1 and Table 2.5.

Comment 23: **Exposure Point Concentrations, Sec. 4.4.4, p. 49: The exposure point**

concentrations (EPCs) used for the utility worker at Pete's Pond Extension, and the construction worker at the Site 17 Disposal Area should include the COPC concentrations detected in soil at the surface (0 to 2 bgs) as well as the subsurface (2 to 10 bgs) depths. In addition, the average and RME EPC calculated for TCDD-TE at Pete's Pond is highly uncertain because only one sample was analyzed for CDDs and CDFs.

Response: The exposure point concentration estimates for the both the utility and construction workers have been changed as recommended to include all soil data collected to a depth of 10 feet. Also, additional soil samples were collected and analyzed as part of the Fort Ord Basewide Ecological Risk Assessment for Sites 16 and 17, as indicated in the response to EPA Specific Comment 12 above. These data, which include the results of additional dioxin and furan analyses, have been incorporated into the dataset for the Draft Final BRA and are carried through the BRA analysis. The appropriate changes have been made to the text and tables of Sections 4.0 and 9.0 of the Draft Final BRA.

Comment 24: Data Evaluation, Sec. 5.2, p. 54: We do not approve of the method of "surface area weighting" the concentrations of chemicals detected at Site 3, in proportion to the surface areas of Study Areas 1 and 2 having different percentage of bullet cover. This is a non-validated, subjective, and unreliable method of treating the data, and cannot be substituted for representative soil monitoring data. Since the target areas represent exposure areas of potential concern to future receptors, particularly children, the soil concentration data should be evaluated separately from the rest of Site 3, and EPCs should be derived specifically for the target areas. We also view as inappropriate, the presentation of surface area weighted chemical concentrations, rather than the actual concentrations detected, in Table 5.3.

Response: The BRA has been revised to evaluate risks for each target area separately, in addition to the evaluation of weighted surface area exposures. Potential health risks have been separately evaluated for those areas with: less than 1 percent, between 1 and 10 percent, and greater than 10 percent bullet cover. EPCs estimated using the analytical data from 0 to 10 feet below ground surface (bgs) for those areas were substantially lower than the EPCs used to evaluate park ranger receptors and visitors. A construction worker receptor, used to evaluate possible exposure to subsurface soils, was therefore not evaluated separately. The Section 5.0 text and tables have been revised to provide more details of this analysis.

Comment 25: Potential Receptors and Exposure Pathways, Sec. 5.4.2, p. 57: Based on the reuse description for Site 3, utility and construction workers should also be considered as potential receptors, using the recommended soil ingestion rate of 480 mg/day for an excavation worker.

Response: The BRA has been revised to discuss utility and construction worker receptors at Site 3.

Comment 26: Exposure Point Concentrations, Sec. 5.4.4, p. 59: As in the comment above, surface area-weighted soil concentrations should not be used to calculate EPCs; they should be calculated directly from site-specific soil concentrations.

Response: See the response to EPA Specific Comment 24.

Comment 27: **Toxicity Assessment, Sec. 5.5, p. 59: Although Inhalation Reference Concentrations (RfCs) have not yet been developed for either antimony or copper, the inhalation pathway should not be eliminated from consideration of noncancer effects resulting from inhalation of these two metals. RfCs, estimated from the ingestion RfDs, after making appropriate route-to-route dosimetric adjustments, may be employed.**

Response: See the response to EPA Specific Comment 1.

Comment 28: **Possible Noncancer Health Effects, Sec. 5.6.1, p. 59: The multipathway HI for the RME of 30 years for the nearby resident receptor is very close to 1 (0.9), and with the recalculation of EPCs, as indicated above, could easily exceed 1. In addition, exposure assumptions for these receptors need modification--the park ranger receptor, or excavation worker would be expected to be more highly exposed to lead on the site than park visitors.**

Response: Comparisons of the HIs estimated for the resident receptor and the park ranger are shown on Tables 5.7 and 5.8, respectively. The method used to calculate HIs in the Draft BRA was changed in the Draft Final BRA. The HI calculation in the Draft BRA summed the age-range HIs for child receptors; the Draft Final BRA does not because such summing is unnecessarily conservative (see NTSC specific Comment 36). The offsite child resident receptor has the highest HI because of very conservative assumptions about: 1) the low body weight (the child receptor body weight is assumed to be one-fifth that of the adult receptor), and 2) the high soil ingestion rate (twice that of the adult receptor) (Tables 2.5, 5.5b, and 5.7). This differential is only partly offset by the difference in exposure frequency (the park ranger receptor is assumed to be present 2.6 times as often as the offsite child resident receptor).

Comment 29: **Lead Exposure, Sec. 5.6.3, p. 60: The lead models (UBK AND LEADSPREAD) needs to be re-run using the recalculated EPCs that are based on non-surface area-weighted soil concentrations.**

Response: Please see response to EPA Comment 24 above. The LEADSPREAD and UBK models were rerun as requested.

Comment 30: **Uncertainty Analysis, Sec. 5.7, p. 60: We do not agree with the assumption that the uncertainty involving the methods used to weight the chemical concentrations by the distribution of spent ammunition at locations within Site 3 does not significantly add to the uncertainty of the BRA for Site 3--it is our view that it does.**

Response: The BRA has been revised to provide additional analysis addressing this comment (see Sections 5.2, 5.4.4, 5.6, and 5.7).

Comment 31: **Summary of the Baseline Risk Assessment for Site 3, Sec. 5.8, p. 60: For the reasons set forth in comments on Sections 5.2, 5.4.4, 5.5, 5.6.1, 5.6.3, and 5.7 above, we cannot agree with the conclusion that potential adverse health effects resulting from potential exposure to the COPCs at Site 3 are not expected.**

Response: The BRA for Site 3 (Section 5.0) has been revised substantially, as described in

the responses to EPA Specific Comments 24 through 30 above.

Comment 32: **Possible Cancer Risks, North Slope, Site 31, Sec. 6.6.2.1, p. 71: We do not agree with the conclusion that the cancer risk estimated for B(a)P-TE for the RME scenario is not a valid result, representative of actual conditions, based on the finding that the arithmetic mean concentration exceeded the actual measured concentration in only one detected sample. It appears, from Table 6.1a, that the detection limits for B(a)P-TE were too high relative to the actual soil concentrations, and the single value reported of 0.2 mg/kg, may in fact, be representative.**

Response: The detection limits for the PAHs were not substantially elevated in the analyses performed on Site 31 soil samples, but the maximum detected concentration was less than the reporting limit. The statistical methods used were revised to eliminate from the calculations concentrations reflecting one-half the detection limit (i.e., in samples where the chemical was not detected) if the value was greater than the maximum detected concentration. Section 6.6.2.1 has been revised to reflect this approach.

Comment 33: **Summary of Possible Cancer Risks, Sec. 6.6.2.4, p. 72: Because we do not agree with the conclusion drawn for B(a)P-TE cancer risk in the comment above, we do not agree with the conclusion drawn here, that the RME total cancer risk of 2×10^{-6} does not represent an actual elevated risk.**

Response: See the response to EPA Specific Comment 32. No changes were made to the document in response to this comment.

Comment 34: **Summary of Baseline Risk Assessment for Site 31, Sec. 6.8, p. 73: The last sentence should be changed to read: "The results of the lead exposure evaluation, and the cancer risk evaluation, indicate that remediation based on possible human health effects is required for Site 31.**

Response: Cancer risk estimates for Site 31 have been revised in response to other EPA and Cal/EPA DTSC comments; the highest cancer risks no longer exceed 10^{-6} . The text of Section 6.8 has been revised to reflect the revised risk estimates.

Comment 35: **Physical Setting, Site 39, Sec. 9.1.1, p. 1: Please provide a more complete explanation for why no chemical data were collected from the 17 small arms ranges.**

Response: Please note that section numbers for the Site 39 BRA have changed from 9.0 to 7.0. The text of Section 7.1.1 has been revised to address this comment.

Comment 36: **Data Evaluation, Sec. 9.2, p. 3: Please provide a more complete explanation for why the analytical data for 24 soil samples from Range 36A were not included in the BRA.**

Response: The analytical data for 24 soil samples collected from Range 36A by JMM were reviewed, and are discussed in detail in Volume II, Remedial Investigation Site 39, Section 3.1. Data for these 24 samples were not included in the BRA because complete validation by HLA was not possible, and a review of the data indicated exclusion of these data does not significantly impact the results of the BRA.

Comment 37: Groundwater, Sec. 9.2.2, p. 4: Please provide a more complete rationale for the statement: "Results of the groundwater sampling indicate that groundwater beneath Site 39 does not appear to have been impacted by site activities."

Response: The text of Section 7.2.2 has been revised to address this comment. In addition, potential impacts to groundwater quality at Site 39 are discussed in Volume II, Remedial Investigation Site 39. Although the groundwater at Site 39 does not appear to have been impacted by site activity, potential exposures to COPCs in groundwater were evaluated in the BRA.

Comment 38: Selection of Chemicals of Potential Concern, Soil, Sec. 9.3.1, p. 5: Please provide data on environmental stability, transformation, and degradation rates for the three explosives (nitroglycerin, 4-nitrophenol, and PETN) which could not be evaluated in the toxicity screen.

Response: Section 7.3.1 has been modified to incorporate information regarding the stability and persistence of nitroglycerin, 4-nitrophenol, and PETN.

Comment 39: Potential Exposure Pathways, Sec. 9.4.3, p. 9: This is another site in which additional future receptors, and exposure pathways should be considered; for example, the hypothetical offsite resident exposed to chemicals in surface soil via inhalation of dust, may also be exposed via ingestion, dermal absorption, and inhalation on site, as a visitor/trespasser.

Response: The text of Section 7.4.3 has been modified to emphasize that exposure to COPCs at Site 39 by trespassers is not expected because contaminated areas at Site 39 are located within the interior of the site. The probability of a trespasser successfully reaching the inner portions of the site on a repeated basis (i.e. exposure of a significant frequency and duration) is low due to unexploded ordnance in the area.

Comment 40: Toxicity Screen Evaluation, Appendix C, p. C1: The risk assessment assumes that ingestion represents the most significant exposure route, and therefore toxicity screens did not evaluate either inhalation or dermal contact. Although it is unlikely that either of these routes drive the overall risk, the inhalation route, particularly for the carcinogenic metals, and the dermal route, particularly for the semivolatiles, such as PAHs, should be included in the toxicity screen. In addition the toxicity screening evaluation should be conducted for the most sensitive receptor (i.e., the child) for noncancer endpoints.

For the purpose of conducting toxicity screening evaluations, we recommend the use of USEPA Region IX PRGs, which incorporate the appropriate exposure pathways and receptors, and have been approved for this purpose by Cal/EPA.

Response: See the response to EPA Specific Comment 13.

Comment 41: Lead Model Output, Appendix F, Tables F-1 & F-2: We do not understand the use of the term sediment in the tables. Does this value refer to outdoor soil concentrations? We also do not understand the zero exposure assumption for house dust. This value would not be supportable for any residential scenario on site, and would result in a significant underestimate of blood lead concentrations in the output of the model. The health-based soil threshold level of concern of 1,925 mg/kg estimated for the resident child is significantly higher than the

USEPA Region IX Pre-Remedial Goal (PRG) of 400 mg/kg, and appears to be the result of non-standard inputs into the UBK lead exposure model. All departures from standard default values for the UBK lead model must be well-supported by specific data, and thoroughly documented.

Response: The term "sediment" has been changed to "soil" in the UBK output tables. Exposures from lead in house dust have also been added to the model; the house dust concentrations are considered to be equal to the onsite soil concentrations for onsite receptors, and equal to surface soil background lead concentrations for offsite receptors. See the responses to EPA General Comment 5 and Specific Comment 3 for additional information. The text and tables in Appendix F reflect the changes made to the lead modeling.

Conclusions and Recommendations

Comment 1: The data and information contained in the Baseline Risk Assessment document is thorough and clearly presented, but it is not acceptable as it stands, as it may underestimate potential human health risk at Fort Ord, due to a variety of reasons enumerated in our general and specific comments outlined above. We anticipate that these comments can be readily addressed in the final draft of the risk assessment.

Response: As reflected in the responses to EPA's General and Specific Comments, substantial changes have been made in the analysis and document to address the EPA's concerns.

III. DEPARTMENT OF TOXIC SUBSTANCE CONTROL TECHNICAL REVIEW COMMENTS - VOLUME III - BASELINE HUMAN HEALTH RISK ASSESSMENT

Scope of Review

Comment 1: The document was reviewed for scientific content. Minor grammatical or typographical errors that do not affect the interpretation have not been noted. However, these should be corrected in the final version of the document. We assume that the sampling of environmental media, analytical chemistry data, and quality assurance procedure described in the document reviewed by OSA were adequately reviewed by Regional staff. If deficiencies or data gaps were encountered to adequacy of risk assessment, these are noted. Future changes in the document should be clearly identified. This may be done in several ways: by submitting revised pages with the reason for the changes noted, by the use of **strikeout and underline**, by the use of **shading and italics**, or by cover letter stating how each of the comments herein has been addressed.

Response: A number of changes have been made in the analysis and document in response to EPA and Cal/EPA DTSC comments. The responses to the specific comments presented below identify specific changes made. Responses that entail changes in many locations in the document are not specifically identified. Other changes were made in response to EPA comments and may not be represented in the responses to Cal/EPA-DTSC comments.

General Comments

The risk assessment is thorough for the sites it covers, but it is not acceptable as it stands, principally

for the reasons given in the first two comments below. We anticipate that the other general and specific comments can be addressed readily as the final draft is prepared.

Comment 1: **Selecting Receptors and Pathways According to Reuse Plans:** Our experience at other closing military facilities has been that reuse plans are subject to change, sometimes quite often. We fear that the dependence on a particular reuse plan is too great in this risk assessment. By this we mean that risks were not quantified for a great number of potential future receptors and pathways. If the approach had been more generic in nature (e.g., evaluation of all the receptors shown in Table 2.3), greater flexibility would have been achieved.

The Army has often stated that their policy is to clean Ft. Ord adequately for reuse. This is a risk management decision. Such a policy is best served by assessing risks for several possible future receptors at each site. In that manner, changes in the reuse plan are likely to be accommodated in the baseline risk assessment.

Response: As discussed between the EPA, Cal/EPA, RWQCB, COE, and HLA, future land use plans from the Fort Ord Reuse Group (FORG) were used as the basis of the future exposure scenarios in the BRA. The Army considers the use of these plans to represent a reasonable approach for assessing potential future impacts. Additionally, the Army has indicated it is willing to accept requirements that land use restrictions be incorporated into deeds and lease and other agreements for specific areas at Fort Ord. Significant changes in the proposed future land uses (e.g., change of commercial/industrial use to residential property) may warrant reevaluation of the potential for health impacts, if exposures are expected to be greater than those currently evaluated in the BRA. Specific changes made in the document are identified in the responses to EPA and Cal/EPA DTSC's specific comments.

Comment 2: **Residential Scenario:** The residential setting is the customary default exposure scenario for baseline risk assessments at Superfund sites, but it is not quantified often enough in this risk assessment. Future users of this base cannot point to this document as assurance that any other activities other than those narrowly defined herein are free from risk or hazard due to exposure to contaminants.

The residential setting is quantified for the wrong group of future residents at Sites 16 and 17 and it is missing altogether for Site 31. This baseline risk assessment is incomplete and will remain so until the residential setting has been adequately assessed at these sites.

Response: A residential exposure scenario was conservatively evaluated for all sites in which there was no definitive information on future land use. EPA guidance was followed in evaluating those sites not expected to be used as residential property in the future; this guidance clearly indicates that residential land use should not be evaluated in cases where it is not expected (*EPA, 1989b, 1990f*). Potential exposure of residents at Sites 16 and 17 and Site 31 are specifically addressed in Sections 4.4.2 and 6.4.2 of the text, respectively; Section 4.4.2 of the text was revised to evaluate additional receptors. In addition, the toxicity assessment and exposure scenarios evaluated in the BRA were conservative in nature and are considered to provide reasonable, upper-bound estimates of potential health risks from long-term, continuous exposure. As the Uncertainty Analysis in Section 8.0 indicates, it is expected that the results of the BRA overestimate, rather than

underestimate, potential health risks.

Comment 3: **Site Conceptual Models:** Diagrams of the conceptual models for exposure at each site would be most helpful. Descriptions are provided in text, but the large numbers of tables are difficult to follow without a diagram. Conceptual models provide a clear picture of what is being assessed and not assessed. We strongly recommend their use.

Response: See the response to EPA General Comment 2.

Comment 4: **Hexavalent Chromium:** We found many references in the document to samples being analyzed for hexavalent chromium, but we were unable to locate results of these analyses in any volume of the draft RI/FS. Where are these data? If they cannot be located, we will not be able to approve of treating total chromium as trivalent chromium.

Response: See the response to EPA General Comment 4.

Comment 5: **Zinc:** We are puzzled by the treatment of zinc as an essential nutrient in Appendix B. *Risk Assessment Guidance for Superfund, Part A (RAGS Part A)* (USEPA, 1989) allows five specified essential nutrients to be eliminated as chemicals of potential concern, but zinc is not among them. In general, we reject the approach for zinc presented in Appendix B as being outside guidelines. However, zinc was not selected as a chemical of concern in any medium at any site using the approach in Appendix B and this result would have been the same if the more conventional approach had been used based on toxicity (i.e., hazard quotient less than or 0.01). Because the results of this risk assessment would be unaltered, we will not require the Army to recalculate all the screening values for zinc, but we will reject in the future the method of screening any metals as essential nutrients other than the five specifically mentioned in RAGS Part A.

Response: The comment is acknowledged. The document was not changed in response to this comment.

Specific Comments

A. Chapter 2, Methods

Comment 1: **Duplicate Data, Sec. 2.1.1.5, p. 6:** The last sentence in this sentence is unclear. Does this indicate that some samples received double weighting in calculating means? Please give us example.

Response: Samples for which duplicate analyses (using the same method) were performed for quality control did not receive double weighting in the statistical analyses. The results from only one of the duplicate analyses were included in the risk assessment dataset; the results from the samples identified as duplicates were excluded from the dataset.

The results from analyses of the same sample using different methods with common analytes, e.g., BTEX analyzed using EPA Methods 8020 and 8240, were both included in the dataset analyzed to avoid underestimating exposure point concentrations. This occurred infrequently, and in all cases, the chemical was detected by only one of the analyses. No changes were made in the document in

response to this comment.

Comment 2: **Background Concentrations, Table 2.2:** Please expand Table 2.2 to show for each metal: numbers of samples assayed, ranges of detection limits or reporting limits, ranges of detected concentrations, means, standard and deviations. It would be useful to present these data for both relevant types of soils. Also, please give a definition in the text in statistical terms for the background threshold concentration.

Response: See the response to EPA Specific Comment 5.

Comment 3: **Quantification of Risks and Hazards in Background, Appendix A:** In its *Supplemental Guidance for Human Health Multimedia Risk Assessments at Hazardous Waste Sites and Permitted Facilities* (DTSC, 1992), the Department permits subtracting estimated background cancer risks from the total risks at release sites. This allows quantification of incremental cancer risks due to site-related activities. Because all does of carcinogens are thought to be associated with some amount of incremental risk, remedial alternatives lower the total risk at a release site by a finite amount. Risk managers may then choose the remedial alternative which reduces total cancer risk by the desired amount. If background cancer risks constitute the great bulk of the total risk, the risk manager might not find it justifiable to remediate to remove a small fraction of the cancer risk.

On the other hand, the Department disagrees with the practice of subtracting background for non-cancer health effects, based on the toxicological principle of the existence of threshold doses for non-cancer toxicity. It is generally assumed that a hazard quotient or summed hazard index greater than unity suggests that exposure to environmental concentrations of chemicals might yield doses which exceed the threshold for toxic effects. Subtracting background concentrations could thus lead to erroneous conclusions about whether threshold for toxicity have been exceeded. A decision to remediate a site based on reduction of the threat of a non-cancer toxic effect must be based on lowering the total dose below the threshold. The site-related fraction of a greater-than-threshold dose is immaterial.

In the current risk assessment, total cancer risk and hazard are expressed for each group of receptors. We strongly urge that the Army not mix risk management decisions into the risk assessment by expressing the relevant risk as one with background subtracted. It is our experience that such mixing confuses both the risk managers and the public. Let the risk assessors quantify risks and hazards for release sites and for background in the baseline risk assessment. If background risks and hazards are to be compared to risks, let that occur when remedial alternatives are compared as part of a feasibility study.

Response: The exposure point concentrations used in Sections 3.4.4, 4.4.4, 5.4.4 and 6.4.4 to estimate possible site-related exposures represent detected concentrations, with no subtraction of background concentrations. The health risks associated with background chemical concentrations were evaluated separately in Appendix A to provide a context for risk management. Discussion of background components of noncancer hazard indices was deleted from the text in Sections 3.6.1, 4.6.1, 5.6.1, and 6.6.1.

Comment 4. Lead, Appendix A, Table A1: Please do not create a hazard quotient for lead nor include lead in a summed hazard index. The hazards of lead are assessed in a manner so fundamentally different from that used for other chemicals with non-cancer endpoints that results of the two types of assessment must not be combined.

Response: Table A1 and the text of Appendix A were revised as recommended.

Comment 5. Soil to Skin Adherence Factor, Sec. 2.2.5.3, p. 13: The Department recommends 1 mg/cm² as a default for the adherence of soil to skin in the case of the reasonable maximum exposure (RME). We base this on *Dermal Exposure Assessment: Principles and Practice* (USEPA, 1992). On pages 8-16 and 8-17 of this guidance, USEPA summarizes available studies as showing that values range from 0.2 to 1.5 mg/cm². USEPA goes on to recommend quite clearly that 1.0 mg/cm² is a reasonable upper bound of the range of these studies. The highest value, 1.5 mg/cm², is taken from the study of Driver et al. (1989), who used "humans" as test subjects. We do not understand why the Army asserts that the value of 1.5 mg/cm² is characteristic of children. The Department favors USEPA's recommendation in this regard; we reject the default value of 0.4 mg/cm² suggested by the Army, because it does not conform to Department guidance. We have expressed this comment to the Army on previous occasions.

Response: See the response to EPA Specific Comment 2.

Comment 6 Dermal Absorption of Dioxins, Sec. 2.2.6, p. 16: The Department recommends 3% as a default for dermal absorption of chlorinated dibenzo-p-dioxins (CDD) and chlorinated dibenzofurans (CDF), based on *Dermal Exposure Assessment: Principles and Practice* (USEPA, 1992). The extended quotation given by the Army on page 16 lists three values for dermal absorption of 2,3,7,8-tetraCDD (TCDD) derived from the rat but "corrected" for humans: 0.2%, 1.0%, and 2.5%. [In reality, the value 0.2% is a miscalculation: 1.08% x 2.42 / 7.74 = 0.33%.] The next two sentences after the quotation selected by the Army read as follows:

"The percents absorbed, corrected to reflect absorption in vivo in humans, range from 0.1% to 2.5%. The recommended percent of applied dose absorbed for TCDD is 0.1 to 3%."

The Department takes this last sentence to be a clear statement that USEPA recommends 3% as the dermal absorption factors for TCDD for the RME. The Department favors USEPA's recommendation in this regard; we adopted it in the PEA guidance manual. We reject the default value of 1% suggested by the Army. We have expressed this comment to the Army on previous occasions.

Response: The Army believes that the information presented in *Dermal Exposure Assessment: Principles and Applications* (EPA, 1992m) clearly indicates that a 1 percent dermal absorption factor (DAF) used to estimate uptake of dioxin from soils at Fort Ord is a reasonable, conservative value. The EPA's (1992m) document presents four DAF estimates based on the findings of three separate studies evaluating dermal uptake of dioxins from soil:

<u>Value (percent)</u>	<u>Basis</u>
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- 2.5 A 1991 EPA rat study using *in vivo* administration, corrected to reflect differences between dermal absorption *in vivo* in rats and humans observed in the same study
- 0.2 A 1988 rat study by Shu et al., using *in vivo* administration, corrected to reflect differences between dermal absorption *in vivo* in rats and humans observed in the 1991 EPA study. The Cal/EPA DTSC comment points out that the calculation presented by EPA (1992m) indicates this value should be 0.33 percent
- 1 A 1980 rat study by Poiger and Schlatter using *in vivo* administration, corrected to reflect differences between dermal absorption *in vivo* in rats and humans observed in the 1991 EPA study
- 0.45 The 1991 EPA study which used *in vitro* administration to (human) cadaver skin, corrected to reflect differences between dermal absorption *in vitro* in rats and humans observed the same study
- 1 Average of the four values above (using either 0.2 or 0.33 percent for the data from Shu et al.)

The four experimentally-derived DAF values presented above were all based on soil with low organic carbon content, consistent with the conditions at Fort Ord. All are less than the 3 percent DAF value suggested for use. The values presented for each of the three studies were based on conservative interpretations of the data, for example:

- The values from the 1991 EPA study include TCDD retained in the skin as part of the absorbed fraction; this dioxin is likely to be lost by epidermal exfoliation without systemic uptake
- The 1988 Poiger and Schlatter study used soil dioxin concentrations in the 350 to 1300 mg/kg range but also shows that the fraction absorbed is higher at higher dioxin concentrations; this indicates that absorption from soil with lower concentrations, such as those measured at Fort Ord, would be lower
- The value from the 1988 study by Shu et al. included a 30 percent correction for digestive tract absorption, which was not used in the slope factor development

The average value of 1 percent presented above is based on soils representative of conditions at Fort Ord and is within the 0.1 to 3 percent range recommended by EPA (1992m). The DAF value of 3 percent recommended by Cal/EPA DTSC is outside the range of values derived from experimental observations. The 1 percent DAF value is also consistent with a value of 0.5 percent predicted by McCone (1990) using a dermal fugacity model for TCDD and the range described by the probability distribution developed by Copeland et al. (1993).

The DAF value is intended for use in estimating reasonable maximum exposure (RME) that may occur. RME is intended to be reasonable, and therefore need not

use numerous bounding estimates that compound each other to present an unnecessarily conservative analysis. The exposure assessment uses conservative assumptions and bounding values for exposure point concentration, exposure frequency and duration, adherence factor, and exposed body surface area. The use of a DAF value greater than 1 percent is not necessary to estimate RME.

Based on the analysis provided above, no changes were made in the document in response to this comment.

Comment 7: **Calculation of Toxicity Equivalency Factors (TEFs) for CDDs and CDFs, Sec. 2.2.7, p. 16: In a previous memorandum we recommended a more stringent procedure for calculating TEFs. After consulting with USEPA, we accept the method proposed by the Army. Specifically, TEFs may be calculated using data from those congeners detected, ignoring those not detected.**

Response: This comment is acknowledged. The document was not changed in response to this comment.

Comment 8: **Toxicity Equivalency Factors for Polycyclic Aromatic Hydrocarbons (PAH), Sec. 2.2.7, p. 17: Please correct the text at the top of the right hand column on page 17 to reflect that Table 2.8 refers to PAH, not B(a)P.**

Response: The text of Section 2.2.7 was revised to correct this typographical error.

Comment 9: **Methods for LEADSPREAD, Sec. 2.2.9.2, p. 18: In the Department's Supplemental Guidance (DTSC, 1992), we recommend that plant uptake in LEADSPREAD be set to "YES" for residential exposures. We note in all the spreadsheets presented in Appendix F that lead uptake into plants is set to "NO". We do not find Section 2.2.9.2 or in the sections specific for the individual sites any justification for the assumptions that lead will not be taken up into plants or that longer term residents will not use local soils for home-grown produce. The Army should either follow Department guidance or present adequate justification for exclusion of the pathway.**

Response: The LEADSPREAD modeling has been modified to include the plant uptake analysis for Site 12, which may be used for residential property in the future. As indicated in the response to Cal/EPA DTSC General Comment 2, the future residential land use at Sites 16 and 17 is not expected. Potential lead exposures from ingestion of garden vegetables at Sites 16 and 17 were therefore not considered likely, and plant uptake analysis was not conducted for Sites 16 and 17. The Site 12 changes are reflected in Tables F3 and F4, Sections 3.4.2.2, 3.6.3, 4.4.3, and Appendix F.

Comment 10: **Toxicity Values, Sec. 2.3.1, p. 20, and Table 2.9: The oral reference dose (RfD) for 1,1-dichloroethene was used for the inhalation route as well, but the text on page 20 refers to 1,2-dichloroethane, for which no RfD is available. Please correct this.**

The Department recommends the use of surrogate chemicals when toxicity criteria are not available from the customary sources. We approve of the use of the RfD for pyrene as a substitute for the non-cancer toxicity of PAHs with no published RfD. However, all the holes in Table 2.9 should be filled in rather than ignore the presence of a chemical altogether. A provisional RfD of

7E-03 mg/kg-day has been available for over two years from the Environmental Criteria and Assessment Office of USEPA's Office of Research and Development; the Department recommends use of this value for the non-cancer effects of trichloroethene. For other substances, we recommend that risk assessors for the Army consult with their counterparts in USEPA and the Department to gain consensus on appropriate surrogate chemicals.

Response: See the response to EPA Specific Comment 1. The revisions include using the provisional reference dose for trichloroethene as recommended.

Comment 11: Target Risk, Sec. 2.4.2, p. 21: The upper bound of the "decision range" of cancer risks is one in ten thousand, not one in one hundred thousand.

Response: The text of Section 2.4.2 has been modified to correct this typographical error.

Comment 12: Exposure Pathways, Table 2.3: We do not understand how utility or construction workers can become exposed to soils at 2 to 10 ft below ground surface without becoming exposed to the top 2 ft as well. Why are surface soils not included for these receptors? For the resident at Sites 16 and 17, please include inhalation of volatile chemicals as a result of domestic use of groundwater. For Site 31, "worker housing" is mentioned in the reuse plan on page 9. This scenario could yield greater exposures than a trespasser, but it is not included. Why not?

Response: The exposure analysis for construction workers and utility workers has been revised to assess exposure to soils from 0 to 10 feet below ground surface. These changes are reflected in Table 2.3 and others.

The analysis for the student resident receptors at Sites 16 and 17 has been revised to include household exposure to volatile chemicals in groundwater from domestic use of groundwater. These changes are reflected in Section 3.4 and the corresponding tables.

As discussed in a meeting between the Army, EPA, Cal/EPA DTSC, and HLA on October 5, 1994, residential development on the north and south slopes of Site 31 is not expected; the trespasser receptor considered at Site 31 addresses potential residential exposure.

Comment 13: Default Values for the RME, Table 2.5: Both the utility worker and the construction worker seem to resemble closely the "excavation scenario" described in the memorandum, "Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors" (USEPA, 1991). The Department agrees with the recommendation of USEPA that the ingestion rate for soil for excavation workers should be 480 mg/day, not 100 mg/day.

Response: The analysis has been revised using an RME soil ingestion rate of 480 mg/day for utility and construction workers. These changes are reflected in Section 2.2.5.1 and Table 2.5.

Comment 14: Dermal Absorption Values, Table 2.6: In its *Preliminary Endangerment Assessment Guidance Manual* (PEA) (DTSC, 1994), the Department recommends several less conservative values for dermal absorption than those shown in Table 2.6.

Response: Table 2.6 and the exposure analysis for all of the sites has been revised to incorporate less-conservative values for dermal absorption presented in the *Preliminary Endangerment Assessment (PEA) Guidance Manual*.

B. Chapter 3, Sites 2 and 12

Comment 15. 95% UCL vs. C_{max} in Soils, Sec. p. 24, and Tables 3.1-3.3: In general, the Department approves of the use of the lower of the maximum concentration detected (C_{max}) or the 95% upper confidence level (95% UCL) on the arithmetic mean concentration to represent exposure point concentrations. In Tables 3.1 through 3.3 we note that the two values do not differ greatly for most chemicals. However, we are disturbed by the number of instances in which C_{max} is less than one-half of the 95% UCL. In some cases, C_{max} is less than one-tenth of the 95% UCL. In those instances associated with a low frequency of detection, it seems likely that the 95% UCL has been driven up by one or more non-detects in samples with elevated reporting limits. Elevated reporting limits are usually caused by high quantities of one or more contaminants in the sample. In samples contaminated enough to elevate the reporting limit, concentrations higher than C_{max} could be masked.

We show below the instances at Sites 2 and 12 in which C_{max} is less than one-half the 95% UCL. Frequencies of detection are also given. Please present a discussion of the likelihood of having erroneously eliminated chemicals of potential concern due to high detection limits in these instances.

Table	Chemical	FOD	95% UCL (ppm)	C_{max} (ppm)
3.1c:	Acetone	5 / 14	3.30E+03	4.50E+01
3.2a:	4,4'-DDT	1 / 8	3.30E-02	1.50E-02
	Diethylphthalate	1 / 13	1.68E+00	4.10E-02
	Trichloroethene	1 / 30	6.67E-03	2.40E-03
3.2b:	Antimony	3 / 58	4.32E+00	1.90E+00
3.2c:	Antimony	1 / 71	3.81E+00	4.10E-01
	Diethylphthalate	3 / 22	4.88E-01	9.40E-02
	Pentachlorophenol	2 / 22	2.34E+00	3.60E-02
3.3:	1,1-Dichloroethane	1 / 27	3.25E-03	6.30E-04
	Pentachlorophenol	1 / 4	4.18E-02	2.00E-03

Response: The anomalies noted are not expected to substantially affect risk estimation or, in most cases, COPC selection. The acetone 95 percent UCL was reported in micrograms per kilogram and should have been reported as 3.3E+00 mg/kg, eliminating the observed inconsistency. Table 3.1c has been revised to reflect this correction. For DDT, the highest reporting limit of any sample from the site (0.074 mg/kg) corresponds to a cancer risk of 1×10^{-8} in the toxicity screen, indicating that risk estimation was not substantially affected. For diethylphthalate (DEP), the highest reported concentration was less than the lowest reporting limit, contributing to the observed anomaly. For DEP, toxicity screening using the highest reporting limit (5.2 mg/kg) would eliminate DEP as a COPC. For TCE, toxicity screening using the highest reporting limit (0.026 mg/kg)

would eliminate TCE as a COPC. For antimony, toxicity screening using the highest reporting limit corresponds to a hazard index of 0.02, indicating that risk estimation was not substantially affected. Pentachlorophenol was detected infrequently in soil and only at depths greater than 10 feet; risk estimation was not affected because no complete exposure pathways were identified for chemicals in these deep soils. Toxicity screening for 1,1-dichloroethane using the highest detection limit (0.05 mg/l) provides a hazard index of 0.014, indicating that risk estimation was not substantially affected. The pentachlorophenol in water was selected as a COPC. The document was not changed in response to this comment.

Comment 16: **Screening for Selection of Chemicals of Concern, Sec. 3.3, pp. 25 ff., and Tables 3.5-3.8: Chloride, sulfate, magnesium, potassium, and sodium are eliminated as chemicals of concern for Sites 2 and 12. The Department does not disagree that these essential nutrients may be eliminated (per RAGS Part A, Sec. 5.9, USEPA 1989), but the basis given by the Army is not valid. Text on page 26 indicates that a toxicity screen was performed. However, no toxicity values are shown in Table 2.9 and no hazard quotients are calculated in Tables 3.5 through 3.8. Please alter the text to indicate that no toxicity screen was performed. Also, please supply references in the text to the specific tables in Appendix C which support Tables 3.5 through 3.8. These same comments apply equally to in Sections 4 and 5. Regarding the screen for essential nutrients in Tables 3.5 through 3.8, please show the value screened against, so the reader need not refer repeatedly to Appendix B.**

Response: The text of Appendix B has been revised to clarify the approach used in the BRA to evaluate essential nutrients. Estimated daily doses of essential nutrients were compared to Recommended Daily Allowances (RDA); details of the analysis are presented in Appendix B. Section 3.3 has been revised to indicate the analysis is described in Appendix B. Footnotes in Tables 3.5 through 3.8 identify the RDAs used.

Comment 17: **Risk Characterization, Sec. 3.6, p. 29 ff., and Tables 3.13-3.16: Please add to the text references to the specific tables in Appendix E which support the summed risks and hazards shown in Tables 3.13 through 3.16. It is inappropriate to subtract background when characterizing the probability of non-cancer toxicity. Analysis at Site 12 suggests that a child might receive a dose of arsenic in excess of the threshold for toxicity. The presentation in this section seems to suggest erroneously that exposure of children to arsenic in soils at Site 12 will not give rise to a dose associated with a hazard quotient greater than one, because the contribution of background somehow does not count. This estimate can lead to the erroneous conclusion that people exposed at hazard indices greater than 1 are not at risk. Regardless of the fact that some fraction of that dose arises from background arsenic, risk managers need to know whether adverse health effects might occur.**

Table 3.14 shows a summed hazard index of 3.1 for all receptors. It seems to us that for a threshold toxic effect this sum ought not to be calculated across the receptors shown. Please either eliminate this sum or provide an interpretation.

The first paragraph on page 31 is very difficult to understand. A table of data would greatly assist this explanation. The Army might want to show more than one calculation of cancer risk due to PAHs for purposes of clarification.

Response: Tables 3.13 through 3.16 have been revised to reference information from Appendix G, where appropriate. In addition, the text has been revised to remove references to non-cancer effects from background concentrations of chemicals. Table 3.14 has been revised; the HIs for all receptors are no longer summed. The first paragraph on page 31 of the Draft BRA has been revised to clarify the approach used. The PAH data analyzed using EPA Method 8270 have been added into the existing dataset for this site, at the request of the EPA.

Comment 18: **Lead, Sec. 3.6.3, p. 31: As discussed in the general comments above, lead exposures for residential scenarios have been underestimated here. Rerun LEADSPREAD with plant uptake set to "yes".**

Response: Please see response to Cal/EPA DTSC Specific Comment 9.

Comment 19: **Uncertainly Analysis, Sec. 3.7, p. 31: This presentation is wholly unacceptable. First, possible future remediation of groundwater has no bearing whatever on computation of baseline risk. If this pathway will become complete in the future, now is the time to assess it. Second, if it is the Army's intention to review recent literature on the distribution of ingestion rates for tap water, then make the presentation.**

Unsupported assertions are of no value. Third, the "other factors" referred to in the last sentence all seem to lead to overestimation of risk. It would be useful to state this if that is why these factors were included here.

Response: The presentation of Section 3.7 and other uncertainty analysis text has been revised to remove unsupported assertions and discussions of impacts of possible future remedial actions.

Comment 20: **Summary, Sec. 3.8, p. 32: The first sentence in the last paragraph in the left hand column is incorrect. Summed hazard indices for arsenic are greater than 1.0 and it is not appropriate to subtract background. The last sentence of this section is unsupported and should be removed.**

Response: The text of Section 3.8 has been modified to address the following changes: (1) the hazard index calculation method was changed, as described in the response to EPA Specific Comment 28, and (2) the contribution of background chemical concentrations to potential non-cancer health effects is no longer discussed in the Draft Final BRA.

C. Chapter 4, Sites 16 and 17

Comment 21: **95% UCL vs. C_{max} in Soils, Sec. 3.2, p. 24, and Tables 4.1a-4.4c: See Specific Comment 15 above. We note below the instances in Tables 4.1a through 4.4c the instances where the maximum concentration detected is less than one-half the 95% UCL, apparently the combined result of a low frequency of detection and evaluated reporting limits. In samples contaminated enough to elevate the reporting limit, concentrations higher than C_{max} could be masked. Please present a discussion of the likelihood of having erroneously eliminated chemicals of potential concern due to high detection limits in these instances.**

Table	Chemical	FOD	95% UCL	C_{max}
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4.1a:	Di-n-butylphthalate	1 / 9	2.37E+00	9.50E-02
	Dibenzofuran	1 / 9	2.09E+00	4.10E-01
4.3a:	Bis(2-ethylhexyl)- phthalate	1 / 6	2.09E-01	9.60E-02
4.3b:	Bis(2-ethylhexyl)- phthalate	2 / 4	2.54E-01	7.70E-02
	Pentachlorophenol	1 / 4	1.44E+00	8.80E-02
4.4a:	Antimony	2 / 9	3.56E+00	7.20E-01
4.4b:	Bis(2-ethylhexyl)- phthalate	1 / 13	1.21E+00	1.30E-01
4.4c:	Antimony	1 / 20	1.10E-02	5.00E-03

Response: Elevated reporting limits introduce uncertainties into the COPC selection and risk assessment process but do not erroneously eliminate COPCs. Chemicals for which the evaluated reporting limits might have interfered with COPC selection are not expected to substantially affect risk estimates. For di-n-butylphthalate and dibenzofuran, toxicity screening using the highest reporting limit ranged (5000 mg/kg) would eliminate these chemicals as COPCs. For antimony in soil (Table 4.4a), toxicity screening using the highest reporting limit (8.3 mg/kg) provides a hazard index of 0.023, indicating that risk estimation was not substantially affected. Antimony was selected as a COPC for groundwater (Table 4.4c). For bis(2-ethylhexyl)phthalate, toxicity screening using the highest reporting limit (5 mg/kg) produces a cancer risk estimate of 4×10^{-6} , indicating that risk estimation was not substantially affected. For pentachlorophenol, toxicity screening using the highest reporting limit (22 mg/kg) produces a cancer risk estimate of 2×10^{-6} . However, chemical analysis of environmental samples may not be able to detect biologically significant concentrations of all chemicals in all samples. Accordingly, analytical detection limits represent one of the limitations of this or any investigation that relies on chemical analyses. Additional sampling and analysis would be similarly constrained. The maximum detected pentachlorophenol concentration was eliminated as a COPC using the toxicity screen, and pentachlorophenol was not selected as a COPC. The document was not changed in response to this comment.

Comment 22: Groundwater Data, Sec. 4.2.6, p. 37: This paragraph is not clear. Which years were used for carbon tetrachloride? for perchloroethene?

Response: The text of Section 4.2.6 has been modified to clarify which data were used in the analysis.

Comment 23: Sec. 4.4, p. 42: The second sentence of this section seems to have an extra "of".

Response: The text has been revised to correct this typographical error.

Comment 24: Dust and Stormwater, Secs. 4.4.1.2 and 4.4.1.3, p. 43: It is inconsistent to assume the absence of pavement for estimation of exposure to dust while assuming pavement is present to prevent runoff of stormwater. By definition, the same receptor cannot be exposed to both conditions. Please use one or the other.

- Response: The text of Section 4.4.1.2 and 4.4.1.3 has been revised to clarify the pathway analysis.
- Comment 25:** **Pete's Pond and Pete's Pond Extension, Secs. 4.4.2.2 and 4.4.2.3, pp. 44-45: We do not understand how the size of these parcels has any bearing on the likelihood of their being developed in the future. Outfalls for storm drains can be moved, reuse maps can be altered. If the sites are small and adjoining sites with the same intended reuse are being assessed, then assessment of this site should combine data from the adjoining parcels and use a single residential scenario for the combined parcel.**
- Response: The expected future land use for Pete's Pond and Pete's Pond Extension are different than that expected for Site 17. See also the response to EPA Specific Comment 19 and Cal/EPA General Comment 2. The text of Sections 4.4.2.2 and 4.4.2.3 has been revised to more clearly describe the expected land uses in, and exposure scenarios for, the different areas on Sites 16 and 17.
- Comment 26:** **Student Resident at Site 17, Sec. 4.4.2.4, p. 45: Use of the student resident scenario underestimates risk at this site. A conventional residential scenario should be used. It is stated in Section 4.1.3 that Site 17 Disposal is slated for future use as housing for students and faculty. A residential setting for faculty would result in exposure duration's much longer than the three to five years assumed for student residents. We believe that faculty residents do not differ from the conventional resident described in USEPA and Cal/EPA guidance.**
- Response: See the response to EPA Specific Comment 19 and Cal/EPA General Comment 2.
- Comment 27:** **Groundwater, Sec. 4.4.2.5, p. 46: The last paragraph on page 46 is very confusing. We do not understand why the aquifers are evaluated separately. If a domestic well were to be sunk, no one can predict where it might be screened. Therefore, no distinction between the aquifers can be made. Dissection of this hypothetical future exposure setting requires a high degree of certainty about future conditions. We believe future exposures are uncertain and regulatory guidelines and default factors should be used.**
- Response: The aquifers were evaluated separately because: 1) they are distinct water-bearing formations and might be utilized separately, 2) each has different COPCs at different concentrations, 3) potential exposure to both aquifers was evaluated, 4) the final evaluation considered the aquifer associated with greater health risks, and 5) combining the data would result in more dilute EPC estimates and possible underestimation of health risks. The text of Section 4.4.2.5 has been revised to clarify the methods used.
- Comment 28:** **Student Resident, Sec. 4.4.3.1, p. 47-48, and Table 4.14: In the last paragraph on page 47, 2.5 hr/day is accounted for, but not the other 22.5 hr/day. Where will these student residents get the other 90% of the air they breathe? The authors have chosen to dissect the hypothetical future residential setting into fractions of the day at Pete's Pond, Pete's Pond Extension, and Site 17 Disposal Area (Table 4.14). We do not believe the reuse plan is so finely textured that such a construct can be predicted with any degree of certainty. In addition, "fraction of intake" shown in Table 4.14 for the RME adds up to various numbers. Where are these justified?**

Response: Section 4.4.3.1 and Table 4.1.4 have been revised to evaluate additional data using a student receptor assumed to reside at the Site 17 Disposal Area. The exposure time for the student resident receptor was assumed to be 20.5 hours. Potential exposure at Sites 16 and 17 are not dissected, RME exposures at each location were conservatively considered to be additive instead of evaluating locations separately. Section 4.4.3.1 was revised to clarify the basis for the exposure time and fraction of intake value assumptions.

Comment 29: Utility and Construction Workers, Sec. 4.4.3.2 and 4.4.3.3, p. 48-49: Workers exposed to soils 2 to 10 ft bgs cannot have failed to have been exposed to soils 0 to 2 ft bgs. Combine data from 0 to 10 ft bgs to derive concentration terms. Also, we find 45 days to be too short an exposure duration for the RME for the construction worker. Please use 1 yr.

Response: The risk assessment was revised to incorporate the recommended changes. The text of Section 4.4.3.2 and 4.4.3.3 and associated tables have been revised to reflect this change.

Comment 30: Risk Characterization, Sec. 4.6, p. 50-51: The student resident scenario underestimates risk for the faculty by a wide margin, perhaps tenfold or more. Therefore, the risks of interests for Sites 16 and 17 are not yet characterized.

Response: See the response to EPA Specific Comment 19 and Cal/EPA General Comment 2. The risk assessment was not changed in response to this comment.

Comment 31: Lead, Tables 4.24 and F5-F10: When LEADSPREAD is used for a residential scenario, plant uptake should be set to "ON" or "1". this will increase the estimates of blood lead levels for the student resident. Please recalculate these when calculations are added for the faculty resident.

Response: See the response to EPA Specific Comment 19 and Cal/EPA General Comment 2. Although the student resident receptor was assumed to live onsite, the consumption of fruits and/or vegetables grown at the site by those receptors was considered unlikely. The risk assessment was not changed in response to this comment.

D. Chapter 5, Site 3

Comment 32: Weighted Average, Sec. 5.2, p. 55: We do not understand the explanation of the weighted average given in the text. Please rewrite this. Perhaps an example calculation would help to clarify.

Response: The risk assessment analysis approach was revised in response to this and other regulatory agency comments; the text of Section 5.2 has been revised to reflect those changes.

Comment 33: Chemicals of Concern, Sec. 5.3, pp. 55-56: In general we concur with the selection of COPC. However, we find no mention of assay for hexavalent chromium. See also General Comment 4 above.

Response: See the response to EPA General Comment 4.

Comment 34: Potential Receptors, Sec. 5.4.2, pp. 57 ff.: We concur with the estimates of

exposure parameters for park rangers and visitors. However, the greatest exposure and possible risks might arise for future construction or utility workers at Site 3. Such workers will be exposed intensively to soils during construction of boardwalks, parking lots, underground telephone lines, and the like. Please assess this group of receptors using analytical data from soils 0 to 10 ft bgs. It might be useful to develop three assessments for excavation workers, one for each type of area with spent ammunition.

Response: The risk assessment was revised to separately evaluate the three types of areas with spent ammunition. EPCs estimated using the analytical data from 0 to 10 feet below ground surface (bgs) for those areas were substantially lower than the EPCs used to evaluate park ranger receptors and visitors. A construction worker receptor, used to evaluate possible exposure to subsurface soils, was therefore not evaluated separately.

Comment 35: **Inhalation Toxicity of Antimony, Sec. 5.5, p. 59: Rather than leave out the inhalation route altogether, please use cross-route extrapolation from the oral RfD to derive a toxicity criterion for antimony. This is much preferable to assuming a toxicity of zero.**

Response: See the response to EPA Specific Comment 1.

Comment 36: **Risk Characterization, Sec. 5.6.1, p. 59, and Tables 5.7-5.8: It is not appropriate to sum HIs for the three age groups shown unless the toxic effect is known to be cumulative. Please correct this.**

Response: Section 5.6.1 and Tables 5.7 and 5.8 have been revised as recommended. See also the response to EPA Specific Comment 28.

Comment 37: **Lead, Sec. 5.6.3, p. 60, and Table 5.9: Utility and construction workers will certainly show a greater effect of lead than park visitors, when one recalls that the recommended default for soil ingestion for an excavation worker is 480 mg/day. The potential health effects of lead are underestimated for Site 3. This is not surprising, since this site has many tons of lead lying at the surface and no risk of adverse health effects was predicted by the Army. This does not pass reality check.**

Response: See the responses to Cal/EPA DTSC Specific Comments 32 and 34, and EPA Specific Comment 28.

E. Chapter 6, Site 31

Comment 38: **95% UCL vs. C_{max} in Soils, Sec. 6.2, pp. 63 ff., and Tables 6.1a + 6.2b: See Specific Comment 15 above. We note below the instances in Tables 6.1a and 6.2b the instances where the maximum concentration detected is less than one-half the 95% UCL, apparently the combined result of a low frequency of detection and elevated reporting limits. In samples contaminated enough to elevate the reporting limit, concentrations higher than C_{max} could be masked. Please present a discussion of the likelihood of having erroneously eliminated chemicals of potential concern due to high detection limits in these instances.**

Table	Chemical	FOD	95% UCL	C_{max}
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6.1a:	Benzo(a)pyrene	1 / 8	2.54E-01	7.85E-02
	Toxic Equivalents			
	Fluoranthene	1 / 8	2.51E-01	3.50E-02
	Phenanthrene	2 / 8	2.49E-01	6.80E-02
	Pyrene	1 / 8	2.44E-01	4.76E-02
	Total PAH for	1 / 8	5.65E-01	2.03E-01
	Noncarcinogenic			
	Effects			
6.2b	Antimony	2 / 17	3.59E+00	1.10E+00

Response:

The 95 percent UCL calculation assumes that sample sets are normally distributed, but sample sets with low frequency of detection (FOD) are not, which limits the utility of the UCL value. In addition to the possible cause identified in this comment, a 95 percent UCL greater than the maximum detected concentration may also be the result of low frequency of detection combined with a small number of samples (without elevated reporting limits). This effect may be compounded by the reporting of chemical concentrations less than the reporting limit (RL) used to estimate concentrations of chemicals not detected (ND concentration). Additionally, for PAHs expressed as benzo[a]pyrene toxic equivalents (BAP-TE) and total PAHs, the ND concentrations were substantially greater than the detection limit for individual PAH compounds because of the algorithm used to estimate BAP-TE and total PAH concentrations for each sample. The algorithm sums the $RL \div 2$ value (used as the ND concentration) for each congener detected elsewhere at the site but not detected in the sample. For these reasons, and because few PAHs were detected in each sample and detected concentrations were low, the ND concentrations tend to be substantially higher than the detected concentrations. In turn, this causes the 95 percent UCL to be elevated.

Detection limits for the listed chemicals were not substantially elevated in the PAH analyses performed on Site 31 samples, and the chemicals identified were not inappropriately eliminated as COPCs. B(a)P-TE and antimony were selected as COPCs. The maximum detected concentrations of the individual PAH compounds listed were substantially lower than the reporting limit, which likely accounts for the apparent statistical anomaly identified (for the PAHs) in the comment. Additionally, toxicity screening for fluoranthene, phenanthrene, and pyrene using the highest reporting limit (0.38 mg/kg) would eliminate these or other PAHs as COPCs. However, chemical analysis of environmental samples may not be able to detect biologically significant concentrations of all chemicals in all samples. Accordingly, analytical detection limits represent one of the limitations of this or any investigation that relies on chemical analyses. Additional sampling and analysis would be similarly constrained. The risk assessment was not changed in response to this comment.

Comment 39: **Metals in Soil at South Slope, Sec. 6.2.2, p. 64: It is stated here that no chemicals were detected in soils at greater than below 10 ft bgs. If the analytes included metals, this is not credible.**

Response: The statement in Section 6.2.2 has been revised to indicate that no soil samples were collected from the South Slope area at depths greater than 10 bgs.

Comment 40: **Runoff, Sec. 6.4.1.3, p. 67: It is not reasonable to state that loose soils on a steep**

slope have a very low potential for running off with stormwater. Include this release mechanism or provide justification for why it is not to be included.

Response: Potential chemical migration in stormwater runoff was evaluated using the analysis of samples collected from areas downslope from areas containing elevated chemical concentrations (including the ravine floor). These analyses indicate that such runoff has not occurred. Sections 6.4.1.3 and 6.4.2 were revised to reflect this evaluation.

Conclusions and Recommendations

Comment 1: The risk assessment is thorough, but it is not acceptable as it stands, principally for two reasons. First, potential risks are quantified within the scope of the current reuse plan. This is too narrow. Other reuses might occur which are not quantified. Second, the residential scenario at Sites 16 and 17 is not appropriate. Various other comments enumerated here should be addressed as the final draft is prepared.

Response: This comment is addressed in the responses to EPA's and Cal/EPA DTSC's general and specific comments, as noted above. Additionally, the Army has indicated it is willing to accept requirements that land use restrictions be incorporated into deeds and lease agreements for specific areas at Fort Ord.