

Appendix H

FFA Regulatory Comments
and DON Responses to Comments

Appendix H

Comments and Responses to Comments
On Draft Report dated
June 15, 2012



Matthew Rodriguez
Secretary for
Environmental Protection



Department of Toxic Substances Control

Deborah O. Raphael, Director
5796 Corporate Avenue
Cypress, California 90630



Edmund G. Brown Jr.
Governor

September 5, 2012

Mr. Ralph Pearce
Project Manager
Naval Facilities Engineering Command, Southwest
1220 Pacific Highway, OPCE.RP
San Diego, California 92132-5190

DRAFT THIRD FIVE-YEAR REVIEW REPORT OPERABLE UNITS 1-6, MARINE CORPS LOGISTICS BASE BARSTOW, CALIFORNIA

Dear Mr. Pearce:

The Department of Toxic Substances Control (DTSC) received for its review the Draft Five-Year Review Report, Operable Units 1-6, Marine Corps Logistics Base Barstow, dated June 15, 2012.

The purpose of this report is to evaluate the performance of the remedies implemented at Operable Units 1-6 to determine if the remedies are protective of human health and the environment, and to recommend remedial system optimization and corrective actions if the remedies have not performed as designed.

DTSC completed its review and has the following comments from the Remedial Project Manager and the Engineering Services Unit:

- (1) Abbreviations and Acronyms in page xi, BMP is defined as Base Master Plan, while in the tables, it is defined as Base Management Plan. Please use the same definition throughout the document to be consistent;
- (2) Section 2.2 Records of Decision, Page 6, last bullet, correct CAOC 10.38/10/39 to "10.38/10.39", same correction on page 22;
- (3) Section 2.3.3 OU3 Yermo Annex Soils with Prior Data, Page 8, please correct the date the ROD was signed (1997 not 199X);
- (4) Section 3.3.4 Yermo Annex Hydrogeology, page 13, first paragraph, third line refers to Figure 3-D, correct this reference;
- (5) Section 3.4.3 CAOC 18 (OU3), Page 15, last sentence states "The BMP modification includes description and history of soil impacts and specifies that

- any actions planned in the two strata of this CAOC be coordinated and reviewed by the Base Environmental Division (DON, 2010)." Please remove the space between the word "action" and the letter "s".
- (6) Section 3.5.2 CAOC 2 (OU4), Page 18, third bullet, the following sentence: "changes in site uses will be reviewed by the Environmental Division" is repeated throughout the document. Please remove the extra space between the word "use" and the letter "s" throughout the document;
 - (7) Section 3.5.9 CAOC 38 (OU2 Groundwater), page 21, first paragraph refers to Figure 1-5. There is no Figure 1-5;
 - (8) Sections 4.0 Remedial Actions, and Section 5.0 Progress Since Last Review, Page 23, and 24 second bullet, please remove the duplicate word "in";
 - (9) Section 6.3.2 Document Review, Page 27, first line refers to Sections 5.0 and 6.0 as including results from the review of the annual O&M and monitoring reports. Sections 5.0 and 6.0 do not include any results.
 - (10) Section 6.6.2, Soil RSLs, Page 30, first bullet states "This CAOC... appears to be covered with pavement and buildings". This statement shows uncertainty of the review findings. Please reword this statement, which is also repeated in Section 9.2, Page 49. The summary of this five year review finding should be included in Table 6-4.
 - (11) Section 7.3.2, Page 38, Section 7.8.2, Page 42, and Section 8.4.2, Page 48 mention several construction Activities that took place and are planned, under the supervision of the Base Environmental Division. The five year review should verify that the restoration to the original conditions were conducted according to the construction records and / or the as-built drawings;
 - (12) Section 7.4.2, Page 39 recommends permanent decommissioning of AS/SVE system at CAOC 26. This recommendation should be included in Section 9.0 and associated tables.
 - (13) Section 7.5.1 Summary of Technical Assessment, page 39, and Section 7.6.1, Page 40 refer to OUs 3 and 4 RAR, it should refer to OUs 3 and 4 ROD;
 - (14) Appendix C, Table C-2, Changes to MCLs Applicable to Groundwater at OU 1 and OU 2 Footnotes (d) and (f): Please reference in the footnotes the document that directed the change from pCi/L to millirem/Yr;
 - (15) Section 7.10.1 Background, Page 43, second paragraph, "GAC adsorption systems that were installed circa 1989", please change the word "circa" to the word "since";
 - (16) Section 8.3.3 Summary of Findings, Page 48, second line, insert the word "of" between the words "lack" and "current";
 - (17) Section 9.2 Recommendations and Follow-Up Actions, Page 49 refers to Table 6-5, which does not exist;
 - (18) Table 6-1: CAOC 16, refers to Table 8-5 for more information. There is no Table 8-5; Also, CAOC 23 has a footnote 2 which does not exist;
 - (19) Table 6-4, column 7 (refers to Table 6-4). Please correct this discrepancy;
 - (20) Table 7-3, Page 4, Part 3, correct the spelling of the word "indicted" to "indicate", Part 4: It is mentioned that cracking is an issue for day-to-day operations and funding is being sought to perform surface repairs. It appears that further

- damage to the existing cracks without repairs would potentially affect the overall effectiveness of the cap. Even though this may seem like a Base operation issue, it also could become a remedy issue. This needs to be reflected and addressed in Section 9.0 and associated tables. Footnotes, Acronyms and Abbreviations: MCLB-Please add the word "Base" to "Marine Corps Logistics".
- (21) Table 7-5, Part 3, discusses the CAOC 23 cap repairs performed due to cracks and settlement, while Part 4 states "no prior or current issues identified with the cap". Please reconcile these statements and explain that these issues would be handled through regular O&M;
 - (22) Table 7-6, Part 3, Page 4, and Part 4, Page 5: This table identifies the survey monument issue, but it is not reflected in Section 9.0 tables. Please rectify;
 - (23) Table 7-7, Page 2, CAOC 23 (OU3), Strata 5, 5(a): It is not clear what grading was done. Please clarify;
 - (24) Table 7-7, page 3, CAOC 26: recommends permanent decommissioning of AS/SVE system at CAOC 26. This recommendation should be included in Section 9.0 and associated tables;
 - (25) Table 8-1, Acronyms and Abbreviations: CERCLA definition is missing;
 - (26) Table 8-2, CAOC 38, Part 3, Page 6, first column, please remove the word "to" before the word "for";
 - (27) Table 8-3, Part 3, Page 6: The statement "The remedy at CAOC 7 Stratum 1 Landfill cap has not prevented migration of vapor-phase VOCs to the groundwater table..." contradicts the earlier statement on Page 5, bullet 1 that says: "significant percolation of precipitation through the cap is not occurring." If the cap is not protective, a new protective remedy should be proposed.
 - (28) Table 8-3-Part 2, Page 4, fourth column, third line from the bottom, remove the word "the" between the words "likely" and "source";
 - (29) Table 8-4, CAOC 1 (OU6), Page 1, and Page 2 second column, Groundwater Monitoring, first sentence: Please rewrite this sentence; third column, insert the word "limit" after the word "reporting";
 - (30) Table 8-4, CAOC 5, Page 3, first column, first sentence mentions that "CAOC 5, the chemical storage Area" while in Figure 8-7, CAOC 5 is described as equipment storage Area. Please reconcile; Third column, Site Action: first sentence, please insert the words "of this" before the word "review"; CAOC 7 (OU6), Page 3, third column, please replace the word "the" with the word "that";
 - (31) Appendix A, Public Notice: first paragraph, please add the following sentence "as indicated in the box below" to the last sentence that says: "The public is invited to review the document and to voice any comments or concerns to MCLB Barstow representatives"; Five-Year Review Process and Schedule: please add to the second sentence that says "The document:" the following sentence "summarizes the following:" , and remove the word "summarizes from the first bullet; Please include a Spanish translation when publishing this Public Notice in a local newspaper;
 - (32) Appendix D-2, Figure D-2.1.2: Please add a footnote explaining why there is no 2008 plot;

Mr. Ralph Pearce
September 5, 2012
Page 4

- (33) Appendix F-1: Please add a footnote explaining why there is no 2009 plot on Figure F-1.2. Graph F-1.1, please clarify why some slopes were calculated based on natural log and some slopes were calculated without the log and tie it to your recommendation to deactivate and decommission the GETS system.

Additionally, attached please find DTSC Human and Ecological Risk Office (HERO) comments on the Draft Report. Thank you for giving us the opportunity to review this document. We look forward to continue to work with you on base cleanup activities at MCLB Barstow. If you have any questions please call me at (714) 484-5381.

Sincerely,



Sue Hakim
Remedial Project Manager
Brownfields and Environmental Restoration Program

Attachment

cc: Mr. Jim Bustamante
Remedial Project Manager
Marine Corps Logistics Base
P.O. Box 110170
Barstow, California 92311-5050

Mr. Philip Ramsey
U.S. Environmental Protection Agency
Region IX, SFD-8-3
75 Hawthorne Street
San Francisco, California 94105

Mr. Omar Pacheco
California Regional Water Quality Control Board
Lahontan Region B Victorville Branch Office
14440 Civic Drive, Suite 200
Victorville, California 92392-2306



Matthew Rodriguez
Secretary for
Environmental Protection



Department of Toxic Substances Control

Deborah O. Raphael, Director
8800 Cal Center Drive
Sacramento, California 95826-3200



Edmund G. Brown Jr.
Governor

MEMORANDUM

TO: Soad Hakim, Project Manager
Brownfields and Environmental Restoration Program
5796 Corporate Avenue
Cypress, 90630-4732

FROM: Tracy Behrsing, Ph.D. *MTU for T Behrsing*
Staff Toxicologist, Human and Ecological Risk Office (HERO)

DATE: September 5, 2012

SUBJECT: DRAFT THIRD FIVE-YEAR REVIEW REPORT, OPERABLE UNITS 1 – 6,
MARINE CORPS LOGISTICS BASE BARSTOW, CALIFORNIA

PCA: 18019 Site: 400092-18

DOCUMENT REVIEWED: Select sections of "Draft Third Five-Year Review Report, Operable Units 1-6, Marine Corps Logistics Base Barstow, California." Prepared for Department of the Navy, Naval Facilities Engineering Command NAVFAC Southwest (San Diego, California). Prepared by AIS-TN&A Joint Venture (Ventura, California). Document dated June 15, 2012. Please see "Scope of Review" for a detailed listing of the sections reviewed by HERO.

BACKGROUND (BASED ON SUBMISSION): Marine Corps Logistics Base (MCLB) is located in San Bernardino County, California, approximately 135 miles northeast of Los Angeles. The Base consists of two areas: the Yermo Annex (7 miles east of Barstow) and the Nebo Main Base (3.5 miles east of Barstow). MCLB Barstow is divided into seven Operable Units (OUs), with each OU further divided into CERCLA Areas of Concern (CAOCs). OUs 1 and 2 are related to groundwater contamination beneath the Yermo Annex and Nebo Main Base, with volatile organic compounds (VOCs) as the primary contaminants. OUs 3 and 5 are related to soil contamination at the Yermo Annex. OUs 4 and 6 pertain to soil contamination at Nebo Main Base. The primary soil contaminants are identified in the report as VOCs, metals, pesticides, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs).

Records of Decision (RODs) were signed for OUs 1 through 6 in 1997 and 1998, with remedial actions (RAs) and institutional controls (ICs; also referred to as land use controls, or LUCs) implemented at various CAOCs within those OUs. The RODs also established remedial action objectives (RAOs), as needed. The current submission presents the results of the Third Five-Year review for OUs 1 through 6, with the review period spanning from October 2007 through September 2012. The OU7 ROD is under development, and therefore not subject to the current Third Five-Year Review.

SCOPE OF REVIEW: Per request from the DTSC Project Manager, HERO's review is limited to the following sections of the document: 1) Appendix C (Technical Assessment Report – Review of Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs for OU 1 through OU 6, also entitled Technical Assessment Report – Evaluation of Changes to Screening Criteria and Regulatory Standards Relevant to the RAOs for OUs 1-6), 2) Table 7-3, Page 4, Part 3 (CACO-16 – Third Five-Year Review [OU 5 – Yermo Annex]), 3) Appendix D-1 (Technical Assessment Report Vapor Intrusion Modeling for Building 537, MCLB Barstow), and 4) the potential impact of the 2011 USEPA toxicity criteria for trichloroethylene (TCE). Our review of these sections focuses on issues related to human health risk assessment (HHRA) only. We assume that regional personnel have evaluated the sampling methods for environmental media, the adequacy of site characterization, analytical chemistry methods, and quality assurance procedures.

GENERAL COMMENTS

APPENDIX C - Technical Assessment Report - Evaluation of Changes To Screening Criteria And Regulatory Standards Relevant to the RAOs for OUs 1 – 6. Appendix C was prepared to document the evaluation of changes to screening criteria and regulatory standards as they relate to the RAOs previously established in the RODs. Three categories of standards were evaluated: soil screening criteria, groundwater maximum contaminant levels (MCLs), and discharge limits. Our comments follow.

1. Discharge Limits (Groundwater and Vapor). HERO did not review the groundwater discharge and vapor discharge limits, as these are not risk-based criteria. For the groundwater discharge limits, we defer to the Regional Water Quality Control Board – Lahontan Region (RWQCB).
2. Groundwater. Similar to General Comment 1 above, in general, we defer to the RWQCB on the referenced groundwater MCL and primary drinking water standards from the RWQCB – Lahontan Region Order Nos. 6-93-106 and R6T-2004-0015. While MCLs may have been selected as part of risk management decisions, these criteria are not necessarily risk-based numbers.
 - a. Risk-Based Criteria. For HHRA purposes at military facilities, HERO uses risk-based criteria such as the USEPA tapwater Regional Screening Levels (RSLs). While tapwater RSLs consider domestic use of water, they do not account for the subsurface vapor intrusion to indoor air pathway which must also be addressed

when VOC contamination is present. If the intent of the evaluation is to evaluate the impact of changes in toxicity criteria and screening levels, we recommend incorporating risk-based concentrations for water, as well as a vapor intrusion evaluation for relevant sites.

b. Naphthalene. Table C-4 lists a California MCL of 170 µg/L for naphthalene. At this time, HERO is unaware of a formal State of CA MCL for naphthalene. The current CA notification level (NL) is 17 µg/L (see <http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Notificationlevels/notificationlevels.pdf> and <http://www.oehha.ca.gov/water/pals/index.html>). Please revise accordingly.

c. Tertiary butyl alcohol (TBA). Table C-4 lists a California MCL of 12 µg/L for TBA. Again, HERO is unaware of a formal MCL for this constituent. Review of the CA OEHHA and DPH websites indicates that this value is a NL. Please revise accordingly.

3. Toxicity Data Change for Tetrachloroethene and Trichloroethene. Appendix C discusses the recently finalized USEPA toxicity criteria for tetrachloroethene (PCE) and TCE from 2012 and 2011, respectively. However, the text further indicates that an evaluation of toxicity data changes was not performed as the changes in toxicity data are incorporated into the establishment of the screening criteria and regulatory standards.

a. Screening Criteria and Regulatory Standards for PCE and TCE. The only "screening criteria and regulatory standards" listed in Appendix C for these two constituents are groundwater detection limits and analytical methods taken from the referenced RWQCB – Lahontan Region Orders. While the updated criteria TCE have been incorporated into the risk-based tapwater RSLs, such criteria are not presented in Appendix C and also do not address vapor intrusion. Therefore, from a risk perspective, it is unclear how the submission can conclude that an evaluation of toxicity data changes is not warranted.

b. TCE MCL. Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA) is currently reviewing all programs with toxicity criteria values for TCE (e.g, air, water) and revising its criteria as appropriate. DTSC is also aware of a site where the Central Valley RWQCB recommended 2.6 µg/L be used as the TCE cleanup value (in lieu of the MCL [5 µg/L]) in light of the newer toxicity data. From a risk-perspective, consideration should be given to evaluating the impact of the updated TCE toxicity criteria with respect to vapor intrusion to indoor air and treatment of drinking water at the base. While an updated indoor air evaluation was presented for CAOC 16 (discussed below), the need to consider the impact of TCE criteria updates would apply to all sites where TCE contamination is present or groundwater is being treated for this constituent.

c. PCE. For reference, HERO has not accepted use of the recently established USEPA toxicity criteria based on cancer. Rather, Cal/EPA OEHHA criteria (which are more health protective) should be used.

d. Other Contaminants and Implications of Updated Toxicity Values. It is unclear why only toxicity criteria updates for TCE and PCE are discussed, particularly since the only criteria listed for TCE and PCE are detection limits and analytical methods. Risk-based concentration and MCLs for these VOCs are not presented.

If there are other contaminants in which toxicity criteria have been revised, they should also be addressed. In addition, Appendix C does not address impacts of the toxicity criteria updates on risk, particularly since non-risk based numbers (e.g., MCLs) appear to have been selected as RAOs. To address this, the scope of the submission would need to be expanded.

4. Soil Screening Criteria. The RODs references USEPA Preliminary Remediation Goals (PRGs) for soil. Because the PRGs have been replaced by USEPA RSLs, the Five-Year Review compares the 2004 PRGs for contaminants of concern (COCs) listed in the RODs to May 2012 RSLs following HERO's 2011 HHRA Note 3.

a. HHRA Note 3. For future reference, HERO recently released an updated August 29, 2012 revision of HHRA Note 3, which addresses use of the Spring 2012 USEPA RSLs in soil and tapwater. For the purpose of the current document, we have reviewed Table C-1 for consistency with current HERO recommendations, and any recommended changes are noted herein.

b. Scope of Contaminants. Review of toxicity criteria updates was limited to COCs only. Because the Five-Year Review did not consider toxicity criteria updates for all contaminants (rather than COCs only), it is possible that important updates of toxicity factors which could impact the protectiveness of the current remedies may have been missed. Potential examples would include contaminants which may have been evaluated as noncarcinogens in the original HHRAs but have subsequently been determined to be carcinogens. Again, to address this, the scope of the submission would need to be expanded.

c. Land Use.

i. Remedies in Place. Soil CAOCs with remedies in place (e.g. caps or covers) not reviewed as the remedies are maintained and otherwise considered protective. HERO defers to the DTSC Project Manager on this issue. This assumption should be revisited if there are any changes in the current remedies which would result in complete soil exposure pathways.

ii. Industrial Land Use Only Assumption and NFA Designations. Review of soil RSLs relative to PRGs was limited to soil screening levels assuming an industrial

land use only, which is reported to be consistent with the land use at MCLB Barstow. However, the text also indicates that the "relevant" RSLs are those where a CAOC was closed with soil contamination in place under a "NFA" remedy.

Typically, residential criteria are used when evaluating sites, unless a LUC or notation in the Base Management Plan (BMP) for industrial land use only is in place. Because the text references NFA (a term often used for unrestricted land use including residential), we recommend Appendix C be clarified in this regard to support the evaluation under an industrial scenario only. While we are unaware of previous discussions related to terminology for the selected remedies, HERO also recommends the Navy consider replacing the term "NFA" with an alternate designation for sites where restrictions are actually in place, and the land use is not unrestricted.

- iii. Contaminant Concentrations Exceeding Industrial RSLs. According to the text, Table C-1 reports the highest COC soil concentrations reported in the ROD for each CACO with a "NFA" remedy. As shown in the table, there are several COCs in which the maximum concentrations significantly exceed risk-based concentrations. DTSC recommends the Navy consider the need to revisit the NFA determinations if restrictions are not currently in place to prevent soil exposure pathways. (This issue is further discussed in General Comment 4 e below.) Examples of exceedances include:
- Chlorinated Pesticides. 4,4'-DDD is present in site soil at a maximum concentration of 4490 mg/kg, compared to the USEPA industrial RSL of 7.2 mg/kg. Using a ratio approach of the maximum concentration to the RSL indicates a risk of 6E-4 which exceeds the upper end of the 1E-6 to 1E-4 risk management range. Similarly, 4,4'-DDE is present at a maximum concentration of 7140 mg/kg, compared to the USEPA industrial RSL of 5.1 mg/kg. Noncancer soil RSLs are not available for DDD and DDE. However, the noncancer industrial soil RSL for DDT can be used as a surrogate (430 mg/kg). Both DDD and DDE exceed this value by more than 10-fold.
 - PCBs. Maximum concentrations of PCBs in site soil significantly exceed the industrial soil RSLs. For example, at CAOC 21, the maximum concentration of Aroclor-1260 is 247,669 mg/kg, compared to the industrial RSL of 0.74 mg/kg. While the RSL tables do not list a soil level based on noncancer for this particular Aroclor, the noncancer-based industrial RSL for Aroclor -1254 is 11 mg/kg. HERO is also concerned that at very high concentrations, PCBs can also pose a subsurface vapor intrusion to indoor air concern.
 - N-Nitroso-di-n-propylamine. The maximum concentration (59 mg/kg) significantly exceeds the current USEPA RSL for industrial soil of 0.25 mg/kg.

d. Volatiles. Table C-1 lists USEPA RSLs for 3 VOCs (1,2-Dichloroethane, 2-Hexanone, and Ethylbenzene). Please be aware that USRSLs do not address vapor intrusion, and therefore simple comparison of RSLs may not be protective of the vapor intrusion pathway. Please address this issue, particularly since it is unclear if these volatiles are actually present in site soil given that no detections are listed in the table.

e. Section 6.6. Appendix C refers the reader to Section 6.6 (Review of Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs) of the main document for information on how the revised soil RSLs were used in the Five-Year review. We have conducted a limited review of this section with respect to how the soil RSLs were applied in the evaluation since this is related to General Comment 4 c ii and 4 c iii above.

Overall, according to Table 6-4, industrial soil RSLs were exceeded at numerous CAOCs with NFA remedies. However, there are LUCs or BMP amendments for each of these sites, with the exception of CAOC 32. (The BMP amendments require Environmental Division review prior to any new land use.) As commented above, the term "NFA" is often used for sites with unrestricted land use, including residential. While we are unaware of previous discussions related to terminology for the selected remedies, HERO recommends the Navy consider replacing the term "NFA" with an alternate designation for sites where restrictions are actually in place, and the land use is not unrestricted.

- i. While CAOC 32 soil contains 4,4-DDE (51 mg/kg) and Aroclor-1242 (5700 mg/kg) at concentrations exceeding industrial RSLs (5.1 mg/kg and 0.74 mg/kg, respectively), the document indicates that the site is covered with pavement and buildings and therefore there are no direct exposure routes and the NFA remedy is protective. However to ensure long-term protectiveness, a BMP amendment is recommended for this site as part of the Five-Year Review. As noted above, the DTSC Project Manager should be aware that even if direct exposure pathways are incomplete, at very high concentrations, PCBs have the potential to pose a vapor intrusion to indoor air issue.
- ii. For the sites other than CAOC 32, the document concludes that the BMP amendments in place require any change in land use to be coordinated with the Environmental Division and this ensures proper management of environmental concerns for these CAOCs. Based on the current land uses listed in Table 6-4, HERO is concerned with this conclusion given the high concentrations of contaminants present at some of the sites. Examples of the current land uses include "open land, unused", base golf course and facilities, equipment storage, drainage channels, former evaporation ponds, and buildings. In some cases, there may be potential for current exposures and it is unclear why a BMP is considered protective in these situations. For example, CAOCs 2 and 3 are at the base golf course and facilities. At these sites, maximum levels of chlorinated

pesticides significantly exceed the RSLs (4,4'-DDD at 4490 mg/kg, 4,4'-DDE at 7140 mg/kg). If there is potential for exposure, we recommend this be addressed.

- iii. Despite high contaminant concentrations, the document concludes that the BMP amendments are adequate to address potential environmental concerns. In addition to human health concerns, ecological risk also needs to be considered and USEPA RSLs only address human health (not ecological issues). According to Table 6-4, there are numerous sites with contaminants exceeding RSLs which have a current land use consisting of open unused land and drainage channels. A separate evaluation of potential risk to ecological receptors must be conducted if significant ecological habitat is present onsite or there is potential transport of contaminants to offsite habitat. Please address this issue.

TABLE 7-3 AND APPENDIX D1 – Technical Assessment Report Vapor Intrusion Modeling for Building 573. HERO was requested to review Table 7-3 and Appendix D1 which pertain to CAOC 16. CAOC 16 includes Building 573 and the surrounding concrete cover, and is known as the Marine Corps Maintenance Command. Six structures are currently present at CAOC 16, and 2 additional buildings are planned for construction in 2012.

The selected remedy for CAOC 16 is LUCs to maintain the existing concrete hardstand, monitoring the physical and structural integrity of the concrete hardstand, and controlling and monitoring exposure pathways at CAOC 16. A regular maintenance program is implemented to maintain a stable surface environment, which will prevent organic vapors from escaping to the atmosphere, prevent direct contact with any soil contamination, and minimize infiltration of water to the subsurface.

As part of the Five-Year Review, the technical assessment of the CAOC 16 selected remedy included Johnson and Ettinger (J&E) modeling of November 2011 vapor data from three soil vapor monitoring probes using the new USEPA toxicity criteria for PCE and TCE. The report concludes that estimated cancer risks for PCE and TCE are below the lower end of the 1E-6 to 1E-4 risk management range, and the hazard quotients (HQs) were less than one. As a result, the selected remedy of preservation of the concrete cap to prevent exposure to shallow soil vapors was considered to be functioning as intended by the ROD. Our comments follow.

5. Groundwater. According to Appendix D-1, soil vapor COCs are primarily TCE, PCE, and 1,1-dichloroethene (1,1-DCE). Additionally, groundwater related to CAOC 16 is being treated by air sparge/soil vapor extraction (SVE) system and groundwater extraction and treatment. In the current report, only soil vapor data were evaluated in the J&E model. According to DTSC's 2011 vapor intrusion guidance, a multiple lines of evidence approach (which includes consideration of soil gas and groundwater) is

recommended. The need to include J&E modeling of groundwater contaminants should be addressed.

6. Cumulative Evaluation.

a. Volatiles. As presented, the only VOCs considered in Appendix D-1 were PCE, TCE, and 1,1-DCE. Because complete data sets were not provided for the 2011 soil gas sampling, it is unclear whether additional VOCs (e.g., vinyl chloride, a carcinogenic breakdown product of TCE) may be present. If additional volatiles were detected, they need to be incorporated into the indoor air evaluation.

b. Cumulative Risk/Hazard. In addition to the modeling for only 3 VOCs, risks and hazard were not summed across these constituents to derive cumulative risks and hazard indices (HIs) for use in making risk management decisions. The evaluation needs to be updated in this regard.

c. Sampling Depths. The J&E modeling was limited to the highest detected concentrations of VOCs in soil vapor, which occurred in samples collected from depths ranging from 60 feet bgs to 140 feet bgs. While lower concentrations were detected at shallower depths (30 feet bgs), we recommend also modeling at least one of the 30 feet bgs samples where the highest relatively-"shallow" VOC concentrations were detected. This will confirm that risk has not been underestimated by exclusive use of the deeper data. Generally, when soil gas is collected over a range of depths, modeling is conducted for each depth for comparison purposes and bounding of the risks estimates.

7. PCE Inhalation Toxicity Criterion for Cancer. As noted above, HERO has not accepted use of the recently established USEPA toxicity criteria based on cancer. Therefore, the Appendix D-1 vapor intrusion evaluation needs to be updated to use the Cal/EPA OEHHA unit risk factor of $5.9E-6$ per $\mu\text{g}/\text{m}^3$ rather than the USEPA 2012 criterion ($2.6E-7$ per $\mu\text{g}/\text{m}^3$).

The Cal/EPA criterion is ~22-fold more protective than the USEPA criterion. For reference, while we do not agree with some of the J&E modeling parameters (see below), simply updating the current J&E evaluation to use the Cal/EPA unit risk factor for PCE would indicate a cancer risk of $4E-6$ for sample YCW-16-1-140.

8. J&E Model Assumptions. HERO has reviewed the J&E modeling parameters, and notes the following inconsistencies with DTSC guidance. We recommend these be addressed as part of the recommended, cumulative indoor air evaluation.

a. Building Assumptions. Site-specific building dimensions (including a 30 foot ceiling height) were used for the J&E modeling. This is acceptable for the existing building, but the results of such modeling may not apply to future buildings with different dimensions. If future buildings are planned for areas with VOC

contamination, we recommend additional modeling using DTSC defaults (10 meters x 10 meters, with an 8 foot ceiling) be conducted at that time.

b. Soil Gas Advection Rate. DTSC guidance indicates that for structures larger than the default building size (100 square meters), the default value for Q_{soil} of 5 liters per minute should be proportionally increased in a linear fashion as a function of the spatial footprint of the building. For example, a building of 1,000 square meters will have, for modeling purposes, a soil gas advection rate of 50 liters per minute. Because the existing building is larger than the default, the Q_{soil} needs to be adjusted.

c. Indoor Air Exchange Rate. The industrial indoor air exchange rate for the existing building was assumed to be 0.25 exchanges per hour. DTSC's default indoor air exchange rate for commercial buildings is 1 exchange per hour, which is less conservative than the current assumption. If site-specific information is available indicating an air exchange rate lower than the DTSC default, this would justify using the current assumption. Otherwise, the DTSC default of 1 exchange per hour should be used.

d. Exposure Frequency and Duration. In the current evaluation, the default residential exposure frequency (350 days per year) and duration (30 years) were assumed for a "conservative" evaluation. Because the existing building is industrial, it is acceptable to use the default exposure parameters for this receptor of 250 days per year, over 25 years. At some sites, an exposure time term of 8 hours per day has also been incorporated to account for a typical work day.

e. Based on the above points, we recommend updating the vapor intrusion evaluation contained in the Five-Year Review to ensure the protectiveness of human health.

SPECIFIC COMMENTS.

1. Table C-1. Table C-1 contains three errors in the reported USEPA RSLs for industrial soil which should be corrected.

a. The current USEPA industrial soil RSL for 2-methylnaphthalene is 2200 mg/kg (not 99 mg/kg as currently listed).

b. The current USEPA industrial soil RSL for n-nitroso-di-n-propylamine is 0.25 mg/kg (not 0.21 mg/kg as currently listed). In addition, the site concentrations should be highlighted in yellow since they exceed the RSL.

c. The USEPA industrial soil RSL for beta-BHC is 0.96 mg/kg (not 0.93 mg/kg as currently listed).

CONCLUSIONS

HERO has reviewed the select sections of Draft Third Five-Year Review Report, Operable Units 1-6, Marine Corps Logistics Base Barstow, California. HERO has noted several issues which we recommend be addressed prior to accepting the Five-Year

Review document. For TCE in particular, consideration should be given to evaluating the impact of the updated TCE toxicity criteria with respect to vapor intrusion to indoor air and treatment of drinking water at the base. While an updated indoor air evaluation was presented for CAOC 16, this evaluation needs to be revised. For soil, HERO has commented on concerns regarding high concentrations of contaminants at sites with NFA. If potential ecological and/or human health exposure pathways are complete (e.g. at the golf course), this should be further discussed.

Reviewed by:

Michael J. Wade, Ph.D., D.A.B.T.
Senior Toxicologist, HERO

A handwritten signature in black ink, appearing to read 'MJW', is positioned to the right of the printed name and title.

Lahontan Regional Water Quality Control Board

September 12, 2012

File: DoD – Marine Corps Logistics Base

Ralph Pearce, MCLB Environmental Project Manager
Southwest Division, Naval Facilities Engineering Command
1200 Pacific Highway, Code OPCE.MN
San Diego, CA 92132

COMMENTS ON DRAFT THIRD FIVE-YEAR REVIEW REPORT, OPERABLE UNITS 1-6, MARINE CORPS LOGISTICS BASE, BARSTOW, SAN BERNARDINO COUNTY

California Regional Water Quality Control Board, Lahontan Region (Water Board) staff has reviewed the Draft Third Five-Year Review Report, Operable Units 1-6, dated June 15, 2012, prepared by AIS-TN&A Joint Venture for the Department of the Navy, Naval Facility Engineering Command Southwest Division.

Summary

The objectives of the third five-year is to: 1) provide an update on the status of remedial actions (RA) implemented since the third five-year review, 2) evaluate whether these remedial actions are protective of human health and the environment, and 3) to assess the progress of the recommendations made in the first five-year review. The five-year review documents the evaluation, implementation and performance of RAs at each of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Area of Concern (CAOC) at Operable Units (OUs) 1 through 6. Additional sites will be included in future five-year reviews as these sites move through the Installation Restoration Program (IRP) process.

Specific Comments

1. Section 7.2.1 Background, page 35 – The Navy describes the remedial action objectives (RAOs) for groundwater cleanup at operable units (OUs) 1 and 2 as described in the OUs 1 and 2 Record of Decision (ROD) report dated April 2, 1998. Please include in this section a description of the RAOs for the vadose zone cleanup.
2. Section 7.2.3 Summary of Findings, page 36 – The Navy states that selected remedy may not achieve the cleanup levels at the predicted time because of the persistence of VOCs in soil gas acting as a continued source of VOCs in groundwater. Please cite the report that performs the data analysis that supports the rationale that the selected remedy will not achieve groundwater cleanup levels within the estimated time frame of 30 years. Also, please include in this

section the revised estimated time frame of when the selected remedy will achieve groundwater cleanup levels.

3. Section 7.4.1 Summary of the Technical Assessment, page 38 – The Navy states that a No Further Action with Base Master Plan modifications was the selected remedy for CAOC 26, the Building 533 Waste Disposal Area. The Navy prepared table 7-7 that describes the status of this CAOC. It would be appropriate to reference this table in this section. Also, the report refers the reader to table 7-3 to review the air sparging/soil vapor extraction (AS/SVE) and groundwater pump and treat remedy at CAOC 26. This reference appears to be an error because in table 7-3 there is no mention of the status of the selected remedy at CAOC 26.
4. Section 7.7.1 Summary of the Technical Assessment, page 40 – The Navy states the RAOs for CAOC 35 include: minimize the potential for the disturbance of the wastes, minimize the potential of future releases to groundwater, and attain landfill closure applicable or relevant and appropriate requirement (ARARs). Please cite the document that states these RAOs.
5. Section 8.2.1 Background, page 45 – The Navy states that Land Use Controls and an existing pilot study AS/SVE system were selected as the final remedy for addressing OU 2 Nebo South groundwater plume and its related vadose zone contaminants. Please include in this section a description of the RAOs as described in the OU 2 ROD dated September 20, 2006.

We look forward to working with you in a manner that protects water quality and the environment. Should you have any questions regarding this matter, please contact me at (760) 241-7377 or Cindi Mitton P.E., Senior Engineer at (760) 241-7413.

Sincerely,



Omar Pacheco, P.G.
Engineering Geologist

cc: Phillip Ramsey, U.S. Environmental Protection Agency
Sue Hakim, DTSC
Nova Clite, OTIE
Jim Bustamante, MCLB

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Soad Hakim, Remedial Project Manager, Brownfields and Environmental Restoration Program, Department of Toxic Substances Control, in correspondence dated 24 August 2012	
Regulator Comment	DON Response to Comments
1. Abbreviations and Acronyms in page xi, BMP, is defined as Base Master Plan, while in the tables, it is defined as Base Management Plan. Please use the same definition throughout the document to be consistent.	1. Correction made.
2. Section 2.2 Records of Decision, Page 6, last bullet, correct CAOC 10.38/10/39 to "1 0.38/1 0.39", same correction on page 22	2. Correction made.
3. Section 2.3.3 OU3 Yermo Annex Soils with Prior Data, Page 8, please correct the date the ROD was signed (1997 not 199X)	3. Correction made.
4. Section 3.3.4 Yermo Annex Hydrogeology, page 13, first paragraph, third line refers to Figure 3-D, correct this reference	4. The reference to a figure has been removed.
5. Section 3.4.3 CAOC 18 (OU3), Page 15, last sentence states "The BMP modification includes description and history of soil impacts and specifies that any action s planned in the two strata of this CAOC be coordinated and reviewed by the Base Environmental Division (DON, 2010)." Please remove the space between the word "action" and the letter "s".	5. Correction made.
6. Section 3.5.2 CAOC 2 (OU4), Page 18, third bullet, the following sentence: "changes in site use s will be reviewed by the Environmental Division" is repeated throughout the document. Please remove the extra space between the word "use" and the letter "s" throughout the document	6. Correction made
7. Section 3.5.9 CAOC 38 (OU2 Groundwater), page 21, first paragraph refers to Figure1-5. There is no Figure 1-5	7. The figure reference has been changed to Figure 3-5.

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Soad Hakim, Remedial Project Manager, Brownfields and Environmental Restoration Program, Department of Toxic Substances Control, in correspondence dated 24 August 2012	
Regulator Comment	DON Response to Comments
8. Sections 4.0 Remedial Actions, and Section 5.0 Progress Since Last Review, Page 23, and 24 second bullet, please remove the duplicate word "in"	8. Correction made.
9. Section 6.3.2 Document Review, Page 27, first line refers to Sections 5.0 and 6.0 as including results from the review of the annual O&M and monitoring reports. Sections 5.0 and 6.0 do not include any results.	9. The Section references have been updated to 7.0 and 8.0.
10. Section 6.6.2, Soil RSLs, Page 30, first bullet states "This CAOC ... appears to be covered with pavement and buildings". This statement shows uncertainty of the review findings. Please reword this statement, which is also repeated in Section 9.2, Page 49. The summary of this five year review finding should be included in Table 6-4.	<p>10. The statement in both Sections 6.6.2 and 9.2 has been revised. An additional site inspection was performed on 13 September 2012 and found that the CAOC 16 hard stand covers the portion of CAOC 32 (Stratum 2) where sampling data indicates PCBs may be present (per OUs 5 and 6 ROD, Figure 17-3).</p> <p>The description of CAOC 32 in Section 6.6.2 was expanded with information from the OUs 5 and 6 ROD. The Site Inspection documentation (Appendix B) was also updated.</p> <p>On Table 6-4: See response to HERO comment # 4.c.iii (page 13). This table was deleted from the Draft Final report after corrections to the toxicity update review resulted in only one CAOC (32) with a soil contaminant above a newly published RSL.</p>
11. Section 7.3.2, Page 38, Section 7.8.2, Page 42, and Section 8.4.2, Page 48 mention several construction activities that took place and are planned, under the supervision of the Base Environmental Division. The five year review should verify that the restoration to the original conditions were conducted according to the construction records and/or the as-built drawings	11. Section 7.3.2, Page 38 and Section 7.8.2, Page 42: An additional site inspection was performed on 13 September 2012 by the Contractor field engineer, which verified hardstand restoration to original condition. The referenced sections and Table 7-8 were updated accordingly. Additionally, the 13 September 2012 inspection found that two buildings originally included on Table 7-8 as "planned for construction" have been built; Table 7-8 was updated accordingly. The Site Inspection (Appendix B) documentation was updated with

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Soad Hakim, Remedial Project Manager, Brownfields and Environmental Restoration Program, Department of Toxic Substances Control, in correspondence dated 24 August 2012	
Regulator Comment	DON Response to Comments
	<p>the new information.</p> <p>Section 8.4.2, Page 48: The original surface conditions at CAOC 5 Stratum 1 have not changed; rather the area is being used for storage of excess military equipment. A statement was added to the second paragraph of 8.4.2: "Equipment storage of excess military equipment does not change or affect the NFA remedy."</p>
12. Section 7.4.2, Page 39 recommends permanent decommissioning of AS/SVE system at CAOC 26. This recommendation should be included in Section 9.0 and associated tables.	12. The recommendation was added to Tables 9-1 and 9-3.
13. Section 7.5.1 Summary of Technical Assessment, page 39, and Section 7.6.1, Page 40 refer to OUs 3 and 4 RAR, it should refer to OUs 3 and 4 ROD;	13. The reference to the Remedial Action Report (RAR) is correct; no change made.
14. Appendix C, Table C-2, Changes to MCLs Applicable to Groundwater at OU 1 and OU 2 Footnotes (d) and (f): Please reference in the footnotes the document that directed the change from pCi/L to millirem/Yr;	14. The reference (CDPH 2011) is included in the second row of the table. The reference was added to footnotes (d) and (f). In addition, the MCL of 50 pCi/L was added to the current Gross Beta MCL, though it does not represent a change from the previous MCL
15. Section 7.10.1 Background, Page 43, second paragraph, "GAC adsorption systems that were installed circa 1989", please change the word "circa" to the word "since";	15. Correction made.
16. Section 8.3.3 Summary of Findings, Page 48, second line, insert the word "of" between the words "lack" and "current";	16. Correction made.
17. Section 9.2 Recommendations and Follow-Up Actions, Page 49 refers to Table 6-5, which does not exist;	17. The reference to Table 6-5 has been removed.
18. Table 6-1: CAOC 16 refers to Table 8-5 for more information. There is	18. The table reference has been changed to Table 7-3; footnote 2

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Soad Hakim, Remedial Project Manager, Brownfields and Environmental Restoration Program, Department of Toxic Substances Control, in correspondence dated 24 August 2012	
Regulator Comment	DON Response to Comments
no Table 8-5; Also, CAOC 23 has a footnote 2 which does not exist;	deleted.
19. Table 6-4, column 7 (refers to Table 6-4). Please correct this discrepancy;	19. Table 6-4 has been deleted from the Draft Final in response to HERO comment #4.c. iii.
<p>20. Table 7-3, Page 4, Part 3, correct the spelling of the word "indicted" to "indicate".</p> <p>Part 4: It is mentioned that cracking is an issue for day-to-day operations and funding is being sought to perform surface repairs. It appears that further damage to the existing cracks without repairs would potentially affect the overall effectiveness of the cap. Even though this may seem like a Base Operation issue, it also could become a remedy issue. This needs to be reflected and addressed in Section 9.0 and associated tables.</p> <p>Footnotes, Acronyms and Abbreviations: MCLB-Please add the word "Base" to "Marine Corps Logistics".</p>	<p>20. Table 7-3, Correction made.</p> <p>Text Section 9 (Tables 9-1 and 9-3) were updated to include repair of surface cracks on the CAOC 16 hardstand is needed.</p> <p>Table 7-3, acronym correction made.</p>
21. Table 7-5, Part 3, discusses the CAOC 23 cap repairs performed due to cracks and settlement, while Part 4 states "no prior or current issues identified with the cap". Please reconcile these statements and explain that these issues would be handled through regular O&M;	21. Table 7-5, Part 3 revised to include the noted cap repairs. Since the repairs were made as part of routine maintenance of the cap, the conclusions regarding the cap protectiveness remain the same.
22. Table 7-6, Part 3, Page 4, and Part 4, Page 5: This table identifies the survey monument issue, but it is not reflected in Section 9.0 tables. Please rectify	22. The survey monument issue has been added to the Section 9 tables.
23. Table 7-7, Page 2, CAOC 23 (OU 3), Strata 5, 5(a): It is not clear what grading was done. Please clarify;	23. The third column of Table 7-7, page 2, for CAOC 23 was revised to: "Surface grading was performed by the Base in 2011 in the NFA portion of the CAOC (Stratum 5/5A) to clear and level the area for

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Soad Hakim, Remedial Project Manager, Brownfields and Environmental Restoration Program, Department of Toxic Substances Control, in correspondence dated 24 August 2012	
Regulator Comment	DON Response to Comments
	military equipment storage. Additionally, footings for solar panel arrays were installed in a portion of Stratum 5/5A during 2012. These activities were coordinated with Base Environmental."
24. Table 7-7, page 3, CAOC 26: recommends permanent decommissioning of AS/SVE system at CAOC 26. This recommendation should be included in Section 9.0 and associated tables;	24. See response to comment 12.
25. Table 8-1, Acronyms and Abbreviations: CERCLA definition is missing;	25. Correction made.
26. Table 8-2, CAOC 38, Part 3, Page 6, first column, please remove the word "to" before the word "for";	26. Correction made.
27. Table 8-3, Part 3, Page 6: The statement "The remedy at CAOC 7 Stratum 1 Landfill cap has not prevented migration of vapor-phase VOCs to the groundwater table..." contradicts the earlier statement on Page 5, bullet 1 that says: "significant percolation of precipitation through the cap is not occurring." If the cap is not protective, a new protective remedy should be proposed.	27. The "Summary of Technical Assessment" Table 8-3, Part 3, page 6, first two sentences were revised to: "The CAOC7 Stratum 1 landfill cap has prevented precipitation from entering the landfill wastes (based on routine moisture monitoring data), which was the intent of the cap design. However, the cap has not prevented migration of vapor-phase VOCs to the groundwater table, leading to TCE concentrations above the MCL downgradient of the cap." The technical assessment summary states the problem. The proposed response action is presented in Table 8-3, Part 5 and in Section 9. The DON is considering alternatives to address the subsurface contamination at CAOC 7 under the OU 7 ROD, which is in process.
28. Table 8-3-Part 2, Page 4, fourth column, third line from the bottom, remove the word "the" between the words "likely" and "source";	28. Correction made.

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Soad Hakim, Remedial Project Manager, Brownfields and Environmental Restoration Program, Department of Toxic Substances Control, in correspondence dated 24 August 2012	
Regulator Comment	DON Response to Comments
29. Table 8-4, CAOC 1 (OU6), Page 1, and Page 2 second column, Groundwater Monitoring, first sentence: Please rewrite this sentence; third column, insert the word "limit" after the word "reporting;	29. Correction made.
30. Table 8-4, CAOC 5, Page 3, first column, first sentence mentions that "CAOC 5, the chemical storage Area" while in Figure 8-7, CAOC 5 is described as Equipment Storage Area, please reconcile. Third column, Site Action: first sentence, please insert the words "of this" before the word "review"; CAOC 7 (OU6), Page 3, third column, please replace the word "the" with the word "that"	30. The correct name, per the ROD, for CAOC 5 is "Chemical Storage Area"; Figure 8-7 was corrected accordingly. The other corrections were made.
31. Appendix A, Public Notice: first paragraph, please add the following sentence "as indicated in the box below" to the last sentence that says: "The public is invited to review the document and to voice any comments or concerns to MCLB Barstow representatives"; Five-Year Review Process and Schedule: please add to the second sentence that says "The document:" the following sentence "summarizes the following:" , and remove the word "summarizes from the first bullet; Please include a Spanish translation when publishing this Public Notice in a local newspaper;	31. Updates made.
32. Appendix D-2, Figure D-2.1.2: Please add a footnote explaining why there is no 2008 plot;	32. A note to indicate that the plume for 2008 was essentially identical to the 2007, and 2009 to 2011 plume has been added to Figure D-2.1.2 (now Figure D-1.1.2). The text of Appendix D has been updated to specify that plumes from 2007 and 2009 to 2011 are shown on the figure.
33. Appendix F-1: Please add a footnote explaining why there is no 2009 plot on Figure F-1.2. Graph F-1.1, please clarify why some slopes were calculated based on natural log and some slopes were calculated	33. A note to indicate that the plume for 2009 was essentially identical to the 2007, 2008, 2010, and 2011 plumes has been added for Figure F-1.2. The text of Appendix F has been updated to specify that plumes

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Soad Hakim, Remedial Project Manager, Brownfields and Environmental Restoration Program, Department of Toxic Substances Control, in correspondence dated 24 August 2012	
Regulator Comment	DON Response to Comments
without the log, and tie it to your recommendation to deactivate and decommission the GETS system.	for 2007, 2008, 2010 and 2011 are show on the figure. The following explanation was added to the text of Appendix F Evaluation of Trends in Groundwater Concentrations: "As part of the statistical analysis, the data were tested for a normal distribution; if the data were not normally distributed, the natural log of the data set was used for the analysis as recommended in Helsel, 2005." Appendix F Sections "Evaluation of Trends in Groundwater Concentrations" and "Conclusions" provide the reasoning to deactivate and decommission of the GETS system.

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
<p><u>APPENDIX C – Technical Assessment Report – Evaluation of changes to Screening Criteria and Regulatory Standards Relevant to the RAOs for OUs 1 – 6.</u> Appendix C was prepared to document the evaluation of changes to screening criteria and regulatory standards as they related to the RAOs previously established in the RODs. Three categories of standards were evaluated: soil screening criteria, groundwater maximum contaminant levels (MCLs), and discharge limits. Our comments follow.</p>	<p><u>APPENDIX C – Technical Assessment Report</u></p> <p>Appendix C has been substantially revised as discussed in the responses to comments below.</p>
<p><u>1. Discharge Limits (Groundwater and Vapor).</u> HERO did not review the groundwater discharge and vapor discharge limits, as these are not risk-based criteria. For the groundwater discharge limits, we defer to the Regional Water Quality Control Board Lahontan Region (RWQCB).</p>	<p>1. Comment acknowledged</p>
<p><u>2. Groundwater.</u> Similar to General Comment 1 above, in general, we defer to the RWQCB on the referenced groundwater MCL and primary drinking water standards from the RWQCB- Lahontan Region Order Nos. 6-93-106 and R6T-2004-0015. While MCLs may have been selected as part of risk management decisions, these criteria are not necessarily risk-based numbers.</p> <p><u>2a. Risk-Based Criteria.</u> For HHRA purposes at military facilities, HERO uses risk-based criteria such as the USEPA tapwater Regional Screening Levels (RSLs). While tapwater RSLs consider domestic use of water, they do not account for the subsurface vapor intrusion to indoor air pathway which must also be addressed when VOC contamination is present. If the intent of the evaluation is to evaluate the impact of changes in toxicity criteria and screening levels, we recommend incorporating risk-based concentrations for water, as well as a vapor intrusion evaluation for relevant sites.</p>	<p><u>2. Groundwater.</u> Comment acknowledged.</p> <p><u>2.a. Risk-Based Criteria.</u> Tap-water regional screening levels (RSLs) were added to the groundwater COC evaluation tables in Appendix C. The vapor-intrusion assessment presented originally in Appendix D (as “D-1”) has been updated and incorporated into Appendix C. See additional information in the responses to HERO Comment #4.</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
<p><u>2.b. Naphthalene.</u> Table C-4 lists a California MCL of 170 µg/L for naphthalene. At this time, HERO is unaware of a formal State of CA MCL for naphthalene. The current CA notification level (NL) is 17 µg/L (see http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Notificationlevels/notificationlevels.pdf and http://www.oehha.ca.gov/water/pals/index.html). Please revise accordingly.</p> <p><u>2.c. Tertiary butyl alcohol (TBA).</u> Table C-4 lists a California MCL of 12 µg/L for TBA. Again, HERO is unaware of a formal MCL for this constituent. Review of the CA OEHHA and DPH websites indicates that this value is a NL. Please revise accordingly.</p>	<p><u>2.b. Naphthalene.</u> Water Board Order R6T-2004-0015 lists the value for naphthalene as a CA MCL. The reference for this compound in Table C-4 (now C-8) was replaced with “Order R6T-2004-0015”.</p> <p><u>2.c. Tertiary butyl alcohol (TBA).</u> Water Board Order R6T-2004-0015 lists the value for TBA as a CA MCL. The Table C-4 (now C-8) reference for TBA was revised to “Order R6T-2004-0015”.</p>
<p><u>3. Toxicity Data Change for Tetrachloroethene and Trichloroethene.</u> Appendix C discusses the recently finalized US EPA toxicity criteria for tetrachloroethene (PCE) and TCE from 2012 and 2011, respectively. However, the text further indicates that an evaluation of toxicity data changes was not performed as the changes in toxicity data are incorporated into the establishment of the screening criteria and regulatory standards.</p> <p><u>3.a. Screening Criteria and Regulatory Standards for PCE and TCE.</u> The only "screening criteria and regulatory standards" listed in Appendix C for these two constituents are groundwater detection limits and analytical methods taken from the referenced RWQCB - Lahontan Region Orders. While the updated criteria TCE have been incorporated into the risk-based tapwater RSLs, such criteria are not presented in Appendix C and also do not address vapor intrusion. Therefore, from a risk perspective, it is unclear how the submission can conclude that an evaluation of toxicity data changes is not warranted.</p>	<p><u>3. Toxicity Data Change for Tetrachloroethene and Trichloroethene</u></p> <p>Please see responses to specific comments below.</p> <p><u>3a. Screening Criteria and Regulatory Standards for PCE and TCE.</u> Tapwater RSLs have been incorporated into Appendix C as an additional text section and screening levels in Table C-6. Tapwater RSLs for PCE and TCE increased approximately an order of magnitude as compared to the Preliminary Remedial Goals [PRGs] reported in the prior Five Year Review Report (see Appendix J of the Second Five Year Review Report). Therefore, no additional evaluation is warranted for these two compounds. As previously mentioned, Appendix C has been revised to incorporate the vapor-intrusion modeling that was originally reported in Appendix D.</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
<p><u>3.b. TCE MCL.</u> Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA) is currently reviewing all programs with toxicity criteria values for TCE (e.g. air, water) and revising its criteria as appropriate. DTSC is also aware of a site where the Central Valley RWQCB recommended 2.6 µg/L be used as the TCE cleanup value (in lieu of the MCL [5 µg/L]) in light of the newer toxicity data. From a risk-perspective, consideration should be given to evaluating the impact of the updated TCE toxicity criteria with respect to vapor intrusion to indoor air and treatment of drinking water at the base. While an updated indoor air evaluation was presented for CAOC 16 (discussed below), the need to consider the impact of TCE criteria updates would apply to all sites where TCE contamination is present or groundwater is being treated for this constituent.</p>	<p><u>3.b.TCE MCL.</u> Regarding the comment “consideration should be given to evaluating the impact of the updated TCE toxicity criteria with respect to vapor intrusion to indoor air”, please refer to the vapor intrusion modeling now included in Appendix C (previously D-1). The vapor intrusion model was updated to also evaluate risk using the OEHHA toxicity values for TCE.</p> <p>Regarding the comment “consider the impact of TCE criteria updates would apply to all sites where TCE is present or groundwater is being treated for this constituent”, a vapor intrusion model for TCE and PCE in groundwater at the Nebo North Plume was added to Appendix C.</p> <p>Regarding the impact of the updated TCE toxicity criteria with respect to drinking water at the base: Appendix C was updated to discuss groundwater MCLs, exposure pathways, and implemented treatment technologies.</p>
<p><u>3.c. PCE.</u> For reference, HERO has not accepted use of the recently established USEPA toxicity criteria based on cancer. Rather, Cal/EPA OEHHA criteria (which are more health protective) should be used.</p>	<p><u>3.c. PCE.</u> The DON has updated the VI risk evaluation and now reports the modeling results using both the U.S. EPA’s updated toxicity criteria and Cal/EPA OEHHA criteria for PCE. The revised VI modeling report was moved from Appendix D to Appendix C, as previously mentioned.</p>
<p><u>3.d. Other Contaminants and Implications of Updated Toxicity Values.</u> It is unclear why only toxicity criteria updates for TCE and PCE are discussed, particularly since the only criteria listed for TCE and PCE are detection limits and analytical methods. Risk-based concentration and MCLs for these VOCs are not presented.</p>	<p><u>3.d. Other Contaminants and Implications of Updated Toxicity Values.</u> New Table C-1 was added to Appendix C to show the maximum concentration of groundwater VOCs detected between 2007 and 2011 with their respective frequency of detection. The data on this table show that PCE and TCE are the pre-dominant COCs in</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
If there are other contaminants in which toxicity criteria have been revised, they should also be addressed. In addition, Appendix C does not address impacts of the toxicity criteria updates on risk, particularly since non-risk based numbers (e.g., MCLs) appear to have been selected as RAOs. To address this, the scope of the submission would need to be expanded.	groundwater at the MCLB Barstow.
<u>4. Soil Screening Criteria.</u> The RODs references USEPA Preliminary Remediation Goals (PRGs) for soil. Because the PRGs have been replaced by USEPA RSLs, the Five-Year Review compares the 2004 PRGs for contaminants of concern (COCs) listed in the RODs to May 2012 RSLs following HERO's 2011 HHRA Note 3.	<u>4. Soil Screening Criteria.</u> See responses to specific comments below.
<u>4.a. HHRA Note 3.</u> For future reference, HERO recently released an updated August 29, 2012, revision of HHRA Note 3, which addresses use of the Spring 2012 USEPA RSLs in soil and tapwater. For the purpose of the current document, we have reviewed Table C-1 for consistency with current HERO recommendations, and any recommended changes are noted herein.	<u>4.a. HHRA Note 3.</u> Comment acknowledged; references were updated accordingly.
<u>4.b. Scope of Contaminants.</u> Review of toxicity criteria updates was limited to COCs only. Because the Five-Year Review did not consider toxicity criteria updates for all contaminants (rather than COCs only), it is possible that important updates of toxicity factors which could impact the protectiveness of the current remedies may have been missed. Potential examples would include contaminants which may have been evaluated as noncarcinogens in the original HHRA's but have subsequently been determined to be carcinogens. Again, to address this, the scope of the	<u>4.b. Scope of Contaminants.</u> New contaminants or contaminant sources were evaluated in Section 6.6.3 of the Five Year Review report, including perchlorate at both Nebo Main Base and Yermo Annex, and methyl-tert-butyl ether (MTBE) at Yermo Annex. Because perchlorate concentrations in both groundwater and drinking water at the MCLB Barstow are either below detectable concentrations or occur at trace levels (less than 1 µg/L), likely from naturally occurring sources, a toxicity evaluation of this compound was not warranted. Because MTBE concentrations (from an off-site source) have declined

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
submission would need to be expanded.	to below detectable levels across the Yermo Annex during the review period, no toxicity evaluation of this compound was warranted. No other potential COCs, based on a review of the extensive groundwater and soil vapor monitoring data generated between 2007 and 2011, were identified during the review.
<p><u>4.c. Land Use.</u></p> <p><u>4.c.i. Remedies in Place.</u> Soil CAOCs with remedies in place (e.g. caps or covers) not reviewed as the remedies are maintained and otherwise considered protective. HERO defers to the DTSC Project Manager on this issue. This assumption should be revisited if there are any changes in the current remedies which would result in complete soil exposure pathways.</p>	<p><u>4.c. Land Use</u></p> <p><u>4.c.i. Remedies in Place.</u> Comment acknowledged; the BMP incorporates the controls necessary to prevent completion of a soil exposure pathway at CAOCs where that potential exists.</p>
<p><u>4.c.ii. Industrial Land Use Only Assumption and NFA Designations.</u></p> <p>Review of soil RSLs relative to PRGs was limited to soil screening levels assuming an industrial land use only, which is reported to be consistent with the land use at MCLB Barstow. However, the text also indicates that the "relevant" RSLs are those where a CAOC was closed with soil contamination in place under a "NFA" remedy.</p> <p>Typically, residential criteria are used when evaluating sites, unless a LUC or notation in the Base Management Plan (BMP) for industrial land use only is in place. Because the text references NFA (a term often used for unrestricted land use including residential), we recommend Appendix C be clarified in this regard to support the evaluation under an industrial scenario only. While we are unaware of previous discussions related to terminology for the selected remedies, HERO also recommends the Navy consider replacing the term "NFA" with an alternate designation for sites where restrictions are actually in place, and the land use is not</p>	<p><u>4.c.ii. Industrial Land Use Only Assumption and NFA Designations.</u></p> <p>To address this comment, the following paragraph was added to Section 6.4.4 Additional Considerations/Review (end of section):</p> <p>“The OUs 3 and 4 ROD (DON, 1997) and OUs 5 and 6 ROD (DON, 1998b) selected the No Action Alternative for several CAOCs. When selecting this alternative, the RODs specifically stated that the No Action Alternative does not involve institutional or engineering controls, containment, excavation, or treatment. However, at the conclusion of the selection reasoning, the RODs indicated that for certain CAOCs, the BMP should describe the history of the CAOC and specify that any actions planned in these areas or changes in the site use should be coordinated and reviewed by the MCLB Barstow Environmental Division. In this Five-Year Review, the phrase “NFA with BMP amendments” is used to refer to the No Action CAOCs where Environmental Division oversight is required to maintain the</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
unrestricted.	conditions of the NFA decision. The BMP was updated in 2010 and includes procedures to follow in evaluating changes to land use that may pose a risk to site workers (e.g., during construction activities) or substantially change the conditions supporting the NFA decision. The CAOCs with "NFA with BMP Amendments" were reviewed for any substantial changes in land use or site conditions in this Five Year Review (see Sections 7.8 and 8.4 for Yermo Annex and Nebo Main Base affected CAOCs, respectively)."
<p><u>4.c.iii. Contaminant Concentrations Exceeding Industrial RSLs.</u> According to the text, Table C-1 reports the highest COC soil concentrations reported in the ROD for each CACO with a "NFA" remedy. As shown in the table, there are several COCs in which the maximum concentrations significantly exceeded risk-based concentrations. DTSC recommends the Navy consider the need to revisit the NFA determinations if restrictions are not currently in place to prevent soil exposure pathways. (This issue is further discussed in General Comment 4e below). Examples of exceedances include:</p> <ul style="list-style-type: none"> • <u>Chlorinated Pesticides.</u> 4,4'-DDD is present in site soil at a maximum concentration of 4490 mg/kg, compared to the USEPA industrial RSL of 7.2 mg/kg. Using a ratio approach of the maximum concentration to the RSL indicates a risk of 6E-4 which exceeds the upper end of the 1E-6 to 1E-4 risk management range. Similarly, 4,4'-DDE is present at a maximum concentration of 7140 mg/kg, compared to the USEPA industrial RSL of 5.1 mg/kg. Noncancer soil RSLs are not available for DDD and DDE. However, the noncancer industrial soil RSL for DDT can be used as a surrogate (430 mg/kg). Both DDD and DDE exceed this value 	<p><u>4.c.iii. Contaminant Concentrations Exceeding Industrial RSLs.</u> The SVOC, pesticide, PCB, and TIC values reported in Table C-1 (now C-4) were erroneously reported in units of micrograms/kilogram (ug/kg) while listing the units as milligrams/kilogram (mg/kg). The values in the table have been corrected to units of mg/kg.</p> <p>The chemical concentrations reported in draft Table C-1 (now C-4) were based on data reported in the risk evaluation tables the OUs 3 and 4 ROD for CAOC 2 (ROD Tables 2-46 to 2-55). The tables in the RODs did not indicate (as did the related ROD text) that the areas containing the highest concentrations of pesticides at CAOC 2 had been removed as part of a non-time critical removal action (NTCRA) in 1994. The ROD text (page 2-100) states the remaining soils measured lower than the prescribed 4,4'-DDD and 4,4'-DDE/4,4'-DDT action levels of 1.2 and 0.84 mg/kg, respectively. Details of the removal action at CAOC 2 are provided in the removal action site closeout report prepared by the DON (1995).</p> <p>Similarly, for CAOC 34, the OUs 3 and 4 ROD tables did not report the removal of the maximum concentrations of PCBs reported for the</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
<p>by more than 10-fold.</p> <ul style="list-style-type: none"> • <u>PCBs</u>. Maximum concentrations of PCBs in site soil significantly exceed the industrial soil RSLs. For example, at CAOC 21, the maximum concentration of Aroclor-1260 is 247,669 mg/kg, compared to the industrial RSL or 0.74 mg/kg. While the RSL tables do not list a soil level based on noncancer for this particular Aroclor, the noncancer-based industrial RSL for Aroclor - 1254 is 11 mg/kg. HERO is also concerned that at very high concentrations, PCBs can also pose a subsurface vapor intrusion to indoor air concern. • <u>N-Nitroso-di-n-propylamine</u>. The maximum concentration (59 mg/kg) significantly exceeds the current USEPA RSL for industrial soil of 0.25 mg/kg. 	<p>risk evaluation. A NTCRA performed by the DON in 1994 at CAOC 34 removed soils impacted with PCBs at concentrations of 1 mg/kg or greater. Details of the removal action at CAOC 34 are provided in the removal site evaluation prepared by the DON (1994). The maximum soil concentrations (for CAOCs 2 and 32) were removed from Appendix C and the report in Section 6.6.2.</p> <p>With the corrections made and with only compound at one site exceeding a new RSL (Aroclor 1242 at CAOC 32), Table 6-4 of the main report was eliminated as unnecessary. CAOC 32 is discussed in the text in Section 6.6.2 of the text; the specific area, Stratum 2, is noted. The OUs 5 and 6 ROD section is referenced.</p> <p>Note that since the very high concentration PCB soils have been removed from the site, no inhalation risk is suspected due to this compound.</p>
<p><u>4.d. Volatiles</u>. Table C-1 lists US EPA RSLs for 3 VOCs (1,2-Dichloroethane, 2-Hexanone, and Ethylbenzene). Please be aware that USRSLs do not address vapor intrusion, and therefore simple comparison of RSLs may not be protective of the vapor intrusion pathway. Please address this issue, particularly since it is unclear if these volatiles are actually present in site soil given that no detections are listed in the table.</p>	<p><u>4.d. Volatiles</u>. Vapor-intrusion evaluations were provided for Yermo Annex in Appendix D of the Draft submittal. To respond to this and related comments, Appendix C was revised to incorporate the vapor-intrusion evaluations and an evaluation of inhalation due to VOC impacted groundwater at Nebo North was added.</p> <p>Additionally, Appendix C was updated with a new Table C-1 and C-2 that report all detected VOCs (maximum concentrations and frequency of detection) in groundwater monitoring samples between 2007 and 2011, with a comparison to the OUs 1 and 2 ROD RAOs, current MCLs, and current tapwater RSLs. Based on the additional data review, TCE, PCE, and 1,1-DCE remain the primary VOCs of concern in OUs 1 and 2. Vinyl chloride is not detected. Other VOCs are detected but at low concentrations and infrequently</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
<p><u>4.e. Section 6.6.</u> Appendix C refers the reader to Section 6.6 (Review of Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs) of the main document for information on how the revised soil RSLs were used in the Five-Year review. We have conducted a limited review of this section with respect to how the soil RSLs were applied in the evaluation since this is related to General Comment 4 c ii and 4 c iii above.</p> <p>Overall, according to Table 6-4, industrial soil RSLs were exceeded at numerous CAOCs with NFA remedies. However, there are LUCs or BMP amendments for each of these sites, with the exception of CAOC 32. (The BMP amendments require Environmental Division review prior to any new land use.) As commented above, the term "NFA" is often used for sites with unrestricted land use, including residential. While we are unaware of pervious discussions related to terminology for the selected remedies, HERO recommends the Navy consider replacing the term "NFA" with an alternate designation for sites where restrictions are actually in place, and the land use is not unrestricted.</p>	<p><u>4.e. Section 6.6.</u> Please see response to comment 4. c. ii, above. Errors in the draft Table C-1 (now C-4) have been corrected. Table 6-4 in the main text was eliminated. The comment on use of the term "NFA" was addressed under response to comment 4.c.ii.</p>
<p>4.e.i. While CAOC 32 soil contains 4,4-DDE (51 mg/kg) and Aroclor-1242 (5700 mg/kg) at concentrations exceeding industrial RSLs (5.1 mg/kg and 0.74 mg/kg, respectively), the document indicates that the site is covered with pavement and buildings and therefore there are no direct exposure routes and the NFA remedy is protective. However to ensure long-term protectiveness, a BMP amendment is recommended for this site as part of the Five-Year Review. As noted above, the DTSC Project Manager should be aware that even if direct exposure pathways are incomplete, at very high concentrations, PCBs have the potential to pose a vapor intrusion to</p>	<p>4.e.i. CAOC 32: The values in Table C-1 (now C-4) upon which this comment is based on were not reported in the correct units additionally, the tables in the RODs didn't not indicate that some areas of high concentrations were part of a non-time critical removal action, see response to comment 4.c.iii.</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
indoor air issue.	
4.e.ii. For the sites other than CAOC 32, the document concludes that the BMP amendments in place require any change in land use to be coordinated with the Environmental Division and this ensures proper management of environmental concerns for these CAOCs. Based on the current land uses listed in Table 6-4, HERO is concerned with this conclusion given the high concentrations of contaminants present at some of the sites. Examples of the current land uses include "open land, unused", base golf course and facilities, equipment storage, drainage channels, former evaporation ponds, and buildings. In some cases, there may be potential for current exposures and it is unclear why a BMP is considered protective in these situations. For example, CAOCs 2 and 3 are at the base golf course and facilities. At these sites, maximum levels of chlorinated pesticides significantly exceed the RSLs (4,4'-DDD at 4490 mg/kg, 4,4'-DDE at 7140 mg/kg). If there is potential for exposure, we recommend this be addressed.	4.e.ii. Sites other than CAOC 32: See response to comment 4. e. i.
4.e.iii. Despite high contaminant concentrations, the document concludes that the BMP amendments are adequate to address potential environmental concerns. In addition to human health concerns, ecological risk also needs to be considered and USEPA RSLs only address human health (not ecological issues). According to Table 6-4, there are numerous sites with contaminants exceeding RSLs which have a current land use consisting of open unused land and drainage channels. A separate evaluation of potential risk to ecological receptors must be conducted if significant ecological habitat is present onsite or there is potential transport of contaminants to offsite habitat. Please address this issue.	4.e.iii. See response to comment 4.e.i above

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
<p><u>TABLE 7-3 AND APPENDIX D1 -Technical Assessment Report Vapor Intrusion Modeling for Building 573.</u> HERO was requested to review Table 7-3 and Appendix D1 which pertain to CAOC 16. CAOC 16 includes Building 573 and the surrounding concrete cover, and is known as the Marine Corps Maintenance Command. Six structures are currently present at CAOC 16, and 2 additional buildings are planned for construction in 2012.</p> <p>The selected remedy for CAOC 16 is LUCs to maintain the existing concrete hardstand, monitoring the physical and structural integrity of the concrete hardstand, and controlling and monitoring exposure pathways at CAOC 16. A regular maintenance program is implemented to maintain a stable surface environment, which will prevent organic vapors from escaping to the atmosphere, prevent direct contact with any soil contamination, and minimize infiltration of water to the subsurface.</p> <p>As part of the Five-Year Review, the technical assessment of the CAOC 16 selected remedy included Johnson and Ettinger (J&E) modeling of November 2011 vapor data from three soil vapor monitoring probes using the new US EPA toxicity criteria for PCE and TCE. The report concludes that estimated cancer risks for PCE and TCE are below the lower end of the 1 E-6 to 1 E-4 risk management range, and the hazard quotients (HQs) were less than one. As a result, the selected remedy of preservation of the concrete cap to prevent exposure to shallow soil vapors was considered to be functioning as intended by the ROD. Our comments follow.</p>	<p><u>TABLE 7-3 AND APPENDIX D1 -Technical Assessment Report Vapor Intrusion Modeling for Building 573.</u></p> <p>See responses to specific comments below.</p>
<p><u>5. Groundwater.</u> According to Appendix D-1, soil vapor COCs are primarily TCE, PCE, and 1, 1-dichloroethene (1, 1-DCE). Additionally, groundwater related to CAOC 16 is being treated by air sparge/soil vapor extraction (SVE) system and groundwater extraction and treatment. In the</p>	<p><u>5. Groundwater.</u> For OU1, the long-term soil vapor and groundwater data show that vapor migration is the only relevant pathway. Groundwater concentrations beneath the Building 573 and hardstand</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
current report, only soil vapor data were evaluated in the J&E model. According to DTSC's 2011 vapor intrusion guidance, a multiple lines of evidence approach (which includes consideration of soil gas and groundwater) is recommended. The need to include J&E modeling of groundwater contaminants should be addressed.	are low (below MCLs) and groundwater is approximately 174 ft bgs. A vapor intrusion model based on the residual Nebo North groundwater plume has been added to Appendix C Vapor Intrusion Modeling (formerly Appendix D1). No soil vapor data are available for this area. Based on the modeling results there is no credible threat to human health by the vapor intrusion pathway at the Nebo North site.
<u>6. Cumulative Evaluation.</u> <u>6.a. Volatiles.</u> As presented, the only VOCs considered in Appendix D-1 were PCE, TCE, and 1, 1-DCE. Because complete data sets were not provided for the 2011 soil gas sampling, it is unclear whether additional VOCs (e.g., vinyl chloride, a carcinogenic breakdown product of TCE) may be present. If additional volatiles were detected, they need to be incorporated into the indoor air evaluation.	<u>6. Cumulative Evaluation</u> <u>6.a. Volatiles.</u> Tables C-3 has been added to show the maximum detected concentration of VOCs and their respective frequency of detection. The table shows that the selected VOCs are the relevant COCs. Vinyl Chloride was not detected.
<u>6.b. Cumulative Risk/Hazard.</u> In addition to the modeling for only 3 VOCs, risks and hazard were not summed across these constituents to derive cumulative risks and hazard indices (HIs) for use in making risk management decisions. The evaluation needs to be updated in this regard.	<u>6.b. Cumulative Risk/Hazard.</u> See revised Appendix C which now includes a cumulative risk/hazard table for the VI modeling results.
<u>6.c. Sampling Depths.</u> The J&E modeling was limited to the highest detected concentrations of VOCs in soil vapor, which occurred in samples collected from depths ranging from 60 feet bgs to 140 feet bgs. While lower concentrations were detected at shallower depths (30 feet bgs), we recommend also modeling at least one of the 30 feet bgs samples where the highest relatively-"shallow" VOC concentrations were detected. This will confirm that risk has not been underestimated by exclusive use of the	<u>6.c. Sampling Depths.</u> The J&E model at Building 573 was updated with the highest detected concentrations at the shallowest screened interval. The associated risk remains below the acceptable risk range. See revised Appendix C for the updated J&E model report.

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
deeper data. Generally, when soil gas is collected over a range of depths, modeling is conducted for each depth for comparison purposes and bounding of the risks estimates.	
<p>7. <u>PCE Inhalation Toxicity Criterion for Cancer.</u> As noted above, HERO has not accepted use of the recently established USEPA toxicity criteria based on cancer. Therefore, the Appendix D-1 vapor intrusion evaluation needs to be updated to use the Cal/EPA OEHHA unit risk factor of 5.9E-6 per µg/m3 rather than the USEPA 2012 criterion (2.6E-7 per µg/m3)</p> <p>The Cal/EPA criterion is -22-fold more protective than the USEPA criterion. For reference, while we do not agree with some of the J&E modeling parameters (see below), simply updating the current J&E evaluation to use the Cal/EPA unit risk factor for PCE would indicate a cancer risk of 4E-6 for sample YCW-16-1-140.</p>	<p>7. <u>PCE Inhalation Toxicity Criterion for Cancer.</u> The J&E Model (in Appendix C) now includes both EPA revised toxicity criteria for PCE and the OEHHA unit risk factor. Considering the OEHHA risk criteria, the J&E model results indicate the PCE inhalation risk remains low, within the acceptable risk range.</p>
<p>8. <u>J&E Model Assumptions.</u> HERO has reviewed the J&E modeling parameters, and notes the following inconsistencies with DTSC guidance. We recommend these be addressed as part of the recommended, cumulative indoor air evaluation.</p> <p>8.a. <u>Building Assumptions.</u> Site-specific building dimensions (including a 30-foot ceiling height) were used for the J&E modeling. This is acceptable for the existing building, but the results of such modeling may not apply to future buildings with different dimensions. If future buildings are planned for areas with VOC contamination, we recommend additional modeling using DTSC defaults (10 meters x 10 meters, with an 8-foot ceiling) be conducted at that time.</p> <p>8b. <u>Soil Gas Advection Rate.</u> DTSC guidance indicates that for structures larger than the default building size (100 square meters), the default value for Q_{soil} of 5 liters per minute should be proportionally increased in a</p>	<p>8. J&E Model Assumptions.</p> <p>The J&E model was updated with the suggested parameters. Please see the revised J&E Model report now in Appendix C.</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
<p>linear fashion as a function of the spatial footprint of the building. For example, a building of 1,000 square meters will have, for modeling purposes, a soil gas advection rate of 50 liters per minute. Because the existing building is larger than the default, the Qsoil needs to be adjusted.</p> <p><u>8c. Indoor Air Exchange Rate.</u> The industrial indoor air exchange rate for the existing building was assumed to be 0.25 exchanges per hour. DTSC's default indoor air exchange rate for commercial buildings is 1 exchange per hour, which is less conservative than the current assumption. If site-specific information is available indicating an air exchange rate lower than the DTSC default, this would justify using the current assumption. Otherwise, the DTSC default of 1 exchange per hour should be used.</p> <p><u>8d. Exposure Frequency and Duration.</u> In the current evaluation, the default residential exposure frequency (350 days per year) and duration (30 years) were assumed for a "conservative" evaluation. Because the existing building is industrial, it is acceptable to use the default exposure parameters for this receptor of 250 days per year, over 25 years. At some sites, an exposure time term of 8 hours per day has also been incorporated to account for a typical work day.</p> <p>Based on the above points, we recommend updating the vapor intrusion evaluation contained in the Five-Year Review to ensure the protectiveness of human health.</p>	
<p>SPECIFIC COMMENTS:</p> <p><u>1. Table C-1.</u> Table C-1 contains three errors in the reported USEPA RSLs for industrial soil which should be corrected.</p> <p>1.a. The current US EPA industrial soil RSL for 2-methylnaphthalene is 2200 mg/kg (not 99 mg/kg as currently listed).</p>	<p>1. Table C-1 (now C-4).</p> <p>1.a. Correction made.</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Tracy Behrsing, Ph. D, Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 05 September 2012	
Regulator Comment	DON Response to Comments
<p>1.b. The current USEPA industrial soil RSL for n-nitroso-di-n-propylamine is 0.25 mg/kg (not 0.21 mg/kg as currently listed). In addition, the site concentrations should be highlighted in yellow since they exceed the RSL.</p> <p>1.c. The USEPA industrial soil RSL for beta-BHC is 0.96 mg/kg (not 0.93 mg/kg as currently listed).</p>	<p>1.b. Correction made. The correct USEPA industrial soil RSL for n-nitroso-di-n-propylamine was not changed from the previous RSL value and thus the compound was removed from the table. The values in Table C-1 (now C-4) upon which this comment is based on were not reported in the correct units (see response to comment 4.c.iii). The reported values do not exceed the USEPA industrial Soil RSL.</p> <p>1.c. Correction made.</p>

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Omar Pacheco, Remedial Project Manager, Lahontan Regional Water Quality Control Board, in correspondence dated 12 September, 2012.	
Regulator Comment	DON Response to Comments
1. Section 7 .2.1 Background, page 35 -The Navy describes the remedial action objectives (RAOs) for groundwater cleanup at operable units (OUs) and 2 as described in the OUs 1 and 2 Record of Decision (ROD) report dated April 2, 1998. Please include in this section a description of the RAOs for the vadose zone cleanup.	1. Section 7 .2.1 Background, page 35. The RAOs for groundwater cleanup and vadose zone cleanup from the respective RODs were added to this section. For consistency, a similar change was made for OU 2 (Section 8.2.1).
2. Section 7.2.3 Summary of Findings, page 36- The Navy states that selected remedy may not achieve the cleanup levels at the predicted time because of the persistence of VOCs in soil gas acting as a continued source of VOCs in groundwater. Please cite the report that performs the data analysis that supports the rationale that the selected remedy will not achieve groundwater cleanup levels within the estimated time frame of 30 years. Also, please include in this section the revised estimated time frame of when the selected remedy will achieve groundwater cleanup levels.	2. Section 7.2.3 Summary of Findings, page 36. A trend analysis of key groundwater monitoring wells near the center of the Yermo North Plume has been added to Appendix D. Trends of TCE and PCE are generally increasing in the analyzed wells indicating that that the cleanup goals will not likely be achieved within 30 years. An updated estimate for the cleanup time frame cannot be estimated because trends are increasing.
3. Section 7.4.1 Summary of the Technical Assessment, page 38- The Navy states that a No Further Action with Base Master Plan modifications was the selected remedy for CAOC 26, the Building 533 Waste Disposal Area. The Navy prepared table 7-7 that describes the status of this CAOC. It would be appropriate to reference this table in this section. Also, the report refers the reader to table 7-3 to review the air sparging/soil vapor extraction (AS/SVE) and groundwater pump and treat remedy at CAOC 26. This reference appears to be an error because in Table 7-3 there is no mention of the status of the selected remedy at CAOC 26.	3. Section 7.4.1, page 38 – A reference to the technical assessment of the NFA remedy for CAOC 26 was added. The reference was changed from Table 7-3 to Table 7-2 where the CAOC 26 AS/SVE system is reviewed.
4. Section 7.7.1 Summary of the Technical Assessment, page 40- The Navy states the RAOs for CAOC 35 include: minimize the potential for the disturbance of the wastes, minimize the potential of future	4. Section 7.7.1 Summary of the Technical Assessment, page 40. A reference to the OUs 5 and 6 ROD, Section 3.6.1, was added to Section 7.7.1

RESPONSE TO COMMENTS

Draft Third Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 15 June 2012)

Comments provided by Omar Pacheco, Remedial Project Manager, Lahontan Regional Water Quality Control Board, in correspondence dated 12 September, 2012.	
Regulator Comment	DON Response to Comments
releases to groundwater, and attain landfill closure applicable or relevant and appropriate requirement (ARARs). Please cite the document that states these RAOs.	
5. Section 8.2.1 Background, page 45 -The Navy states that Land Use Controls and an existing pilot study AS/SVE system were selected as the final remedy for addressing OU 2 Nebo South groundwater plume and its related vadose zone contaminants. Please include in this section a description of the RAOs as described in the OU 2 ROD dated September 20, 2006.	5. Section 8.2.1 Background, page 45. The RAOs as stated in the OU1 and OU 2 ROD (1998) were added to this section.

REFERENCES CITED:

Department of the Navy (DON). 1994. Draft Removal Site Evaluation Report - CAOC 34, Marine Corps Logistics Base, Barstow, California, prepared by Jacobs Engineering Group Inc., 10 May

_____. 1995. Preliminary Draft Removal Action Site Closeout Report, CERCLA Area of Concern 2, Stratum 2, Pesticide Storage and Washout Area, Marine Corps Logistics Base, Barstow, California, prepared by OHM Remediation Services Corp., 10 January.

_____. 1997. OUs 3 and 4: Operable Units 3 and 4, Final Record of Decision Report. June.

_____. 1998a. Operable Units 1 and 2, Final Record of Decision Report. April.

_____. 1998b. Operable Units 5 and 6, Record of Decision Report. January.

_____. 2000. Remedial Action Report, CERCLA Areas of Concern 20 and 23, Operable Units 3 and 4. July.

_____. 2002a. Remedial Action Report, Operable Units 5 and 6. June.

_____. 2006. Final Record of Decision, Nebo South Groundwater – Operable Unit 2 Marine Corps Logistics Base, Barstow, California. September.

Tetra Tech EC, Inc. (TtEC). 2010c. Final Technical Memorandum, Status Update on the Second Five Year Review Follow-Up Actions For CAOC 7, OU 6 - Nebo Main Base, MCLB, Barstow, California 11 January.

Appendix H

Comments and Responses to Comments
On Draft Final Report dated
October 5, 2012



Matthew Rodriguez
Secretary for
Environmental Protection



Department of Toxic Substances Control

Deborah O. Raphael, Director
5796 Corporate Avenue
Cypress, California 90630



Edmund G. Brown Jr.
Governor

October 31, 2012

Mr. Ralph Pearce
Project Manager
Naval Facilities Engineering Command, Southwest
1220 Pacific Highway, OPCE.RP
San Diego, California 92132-5190

DRAFT FINAL THIRD FIVE-YEAR REVIEW REPORT OPERABLE UNITS 1-6, MARINE CORPS LOGISTICS BASE BARSTOW, CALIFORNIA

Dear Mr. Pearce:

The Department of Toxic Substances Control (DTSC) received for its review the Draft Final Five-Year Review Report, Operable Units 1-6, Marine Corps Logistics Base Barstow, dated October 5, 2012.

The purpose of this report is to evaluate the performance of the remedies implemented at Operable Units 1-6 to determine if the remedies are protective of human health and the environment, and to recommend remedial system optimization and corrective actions if the remedies have not performed as designed.

DTSC completed its review of the response to comments and the Draft Final document, and has the following comments:

- (1) Section 7.3.2 Summary of Findings, page 38: the new added statement "The MCLB Barstow Environmental Division confirmed that that the ..." Please remove the duplicated word "that";
- (2) Section 7.8.2 Summary of Findings, page 42: the new added sentence "The MCLB Barstow Environmental Division confirmed that site conditions were constant with original site conditions" . Should state "consistent with";
- (3) Table 8-4 Nebo Main Base-CAOCs with No Further Action and Groundwater Monitoring and/or BMP Amendments: the following sentence: "A stipulation that any action planned or changes in site use s will be reviewed by the

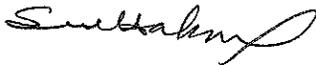
Mr. Ralph Pearce
October 31, 2012
Page 2

Environmental Division" is repeated throughout this table. Please remove the extra space between the word "use" and the letter "s".

- (4) Table 9-3 Issues and Recommendations Summary, CAOC 38, the last column "Other Consideration": Please update the following statement "The Draft OU 7 Feasibility Study is anticipated to be submitted to the FFA in July 2012" to state: "The Draft OU 7 Feasibility Study was submitted to the FFA in August 2012".

Additionally, attached please find DTSC Toxicologist comments on the Draft-Final document. DTSC recommends having a technical meeting to discuss any issues of concern that any party might have, in order to expedite finalizing the Five Year Review in a timely manner. We look forward to continue to work with you on base cleanup activities at MCLB Barstow. If you have any questions please call me at (714) 484-5381.

Sincerely,



Sue Hakim
Remedial Project Manager
Brownfields and Environmental Restoration Program

Attachment

cc: Mr. Jim Bustamante
Remedial Project Manager
Marine Corps Logistics Base
P.O. Box 110170
Barstow, California 92311-5050

Mr. Philip Ramsey
U.S. Environmental Protection Agency
Region IX, SFD-8-3
75 Hawthorne Street
San Francisco, California 94105

Mr. Omar Pacheco
California Regional Water Quality Control Board
Lahontan Region B Victorville Branch Office
14440 Civic Drive, Suite 200
Victorville, California 92392-2306



Matthew Rodriguez
Secretary for
Environmental Protection



Department of Toxic Substances Control

Deborah O. Raphael, Director
8800 Cal Center Drive
Sacramento, California 95826-3200



Edmund G. Brown Jr.
Governor

MEMORANDUM

TO: Soad Hakim, Project Manager *M's Wade for T Behrsing*
Brownfields and Environmental Restoration Program
5796 Corporate Avenue
Cypress, California 90630-4732

FROM: Tracy Behrsing, Ph.D.
Staff Toxicologist, Human and Ecological Risk Office (HERO)

DATE: October 25, 2012

SUBJECT: THIRD FIVE-YEAR REVIEW REPORT, OPERABLE UNITS 1 – 6, MARINE
CORPS LOGISTICS BASE BARSTOW, CALIFORNIA

PCA: 18019 Site: 400092-18

DOCUMENTS REVIEWED: Response to HERO Comments and "Draft Final Third Five-Year Review Report, Operable Units 1-6, Marine Corps Logistics Base Barstow, California." Prepared for Department of the Navy, Naval Facilities Engineering Command NAVFAC Southwest (San Diego, California). Prepared by AIS-TN&A Joint Venture (Ventura, California). Document dated October 5, 2012.

BACKGROUND (BASED ON SUBMISSION): Marine Corps Logistics Base (MCLB) is located in San Bernardino County, California, approximately 135 miles northeast of Los Angeles. The Base consists of two areas: the Yermo Annex (7 miles east of Barstow) and the Nebo Main Base (3.5 miles east of Barstow). MCLB Barstow is divided into seven Operable Units (OUs), with each OU further divided into CERCLA Areas of Concern (CAOCs). OUs 1 and 2 are related to groundwater contamination beneath the Yermo Annex and Nebo Main Base, with volatile organic compounds (VOCs) as the primary contaminants. OUs 3 and 5 are related to soil contamination at the Yermo Annex. OUs 4 and 6 pertain to soil contamination at Nebo Main Base. The primary soil contaminants are identified in the report as VOCs, metals, pesticides, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs).

Records of Decision (RODs) were signed for OUs 1 through 6 in 1997 and 1998, with remedial actions (RAs) and institutional controls (ICs; also referred to as land use controls, or LUCs) implemented at various CAOCs within those OUs. The RODs also established remedial action objectives (RAOs), as needed. The current submission presents the results of the Third Five-Year review for OUs 1 through 6, with the review period spanning from October 2007 through September 2012. The OU7 ROD is under development, and therefore not subject to the current Third Five-Year Review. In a memorandum dated September 5, 2012, HERO reviewed the following sections of the Draft Third Five-Year review: 1) Appendix C (Technical Assessment Report – Review of Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs for OU 1 through OU 6; also entitled Technical Assessment Report – Evaluation of Changes to Screening Criteria and Regulatory Standards Relevant to the RAOs for OUs 1-6), 2) Table 7-3, Page 4, Part 3 (CACO-16 – Third Five-Year Review [OU 5 – Yermo Annex]), 3) Appendix D-1 (Technical Assessment Report Vapor Intrusion Modeling for Building 537, MCLB Barstow), and 4) the potential impact of the 2011 USEPA toxicity criteria for trichloroethylene (TCE).

SCOPE OF REVIEW: HERO's review is limited to the Responses to our September 5, 2012 comments, and corresponding revisions to the document relative to those comments. We defer to the DTSC Project Manager and others on the acceptability of the Responses to their comments, as well as the corresponding changes to the document. We assume that regional personnel have evaluated the sampling methods for environmental media, the adequacy of site characterization, analytical chemistry methods, and quality assurance procedures.

GENERAL COMMENTS

1. Overall Findings. In general, HERO concurs with the Responses and corresponding revisions to the document. The following comments pertain to those issues for which HERO does not concur with the Response, or for which we have additional comments. (No response is needed.)

2. Response to HERO General Comment 2b (Appendix C, Naphthalene). HERO defers to the Regional Water Control Board Lahontan Region (RWQCB) regarding the naphthalene "Primary Drinking Water Standard" of 170 µg/L listed in Table C-8 (formerly Table C-4). As previously commented, the current CA notification level appears to be 17 µg/L, which is 10-fold lower than the referenced standard. (No response is needed.)

3. Response to HERO General Comment 3 (Appendix C, Tetrachloroethene [PCE] and TCE).

a. Comment 3a (Screening Criteria and Regulatory Standards for PCE and TCE). The Response indicates that USEPA tapwater Regional Screening Levels (RSLs) have been incorporated into Appendix C. The Response further indicates that the tapwater RSLs for PCE and TCE have increased approximately an order of magnitude as compared to the Preliminary Remedial Goals (PRGs) reported in the

prior Five Year Review Report, and therefore no additional evaluation is warranted for these two compounds.

- i. The 2004 tapwater PRG for TCE reported in the prior Five Year Review Report (0.028 µg/L) was based on USEPA National Center for Environmental Assessment (NCEA) cancer toxicity criteria for this constituent, which were more protective than CalEPA TCE criteria at that time (the 2004 Cal-modified tapwater PRG was 1.4 µg/L). While no revision is necessary in this regard, we note that the current tapwater RSL (0.44 µg/L) is more protective than the older Cal-modified tapwater PRG but less conservative than the 2004 tapwater PRG based on NCEA criteria. (This comment is provided for informational purposes, and no response is needed.)
- ii. As previously commented, HERO has not accepted use of the recently established USEPA cancer toxicity criteria for PCE. Consistent with DTSC HHRA Note 3 recommendations, please revise the document (including all tables and text) to list the more health-protective 2004 tapwater PRG for PCE, rather than the 2012 tapwater RSL for this compound. Any discussion of the current tapwater RSL for PCE should also be accompanied by text indicating that DTSC recommends use of the 2004 PRG instead.
- iii. USEPA tapwater RSLs do not address the vapor intrusion pathway. In addition, Appendix C presents a separate indoor air evaluation for both PCE and TCE. Both of these points conflict with the statement that no additional evaluation was warranted or performed. Please revise all relevant sections of the document in this regard.

b. Comment 3d (Other Contaminants and Implications of Updated Toxicity Values). HERO previously commented that if there are additional contaminants (other than PCE and TCE) for which toxicity criteria have been revised, they should also be addressed. The Response indicates that based on the data shown in the additional tables added to Appendix C, the predominant chemicals of concern (COCs) are PCE and TCE. Therefore, Section 2.1 discusses toxicity criteria changes for these constituents only.

Unless this section is updated to discuss toxicity criteria changes for all site-related chemicals, the text should be revised to provide the rationale included in the Response, and acknowledge that toxicity criteria for other constituents (not considered to be primary COCs) may have also changed. The Appendix C Tables comparing previous PRGs to current screening levels can be cited in this regard.

4. Response to HERO General Comment 4c (Appendix C, Land Use). As previously commented, the site reviews are based on an assumed industrial land use only. HERO commented that typically residential criteria are used to evaluate sites, unless a land use control (LUC) or notation in the Base Management Plan (BMP) for industrial land

use only is in place. HERO further noted that the term “No Further Action” (NFA) is commonly used for sites with unrestricted land use including residential. In response to HERO’s comment, additional text was added to clarify the term “NFA with BMP amendments.” While the “No Action Alternative” remedy does not involve institutional controls, certain sites closed under NFA have BMP amendments to indicate that MCLB Barstow Environmental Division oversight is required to maintain the conditions of the NFA decision or evaluate changes to land use that may pose a risk to site workers.

HERO defers to the DTSC Project Manager on risk management decisions, and the terminology used in this document which was apparently taken from the corresponding RODs. HERO’s previous concern regarding this issue is no longer as significant, given that the data tables have been corrected to use correct units and remove detections which are no longer present onsite. Many of the contaminant concentrations shown in the revised document are orders of magnitude lower than reported in the initial version of the document. If there are future land use changes, HERO is available to consult with the Base Environmental Division on human health risk-related issues. (No response is needed.)

5. Response to HERO General Comment 4d (Appendix C, Volatiles).

- a. The Response does not address why *soil* RSLs for 1,2-Dichloroethane, 2-Hexanone, and Ethylbenzene are included in Table C-4, since no detections are listed. Please add a footnote to the table which explains this issue.
- b. In response to this and other related comments, the Response refers to the Five-Year Review’s evaluation of vapor intrusion to indoor air at two areas with occupied buildings (CAOC 16 and Nebo North). We discuss vapor intrusion issues below in more detail. Within the context of the current Response, we note the following.
 - i. Contrary to HERO’s previous recommendation to evaluate all detected volatiles, the vapor intrusion evaluation continues to be limited only to the “primary VOCs of concern” (TCE, PCE, and 1,1-Dichloroethene [1,1-DCE]).
 - ii. The Response’s statement that “Vinyl chloride is not detected” appears to be inaccurate. Although vinyl chloride was not detected in soil gas at CAOC 16, Table C-2 lists this contaminant as having been detected in Nebo Main Base Groundwater. While vinyl chloride appears to have been detected only one time between 2007 and 2010, we point this out for accuracy.
 - iii. The Response indicates that VOCs other than the primary COCs “are detected but at low concentrations and infrequently.”

Although the Appendix C tables do support the identification of TCE, PCE, and 1,1-DCE as COCs, comparison to MCLs, tapwater RSLs, and RAOs does not necessarily address vapor intrusion concerns. Second, while the other VOCs

were generally detected at concentrations below MCLs, many of the maximum detected concentrations exceed the RSLs and they were not necessarily detected "infrequently." For example, Table C-2 shows that naphthalene was detected nine times at a maximum concentration of 42 µg/L, compared to the RSL of 0.14 µg/L. Chloroform was detected 90 times, with a maximum concentration of 4.7 µg/L compared to the RSL of 0.19 µg/L. 1,2-Dichloroethane was detected 43 times with a maximum concentration of 2.6 µg/L which exceeds both the tapwater RSL (0.15 µg/L) and CA MCL (0.5 µg/L). Please see below for our recommendations.

6. Response to HERO General Comment 5 (Vapor Intrusion Modeling of Groundwater and Soil Gas). HERO previously commented that according to DTSC vapor intrusion guidance, a multiple lines of evidence approach (including consideration of soil gas and groundwater) is recommended when evaluating this exposure pathway. The Response indicates that for Building 573 (located at CAOC 16), groundwater concentrations are low (below MCLs) and groundwater is approximately 174 feet bgs. Therefore, only soil vapor was evaluated at this location. For Nebo North, soil gas data are not available and therefore only groundwater data could be evaluated.

a. Given the depth to groundwater at CAOC 16 and reported concentrations, vapor intrusion modeling of groundwater is not anticipated to significantly impact the conclusions of this review. However, for completeness and consistency with DTSC guidance, we recommend incorporating at least limited groundwater Johnson and Ettinger (J&E) modeling of TCE and PCE for comparison to the soil gas modeling results.

b. For the Nebo North groundwater plume, the lack of soil gas data should be identified as an uncertainty. While J&E modeling of COCs in groundwater did not indicate a significant vapor intrusion risk, soil gas data are not available to characterize potential vadose zone contamination.

7. Response to HERO General Comment 6 (Cumulative Evaluation - Vapor Intrusion). As previously commented, the only VOCs considered in the vapor intrusion evaluation were PCE, TCE, and 1,1-DCE. HERO commented that if additional volatiles were detected, they need to be incorporated into the indoor air evaluation. Rather than updating the vapor intrusion evaluation in this regard, the Response indicates that these limited VOCs are the "relevant COCs" based on the maximum detected VOC concentrations and their frequency of detection.

a. From a risk assessment perspective, limiting the vapor intrusion evaluation to only three COCs is inconsistent with DTSC guidance. While these three COCs are likely to be the primary risk drivers, summing the risk and hazard across a limited number of constituents does not constitute a *cumulative* risk evaluation.

b. In general, HERO does not allow for the screening out of constituents based on the magnitude of the detection. With respect to the frequency of detection, additional information such as spatial and temporal variability, and the total number of samples analyzed for the constituent would need to be presented. Finally, HERO questions the Table C-3 footnote which identifies acetone, carbon tetrachloride, chloroform, and methylene chloride as "Common laboratory contaminants." USEPA's Risk Assessment Guidance for Superfund (RAGS) Part A has specific guidance on evaluating common laboratory contaminants which should be used when making such an argument. Review of RAGS Part A indicates that carbon tetrachloride and chloroform are not identified as common laboratory contaminants.

c. From a risk perspective, HERO generally recommends evaluating cumulative risk across all contaminants. However, we ultimately defer to the DTSC Project Manager on the scope of this Five-Year Review (i.e., whether it is acceptable to limit the evaluation to these COCs). Unless the document is revised in this regard, the text must minimally acknowledge that the risks and hazards presented do not include all contaminants.

8. Response to HERO General Comment 8 (J&E Model Assumptions). The revised J&E modeling parameters generally address HERO's previous comments. Our remaining comments on this issue follow.

a. Building Assumptions. Use of site-specific building dimensions is acceptable for evaluating current site conditions. However, please clarify whether there are occupied buildings other than Building 573 (CAOC 16) and Warehouses 3 and 4 (Nebo North) in the vicinity of the two areas being evaluated for potential vapor intrusion risks. For example, Figure C-1 appears to indicate that there are numerous additional buildings with footprints which are smaller than Building 573 (e.g., Building 579 located next to well YCW-16-2). Depending on the dimensions of the other buildings, risk may have been underestimated by using site-specific parameters for Buildings 573 and Warehouses 3 and 4 only. Please address this issue so a determination can be made as to the need to conduct additional J&E modeling for any other occupied buildings in these areas.

b. J&E Modeling Printouts. HERO was able to duplicate the J&E modeling results reported in Appendix C. However, for completeness and consistency with other documents which present J&E modeling, we recommend including examples of the J&E modeling printouts as part of Appendix C.

ADDITIONAL COMMENTS

1. Section 6.6.2 (Review of Toxicity Data, Cleanup Levels, and RAOs).

a. Section 6.6.2 refers to Table C-2 for a summary of changes to MCLs applicable groundwater at OU1 and OU2. Please revise this sentence to refer to Table C-5.

- b. Section 6.6.2 discusses changes in MCLs, but not the risk-based tapwater RSLs (which are presented in Table C-6). Because soil RSLs are discussed relative to historical PRGs, it is unclear why the groundwater discussion focuses on changes to MCLs only. Please provide the rationale for limiting discussion to MCLs only, or revise the document to address both MCLs and tapwater RSLs. Based on our review, it appears that the rationale may be that groundwater remedial action objectives (RAOs) were based on MCLs. However, we recommend this be confirmed and clarified in the document for transparency.
2. Section 7.3.2 (Summary of Findings [CAOC 16]). Section 7.3.2 states that vapor intrusion to indoor air at Building 573 was evaluated using toxicity values from the 2012 RSL tables, including the recently finalized toxicity criteria for PCE. Please revise the text to acknowledge that CalEPA criteria for PCE were also used, and report the risk results using CalEPA criteria as presented in Appendix C.
3. Appendix C, Section 2.2. Paragraph 2, sentence 2 of this section refers to Table C-1. Please revise this sentence to refer the reader to Table C-4.
4. Appendix C, Section 3.1.
- a. For CAOC 32, the text indicates that Aroclor-1242 was detected at 5.7 mg/kg, which exceeds USEPA screening criteria for PCBs in residential soils. Please revise the text to specifically state which screening criteria are being referenced. For reference, this concentration exceeds both the residential (0.22 mg/kg) and industrial (0.74 mg/kg) soil RSLs.
- b. Please confirm the reported risk listed in paragraph four of this section, and revise the document if necessary. The risk is currently listed as "2 1 x 10⁻⁵", with a space between the "2" and "1."
9. Appendix C, Section 4.0 (Evaluation of Groundwater MCL/RSL Changes). Similar to the Response to Comment 3d, Section 4.1 (Groundwater COCs) states that VOCs other than PCE, TCE, and 1,1-DCE were detected above the lower of MCLs or tapwater RSLs, but their infrequent detection or magnitude of "expedience" (exceedance?) do not warrant classifying them as COCs in this evaluation.
- a. HERO defers to the DTSC Project Manager on this limited scope of COC evaluation as noted above. For reference, Appendix C concludes that because the Navy has implemented the "best available technology" (BAT) for groundwater treatment, no additional engineering controls could be implemented at Yermo Annex. Drinking Water at Nebo Main Base is provided from Golden State Water and is not subject to review under this Five Year Report. (No response is needed.)

b. Section 4.3 (Yermo Annex Evaluation). Ingestion is identified as the sole groundwater exposure pathway for the Yermo Annex. Section 4.3 concludes that because BAT is being used and VOCs are removed to MCLs or nondetectable levels, the existing remedy would continue to be the BAT regardless of decreases in either RSLs or MCLs. Please clarify why additional exposure routes from beneficial use of groundwater and vapor intrusion to indoor air are not identified as relevant exposure pathways. Other sections of the document indicate that CAOC 16 (evaluated for vapor intrusion in Section 5) is located in Yermo Annex.

c. Section 4.4 (Nebo Main Base). Vapor intrusion to indoor air is identified as a groundwater exposure pathway where VOC plumes underlie occupied buildings. Two areas with impacted groundwater (Nebo South groundwater plume and CAOC 7 Stratum) are reported to be located at unoccupied areas of Base, and therefore were not considered for this pathway. If future land use changes occur such that buildings are located in these other areas, vapor intrusion to indoor air should be evaluated. Generally, this type of information is noted in the BMP.

5. Appendix C, Section 5.3. This section discusses the Nebo North Plume but refers to data in Table C-1, rather than C-2. Please update the document for accuracy.

6. Grammatical Edits. While HERO generally has not commented on minor typographical and grammatical errors, the Draft Final document would benefit from editing in this regard. For example, Appendix C Section 4.3 states "Groundwater exposure pathway remains ingestion..." and "The MCLs for the primary COCs has not..." These are only two of many sentences where editing is needed.

CONCLUSIONS

HERO has reviewed the Responses to HERO comments, and Draft Final Third Five-Year Review Report, Operable Units 1-6, Marine Corps Logistics Base Barstow, California. HERO concurs with many of the Responses, and appreciates the corresponding revisions to the document in these regards. We have noted several remaining issues which we recommend be addressed prior to accepting the Five-Year Review document. As presented, the Five-Year Review vapor intrusion evaluation focuses on TCE, PCE, and 1,1-DCE only. While risks were summed across these COCs, a cumulative evaluation across all VOCs was not conducted which is inconsistent with DTSC risk assessment recommendations. While we generally concur with the J&E modeling parameters, clarification is needed regarding the potential presence of other occupied buildings in the areas under evaluation. The site-specific modeling conducted for Building 573 and Warehouses 3 and 4 is not necessarily applicable to smaller buildings which may be present.

Reviewed by: Michael J. Wade, Ph.D., D.A.B.T.
Senior Toxicologist, HERO



RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Comments provided by Soad Hakim, Remedial Project Manager, Brownfields and Environmental Restoration Program, Department of Toxic Substances Control, in correspondence dated 31 October 2012	
Regulator Comment	DON Response to Comments
1. Section 7.3.2 Summary of Findings, page 38: the new added statement "The MCLB Barstow Environmental Division confirmed that that the ..." Please remove the duplicated word "that"	1. Correction made.
2. Section 7.8.2 Summary of Findings, page 42: the new added sentence "The MCLB Barstow Environmental Division confirmed that site conditions were constant with original site conditions". Should state "consistent with";	2. Correction made.
3. Table 8-4 Nebo Main Base-CAOCs with No Further Action and Groundwater Monitoring and/or BMP Amendments: the following sentence: "A stipulation that any action planned or changes in site use s will be reviewed by the Environmental Division" is repeated throughout this table. Please remove the extra space between the word "use" and the letter "s"	3. Correction made.
4. Table 9-3 Issues and Recommendations Summary, CAOC 38, the last column "Other Consideration": Please update the following statement "The Draft OU 7 Feasibility Study is anticipated to be submitted to the FFA in July 2012 to state: "The Draft OU 7 Feasibility Study was submitted to the FFA in August 2012".	4. Correction made.

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>1. <u>Overall Findings.</u> In general, HERO concurs with the Responses and corresponding revisions to the document. The following comments pertain to those issues for which HERO does not concur with the Response, or for which we have additional comments. (No response is needed).</p>	<p>1. Comment acknowledged</p>
<p>2. <u>Response to HERO General Comment 2b (Appendix C, Naphthalene).</u> HERO defers to the Regional Water Control Board Lahontan Region (RWQCB) regarding the naphthalene "Primary Drinking Water Standard" of 170 µg/L listed in Table C-8 (formerly Table C-4). As previously commented, the current CA notification level appears to be 17 µg/L, which is 10-fold lower than the referenced standard. (No response is needed).</p>	<p>2. A note has been added to Table C-8 to note that the CA notification level is 17 µg/L.</p>
<p>3. <u>Response to HERO General Comment 3 (Appendix C, Tetrachloroethene [PCE] and TCE).</u></p> <p>a. <u>Comment 3a (Screening Criteria and Regulatory Standards for PCE and TCE).</u> The response indicates that USEPA tapwater Regional Screening Levels (RSLs) have been incorporated into Appendix C. The Response further indicates that the tapwater RSLs for PCE and TCE have increased approximately an order of magnitude as compared to the Preliminary Remedial Goals (PRGs) reported in the prior Five Year Review Report, and therefore no additional evaluation is warranted for these two compounds.</p> <p>i. The 2004 tapwater PRG for TCE reported in the prior Five Year Review Report (0.028 µg/L) was based on USEPA National Center for Environmental Assessment (NCEA) cancer toxicity criteria for this constituent, which were more</p>	<p>3.</p> <p>3. a. i.) Comment acknowledged.</p>

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>protective than CalEPA TCE criteria at the time (the 2004 Cal-modified tapwater PRG was 1.4 µg/L). While no revision is necessary in this regard, we note that the current tapwater RSL (0.44 µg/L) is more protective than the older Cal-modified tapwater PRG but less conservative than the 2004 tapwater PRG based on NCEA criteria. (This comment is provided for informational purposes, and no response is needed.)</p> <p>ii. As previously commented, HERO has not accepted use of the recently established USEPA cancer toxicity criteria for PCE. Consistent with DTSC HHRA Note 3 recommendations, please revise the document (including all tables and text) to list the more health-protective 2004 tapwater PRG for PCE, rather than the 2012 tapwater RSL for this compound. Any discussion of the current tapwater RSL for PCE should also be accompanied by text indicating that DTSC recommends use of the 2004 PRG instead.</p> <p>iii. USEPA tapwater RSLs do not address the vapor intrusion pathway. In addition, Appendix C presents a separate indoor air evaluation for both PCE and TCE. Both of these points conflict with the statement that no additional evaluation was warranted or performed. Please revise all relevant sections of the document in this regard.</p> <p>b. <u>Comment 3d (Other Contaminants and Implications of Updated Toxicity Values)</u>. HERO previously commented that if there are additional contaminants (other than PCE and TCE) for which toxicity criteria have been revised, they should also be addressed. The Response indicates that based on the data shown in the additional tables added to Appendix C, the predominant</p>	<p>3. a. ii.) A new footnote was added to Appendix C, Table C-6, as follows: “(c) Consistent with HHRA Note 3 (DTSC, 2012), DTSC recommends the 2004 tap water PRG as the more health-protective screening level for PCE”</p> <p>3. a. iii): Appendix C, Section 4.2, second paragraph was revised to stated that vapor inhalation risks are separately evaluated in Section 5.0.</p> <p>3. b.): The Johnson-Ettinger model was updated to include the highest detected concentration of each soil vapor analyte detected in the VOC data set from 2007 – 2011. The model assumed each detected concentration was detected in the shallowest screened interval of 30-foot bgs (thus closest to the building floor). The cumulative risk from all detected chemicals was unchanged from the original model which evaluated only PCE, TCE, and 1,1-DCE.</p>

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>chemicals of concern (COCs) are PCE and TCE. Therefore, Section 2.1 discusses toxicity criteria changes for these constituents only.</p> <p>Unless this section is updated to discuss toxicity criteria changes for all site-related chemicals, the text should be revised to provide the rationale included in the Response, and acknowledge that toxicity criteria for other constituents (not considered to be primary COCs) may have also changed. The Appendix C Tables comparing previous PRGs to current screening levels can be cited in this regard.</p>	<p>Additionally, vapor-intrusion risk was modeled for Building 579 (which has a significantly smaller footprint than Building 573); the model output indicated inhalation risks were within the acceptable range at the smaller building. Appendix C, Section 5.0 was updated accordingly. Additionally, the frequency of analytes detected over the lowest regulatory limit and the total number of analyses have been added to Tables C-1 and C-2.</p>
<p>4. <u>Response to HERO General Comment 4c (Appendix C, Land Use)</u>. As previously commented, the site reviews are based on an assumed industrial land use only, HERO commented that typically residential criteria are used to evaluate sites, unless a land use control (LUC) or notation in the Base Management Plan (BMP) for industrial land use only is in place. HERO further noted that the term "No Further Action" (NFA) is commonly used for sites with unrestricted land use including residential. In response to HERO's comment, additional text was added to clarify the term "NFA with BMP amendments." While the "No Action Alternative" remedy does not involve institutional controls, certain sites closed under NFA have BMP amendments to indicate that MCLB Barstow Environmental Division oversight is required to maintain the conditions of the NFA decision or evaluate changes to land use that may pose a risk to site workers.</p> <p>HERO defers to the DTSC Project Manager on risk management decisions, and the terminology used in this document which was apparently taken from the corresponding RODs. HERO's previous concern regarding this issue is no longer as significant, given that the</p>	<p>4. Comment acknowledged.</p>

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>data tables have been corrected to use correct units and remove detections which are no longer present onsite. Many of the contaminant concentrations shown in the revised document are orders of magnitude lower than reported in the initial version of the document. If there are future land use changes, HERO is available to consult with the Base Environmental Division on human health risk-related issues. (No response is needed.)</p>	
<p>5. <u>Response to HERO General Comment 4d (Appendix C, Volatiles).</u></p> <p>a. The Response does not address why <i>soil</i> RSLs for 1,2-Dichloroethane, 2-Hexanone, and Ethylbenzene are included in Table C-4, since no detections are listed. Please add a footnote to the table which explains this issue.</p> <p>b. In response to this and other related comments, the Response refers to the Five-Year Review's evaluation of vapor intrusion to indoor air at two areas with occupied buildings (CAOC 16 and Nebo North). We discuss vapor intrusion issues below in more detail. Within the context of the current Response, we note the following.</p> <p>i. Contrary to HERO's previous recommendation to evaluate all detected volatiles, the vapor intrusion evaluation continues to be limited only to the "primary VOCs of concern" (TCE, PCE, and 1,1-Dichloroethene [1,1-DCE]).</p> <p>ii. The Response's statement that "Vinyl chloride is not detected" appears to be inaccurate. Although vinyl chloride was not detected in soil gas at CAOC 16, Table C-2 lists this contaminant as having been detected in Nebo Main Base Groundwater. While vinyl chloride appears to have been</p>	<p>.</p> <p>5. a.) The following note has been added to Table C-4: "Volatile Organic Compounds (VOCs) with decreased industrial screening levels are shown, even when no residual concentration was detected."</p> <p>5. b. i.) Additional soil vapor modeling was performed to address this comment. A model was run of the all detected VOCs (highest detected concentration between 2007 and 2011) in soil vapor at Building 573 assuming a 30-foot depth. Even given these very conservative assumptions, the cumulative risk was not significantly different from that modeled for PCE alone. The text of Appendix C, Section 5 was updated accordingly.</p> <p>5. b. ii.) The comment and response were related specifically to CAOC 16 which is located at the Yermo Annex. Table C-2 includes analytical results from all of Nebo Main Base. The single</p>

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>detected only one time between 2007 and 2010, we point this out for accuracy.</p> <p>iii. The Response indicates that VOCs other than the primary COCs "are detected but at low concentrations and infrequently."</p> <p>Although the Appendix C tables do support the identification of TCE, PCE, and 1,1-DCE as COCs, comparison to MCLs, tapwater RSLs, and RAOs does not necessarily address vapor intrusion concerns. Second, while the other VOCs were generally detected at concentrations below MCLs, many of the maximum detected concentrations exceed the RSLs and they were not necessarily detected "infrequently." For example, Table C-2 shows that naphthalene was detected nine times at a maximum concentration of 42 µg/L, compared to the RSL of 0.14 µg/L. Chloroform was detected 90 times, with a maximum concentration of 4.7 µg/L compared to the RSL of 0.19 µg/L. 1,2-Dichloroethane was detected 43 times with a maximum concentration of 2.6 µg/L which exceeds both the tapwater RSL (0.5 µg/L) and CA MCL (0.5 µg/L). Please see below for our recommendations.</p>	<p>detection of vinyl chloride below the MCL was from CAOC 6 at Nebo Main Base in 2007 and is unrelated to CAOC 16 at Yermo Annex. The response should have more specifically stated that vinyl chloride is not detected in soil gas at CAOC 16.</p> <p>5. b. iii.) The frequency of detections exceeding the minimum regulatory limit and the total number of analyses were added to Tables C-1 and C-2. These additional data support the conclusion that the detections over the regulatory limit are infrequent. The exceptions are bis (2-ethylhexyl) phthalate, which has a small sample size and extremely low tap water RSL, and chloroform which is a common laboratory contaminant that can easily occur above the very low tap water RSL. See also response to comment 5. b. i. on additional modeling performed.</p>
<p>6. <u>Response to HERO General Comment 5 (Vapor Intrusion Modeling of Groundwater and Soil Gas)</u>. HERO previously commented that according to DTSC vapor intrusion guidance, a multiple lines of evidence approach (including consideration of soil gas and groundwater) is recommended when evaluating this exposure pathway. The Response indicates that for Building 573 (located at CAOC 16), groundwater concentrations are low (below MCLs), and groundwater is approximately 174 feet bgs. Therefore, only soil</p>	<p>(responses on next page)</p>

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>vapor was evaluated at this location. For Nebo North, soil gas data are not available and therefore only groundwater data could be evaluated.</p> <p>a. Given the depth to groundwater at CAOC 16 and reported concentrations, vapor intrusion modeling of groundwater is not anticipated to significantly impact the conclusions of this review. However, for completeness and consistency with DTSC guidance, we recommend incorporating at least limited groundwater Johnson and Ettinger (J&E) modeling of TCE and PCE for comparison to the soil gas modeling results.</p> <p>b. For the Nebo North groundwater plume, the lack of soil gas data should be identified as an uncertainty. While J&E modeling of COCs in groundwater did not indicate a significant vapor intrusion risk, soil gas data are not available to characterize potential vadose zone contamination.</p>	<p>6.a.) Comment acknowledged. Given the low risk associated with detected soil vapor concentrations, and the low to non-detect concentrations of groundwater PCE and TCE at 180 feet bgs, additional modeling of potential risks associated with groundwater is not warranted.</p> <p>6. b.) The lack of soil vapor data is noted as an uncertainty in a new Section 5. 4.1 added to address this comment.</p>
<p>7. <u>Response to HERO General Comment 6 (Cumulative Evaluation - Vapor Intrusion)</u>. As previously commented, the only VOCs considered in the vapor intrusion evaluation were PCE, TCE, and 1,1-DCE. HERO commented that if additional volatiles were detected, they need to be incorporated into the indoor air evaluation. Rather than updating the vapor intrusion evaluation in this regard, the Response indicates that these limited VOCs are the "relevant COCs" based on the maximum detected VOC concentrations and their frequency of detection.</p> <p>a. From a risk assessment perspective, limiting the vapor intrusion evaluation to only three COCs is inconsistent with DTSC guidance. While these three COCs are likely to be the primary</p>	<p>7. a.) See response to Comment 5.b.i.</p>

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>risk drivers, summing the risk and hazard across a limited number of constituents does not constitute a <i>cumulative</i> risk evaluation.</p> <p>b. In general, HERO does not allow for the screening out of constituents based on the magnitude of the detection. With the respect to the frequency of detection, additional information such as spatial and temporal variability, and the total number of samples analyzed for the constituent would need to be presented. Finally, HERO questions the Table C-3 footnote which identifies acetone, carbon tetrachloride, chloroform, and methylene chloride as "Common laboratory contaminants." USEPA's Risk Assessment Guidance for Superfund (RAGS) Part A has specific guidance on evaluating common laboratory contaminants which should be used when making such an argument. Review of RAGS Part A indicates that carbon tetrachloride and chloroform are not identified as common laboratory contaminants.</p> <p>c. From a risk perspective, HERO generally recommends evaluating cumulative risk across all contaminants. However, we ultimately defer to the DTSC Project Manager on the scope of the Five-Year Review (i.e., whether it is acceptable to limit the evaluation to these COCs). Unless the document is revised in this regard, the text must minimally acknowledge that the risks and hazards presented do not include all contaminants.</p>	<p>7. b.) The frequency of detections by year, detections over the minimum regulatory limit and the total number of analyses have been added to Tables C-1 and C-2. See also response to Comment 5.b.i. on additional soil vapor modeling performed.</p> <p>Regarding chloroform, subcontracted laboratories analyzing MCLB Barstow groundwater samples have identified chloroform as a potential laboratory contaminant due to its use in method EPA 425.1. Environmental Chemistry Lab, who provides expertise to the DTSC reached the same conclusion (ECL 1996). Carbon tetrachloride has been removed from the list of potential laboratory contaminants.</p> <p>7. c.) See response to Comment 5.b.i.</p>
<p>8. <u>Response to HERO General Comment 8 (J&E Model Assumptions).</u> The revised J&E modeling parameters generally address HERO's previous comments. Our remaining comments on this issue follow.</p>	

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>a. <u>Building Assumptions</u>. Use of site-specific building dimensions is acceptable for evaluating current site conditions. However, please clarify whether there are occupied buildings other than Building 573 (CAOC 16) and Warehouses 3 and 4 (Nebo North) in the vicinity of the two areas being evaluated for potential vapor intrusion risks. For example, Figure C-1 appears to indicate that there are numerous additional buildings with footprints which are smaller than Building 573 (e.g., Building 579 located next to well YCW-16-2). Depending on the dimensions of the buildings, risk may have been underestimated by using site-specific parameters for Buildings 573 and Warehouses 3 and 4 only. Please address this issue so a determination can be made as to the need to conduct additional J&E modeling for any other occupied buildings in these areas.</p> <p>b. <u>J&E Modeling Printouts</u>. HERO was able to duplicate the J&E modeling results reported in Appendix C. However, for completeness and consistency with other documents which presents J&E modeling, we recommend including examples of the J&E modeling printouts as part of Appendix C.</p>	<p>8.a.) At Nebo Main Base, Warehouses 3 and 4 are the only buildings located over or near the residual Nebo North groundwater VOC plume. No changes were made in response to this comment.</p> <p>At Yermo Annex, Building 579 is also now modeled using the J-E Model; the model outcome indicated inhalation risks are within the acceptable risk range and that the existing remedy is protective. Appendix C was updated to include the Building 579 model.</p> <p>8. b.) J&E model files are included as attachment to Appendix C.</p>

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Additional Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>1. <u>Section 6.62 (Review of Toxicity Data, Cleanup Levels, and RAOs).</u></p> <p>a. Section 6.6.2 refers to Table C-2 for a summary of changes to MCLs applicable groundwater at OU1 and OU2. Please revise this sentence to refer to Table C-5.</p> <p>b. Section 6.6.2 discusses changes in MCLs, but not the risk-based tapwater RSLs (which are presented in Table C-6). Because soil RSLs is discussed relative to historical PRGs, it is unclear why the groundwater discussion focuses on changes to MCLs only. Please provide the rationale for limiting discussion to MCLs only, or revise the document to address both MCLs and tapwater RSLs. Based on our review, it appears that the rationale may be that groundwater remedial action objectives (RAOs) were based on MCLs. However, we recommend this be confirmed and clarified in the document for transparency.</p>	<p>1.</p> <p>1. a.) Correction made.</p> <p>1. b.) The following sentence was added to the last paragraph of the groundwater MCLs discussion: "The RAOs developed in the OUs1 and 2 RODs were based on the MCLs."</p>
<p>2. <u>Section 7.3.2 (Summary of Findings [CAOC 16]).</u> Section 7.3.2 states that vapor intrusion to indoor air at Building 573 was evaluated using toxicity values from the 2012 RSL tables, including the recently finalized toxicity criteria for PCE. Please revise the text to acknowledge that CalEPA criteria for PCE were also used, and report the risk results using CalEPA criteria as presented in Appendix C.</p>	<p>2. The text of the third paragraph in Section 7.3.2 has been updated to include this statement: "The most recent U.S. EPA toxicity criteria have not been adopted by the Cal/EPA OEHHA, therefore the model was also run using the CalEPA criteria for PCE."</p>
<p>3. <u>Appendix C, Section 2.2.</u> Paragraph 2, sentence 2 of this section refers to Table C-1. Please revise this sentence to refer the reader to Table C-4.</p>	<p>3. Correction made.</p>
<p>4. <u>Appendix C, Section 3.1.</u></p> <p>a. For CAOC 32, the text indicates that Aroclor-1242 was detected at 5.7 mg/kg, which exceeds USEPA screening criteria for PCBs in residential soils. Please revise the text to specifically state which screening criteria are being referenced. For reference, the concentration exceeds both the residential (0.22 mg/kg) and</p>	<p>4.</p> <p>4.a.) The OUs 5 and 6 ROD indicates the risk-based screening level criteria for PCBs in residential soils were developed from U.S.EPA toxicological data and exposure assumptions. The Section 3.1 text was revised to reference the ROD section where this is discussed.</p>

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1-6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Additional Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>industrial (0.74 mg/kg) soil RSLs.</p> <p>b. Please confirm the reported risk listed in paragraph four of this section, and revise the document if necessary. The risk is currently listed as "2 1 x 10⁻⁵", with a space between the "2" and "1".</p>	<p>Additionally, the current residential RSL is presented for comparison.</p> <p>4. b.) The risk value has been updated.</p>
<p>5. <u>Appendix C, Section 4.0 (Evaluation of Groundwater MCL/RSL Changes)</u>. Similar to the Response to Comments 3d, Section 4.1 (Groundwater COCs) states that VOCs other than PCE, TCE, and 1,1-DCE were detected above the lower of MCLs or tapwater RSLs, but their infrequent detection or magnitude of "expedience" (exceedance?) do not warrant classifying them as COCs in this evaluation.</p> <p>a. <u>HERO defers to the DTSC Project Manager on this limited scope of COC evaluation as noted above</u>. For reference, Appendix C concludes that because the Navy has implemented the "best available technology" (BAT) for groundwater treatment, no additional engineering controls could be implemented at Yermo Annex. Drinking Water at Nebo Main Base is provided from Golden State Water and is not subject to review under this Five Year Report. (No response is needed).</p> <p>b. <u>Section 4.3 (Yermo Annex Evaluation)</u>. Ingestion is identified as the sole groundwater exposure pathway for the Yermo Annex. Section 4.3 concludes that because BAT is being used and VOCs are removed to MCLs or non-detectable levels, the existing remedy would continue to be the BAT regardless of decreases in either RSLs or MCLs. Please clarify why additional exposure routes from beneficial use of groundwater and vapor intrusion to indoor air are not identified as relevant exposure pathways. Other sections of the document indicate that CAOC 16</p>	<p>5.</p> <p>5. a.) Comment acknowledged.</p> <p>5. b.) Section 4.3 of Appendix C was revised to add information from the OUs 1 and 2 ROD on the identified primary COCs, contaminant migration routes, exposure routes (including vapor intrusion), and the basis for RAOs. Paragraphs were also added to address vapor intrusion and beneficial reuse potential exposure pathways.</p>

RESPONSE TO COMMENTS

Draft Final 2012 Five-Year Review Report, Operable Units 1–6
Marine Corps Logistics Base (MCLB) Barstow, California (dated 05 October 2012)

Additional Comments provided by Tracy Behrsing, Ph.D., Staff Toxicologist, Human and Ecological Risk Office (HERO), Department of Toxic Substances Control, in correspondence dated 25 October 2012	
Regulator Comment	DON Response to Comments
<p>(evaluated for vapor intrusion in Section 5) is located in Yermo Annex.</p> <p>c. <u>Section 4.4 (Nebo Main Base)</u>. Vapor intrusion to indoor air is identified as a groundwater exposure pathway where VOC plumes underlie occupied buildings. Two areas with impacted groundwater (Nebo South groundwater plume and CAOC 7 Stratum) are reported to be located at unoccupied areas of Base, and therefore were not considered for this pathway. If future land use changes occur such that buildings are located in these other areas, vapor intrusion to indoor air should be evaluated. Generally, this type of information is noted in the BMP.</p>	<p>5. c.) Comment acknowledged. The BMP includes LUCs for both Nebo South and CAOC 7.</p>
<p>6. <u>Appendix C, Section 5.3</u>. This section discusses the Nebo North Plume but refers to data in Table C-1, rather than C-2. Please update the document for accuracy.</p>	<p>6. Correction made.</p>
<p>7. <u>Grammatical Edits</u>. While HERO generally has not commented on minor typographical and grammatical errors, the Draft Final document would benefit from editing in this regard. For example, Appendix C Section 4.3 states "Groundwater exposure pathway remains ingestion..." and "The MCLs for the primary COCs has not..." These are only two of many sentences where editing is needed.</p>	<p>7. Corrections made throughout.</p>

REFERENCES CITED:

Environmental Chemistry Lab (ECL). 1996. Common Laboratory Contaminants. ECL User’s Manual. Section No.: Appendix C. Revision no.: 14. http://www.dtsc.ca.gov/AssessingRisk/ECL/upload/AppC_06_UM.pdf July 27.



Matthew Rodriguez
Secretary for
Environmental Protection



Department of Toxic Substances Control

Deborah O. Raphael, Director
8800 Cal Center Drive
Sacramento, California 95826-3200



Edmund G. Brown Jr.
Governor

MEMORANDUM

TO: Soad Hakim, Project Manager
Brownfields and Environmental Restoration Program
5796 Corporate Avenue
Cypress, California 90630-4732

FROM: Tracy Behrsing, Ph.D. *TSS for Tracy Behrsing*
Staff Toxicologist, Human and Ecological Risk Office (HERO)

DATE: December 6, 2012

SUBJECT: THIRD FIVE-YEAR REVIEW REPORT, OPERABLE UNITS 1 – 6, MARINE
CORPS LOGISTICS BASE BARSTOW, CALIFORNIA

PCA: 18019

Site: 400092-18

DOCUMENT REVIEWED: Response to HERO's October 25, 2012 Comments regarding the "Draft Final Third Five-Year Review Report, Operable Units 1-6, Marine Corps Logistics Base Barstow, California." Prepared for Department of the Navy, Naval Facilities Engineering Command NAVFAC Southwest (San Diego, California). Prepared by AIS-TN&A Joint Venture (Ventura, California). Dated December 15, 2012, according to page 1 of the submission. However, the submission was received by DTSC on November 28, 2012.

BACKGROUND (BASED ON SUBMISSION): Marine Corps Logistics Base (MCLB) is located in San Bernardino County, California, approximately 135 miles northeast of Los Angeles. The Base consists of two areas: the Yermo Annex (7 miles east of Barstow) and the Nebo Main Base (3.5 miles east of Barstow). MCLB Barstow is divided into seven Operable Units (OUs), with each OU further divided into Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Areas of Concern (CAOCs). OUs 1 and 2 are related to groundwater contamination beneath the Yermo Annex and Nebo Main Base, with volatile organic compounds (VOCs) as the primary contaminants. OUs 3 and 5 are related to soil contamination at the Yermo Annex. OUs 4 and 6 pertain to soil contamination at Nebo Main Base. The primary soil

contaminants are identified in the report as VOCs, metals, pesticides, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs).

Records of Decision (RODs) were signed for OUs 1 through 6 in 1997 and 1998, with remedial actions (RAs) and institutional controls (ICs; also referred to as land use controls, or LUCs) implemented at various CAOCs within those OUs. The RODs also established remedial action objectives (RAOs), as needed. The current submission presents the results of the Third Five-Year review for OUs 1 through 6, with the review period spanning from October 2007 through September 2012. The OU7 ROD is under development, and therefore not subject to the current Third Five-Year Review.

In a memorandum dated September 5, 2012, HERO reviewed the following sections of the Draft Third Five-Year Review: 1) Appendix C (Technical Assessment Report – Review of Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs for OU 1 through OU 6; also entitled Technical Assessment Report – Evaluation of Changes to Screening Criteria and Regulatory Standards Relevant to the RAOs for OUs 1-6), 2) Table 7-3, Page 4, Part 3 (CACO-16 – Third Five-Year Review [OU 5 – Yermo Annex]), 3) Appendix D-1 (Technical Assessment Report Vapor Intrusion Modeling for Building 537, MCLB Barstow), and 4) the potential impact of the 2011 USEPA toxicity criteria for trichloroethylene (TCE). In a memorandum dated October 25, 2012, HERO reviewed the responses to our September 2012 comments and the Draft Final Third Five-Year Review submission.

SCOPE OF REVIEW: HERO's review is limited to the responses to our October 25, 2012 comments. We defer to the DTSC Project Manager on the acceptability of the responses to their comments. We assume that regional personnel have evaluated the sampling methods for environmental media, the adequacy of site characterization, analytical chemistry methods, and quality assurance procedures.

GENERAL COMMENTS

1. Overall Findings. In general, HERO concurs with the responses. However, an updated version of the document (with revisions corresponding to those referenced in the responses) was not provided. As such, HERO will review the document revisions once submitted. Issues for which we have additional comments are discussed below.
2. Response to HERO's October 2012 General Comment 3aii. HERO concurs with the addition of footnote c to Appendix C, Table C-6. Please also ensure that the table and related text are revised to list the more health-protective 2004 tapwater preliminary remediation goal (PRG) for tetrachloroethylene (PCE), rather than only the 2012 tapwater regional screening level (RSL). The response does not specifically state whether the document will be revised in this regard, other than the incorporation of footnote c on Table C-6.
3. Response to HERO's October 2012 General Comments 3b, 5bi, and 7a.

- a. CAOC 16. HERO appreciates the response's indication that the submission will be updated to: 1) address vapor intrusion exposures across all VOCs detected in soil gas, and 2) evaluate vapor intrusion exposures at Building 579 (which has a significantly smaller footprint than Building 573). HERO will review the updated Johnson and Ettinger (J&E) modeling, text, and tables once submitted.
 - b. Nebo North Plume. While the Response indicates that J&E modeling will be included for all VOCs detected in soil gas, it is unclear whether the submission will be revised to address vapor intrusion exposures across all VOCs detected in groundwater at the Nebo North groundwater plume. For consistency with: 1) DTSC recommendations and 2) the updated cumulative evaluation for CAOC 16, the submission should be revised in this regard. If the submission is not revised in this regard, HERO is available to include such an evaluation as part of our review of the revised submission. However, to allow for such an evaluation, a complete list of VOCs detected in the Nebo North groundwater plume is needed. Currently, Appendix C, Table C-2 presents maximum concentrations of all detected VOCs in Nebo Main Base Groundwater between 2007 and 2011. These data may not reflect current concentrations, and are not specific for the Nebo North plume.
 - c. Section 2.1. While the Response discusses updated vapor intrusion modeling for CAOC 16, and revisions for Appendix C, Tables C-1 and C-2, there is no indication of whether Section 2.1 will be revised to either: 1) discuss toxicity criteria changes for all site-related chemicals, or 2) provide the rationale included in the previous Response to Comment for why this section focuses on PCE and TCE only. We continue to recommend that this be addressed in the text for transparency.
4. Response to HERO's October 2012 General Comment 5b,iii. HERO will review the revised tables and corresponding text once submitted. (Please see General Comment 6b below regarding the Response's indication that chloroform is a common laboratory contaminant for groundwater.)
 5. Response to HERO's October 2012 General Comment 6a. HERO previously commented that given the depth to groundwater at CAOC 16 and reported concentrations, vapor intrusion modeling of groundwater is not anticipated to significantly impact the conclusions of this review. However, for completeness and consistency with DTSC guidance, we recommended incorporating at least limited groundwater J&E modeling of TCE and PCE for comparison to the soil gas modeling results.

The Response indicates that in light of the low risk associated with soil gas modeling, and the low to non-detect concentrations of TCE and PCE in groundwater at 180 feet bgs, additional modeling of potential risks associated with groundwater is not warranted. While it is likely that additional groundwater modeling will not significantly impact the overall vapor intrusion findings, we continue to recommend limited modeling for verification of this assumption. If the submission is not revised in this regard, HERO is

available to include such an evaluation as part of our review of the revised submission. However, a complete list of VOCs detected in the groundwater at CAOC 16 would be needed. Currently, Appendix C, Table C-1 presents maximum concentrations of all detected VOCs in Yermo Annex Groundwater between 2007 and 2011. These data may not reflect current concentrations, and are not specific to CAOC 16.

6. Response to HERO's October 2012 General Comments 7b.

a. HERO will review the Table C-1 and C-2 revisions regarding the frequency and magnitude of detection once submitted. Because the CAOC 16 vapor intrusion evaluation was updated to address all detected VOCs, it is unclear whether the Table C-1 and C-2 revisions were incorporated for completeness, or if specific constituents have been eliminated from the evaluation based on arguments such as low frequency of detection. If constituents were in fact eliminated as chemicals of potential concern (COPCs), we will review and comment on this issue once the revised document is submitted.

b. As previously commented, USEPA's Risk Assessment Guidance for Superfund (RAGS) Part A does not identify chloroform as a common laboratory contaminant. The Response indicates that the laboratory which conducted groundwater sample analysis identified chloroform as a potential laboratory contaminant due to its use in Method EPA 425.1. Furthermore, the 1996 DTSC Environmental Chemistry Lab (ECL) manual is cited as having reached the same conclusion. In the absence of detailed information on this issue, HERO cannot comment further on whether the referenced chloroform detections in groundwater are site-related. We defer to the DTSC Project Manager, given that this issue appears to have been addressed previously. Generally, for risk assessment purposes, chloroform is evaluated as a site-related contaminant.

7. Response to HERO's October 2012 General Comment 8. Again, HERO will review the updated Johnson and Ettinger (J&E) modeling, text, and tables once submitted.

8. Response to HERO's October 2012 Specific Comment 5b. HERO will review the revised text once submitted.

CONCLUSIONS

HERO has reviewed the Responses to HERO's October 2012 comments related to the Draft Final Third Five-Year Review Report, Operable Units 1-6, Marine Corps Logistics Base Barstow, California. In general, HERO concurs with the majority of the responses, and we will review the corresponding revisions to the document once submitted. The primary remaining issues are: 1) HERO's recommendation for limited J&E modeling of groundwater at CAOC 16, and 2) HERO's recommendation for a cumulative vapor intrusion evaluation at the Nebo North groundwater plume. We do not recommend further iterations of responses to comments on these issues. Rather, if the submission

S. Hakim
December 6, 2012
Page 5 of 5

is not revised in this regard, HERO is available to include such an evaluation as part of our review of the revised submission. However, to allow for such an evaluation, a complete list of VOCs detected in CAOC 16 groundwater and the Nebo North groundwater plume is needed. Currently, the tables present maximum detected concentrations between 2007 and 2011 for Yermo Annex and the Nebo Main Base. These data may not reflect current concentrations, and are not specific for the two areas (i.e., CAOC 16 and the Nebo North plume) where vapor intrusion is being evaluated.

Reviewed by: Kimberly C. Day, Ph.D.
Staff Toxicologist, HERO

A handwritten signature in blue ink, appearing to be 'K. Day', written over the printed name of Kimberly C. Day.

cc': Michael J. Wade, Ph.D., D.A.B.T.
Senior Toxicologist, HERO