CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY PETE WILSON, *Governor*

DEPARTMENT OF TOXIC SUBSTANCES CONTROL
301 Capitol Mall, 2nd Floor
Sacramento, CA 95814
Mail: P. O. Box 806
Sacramento, CA 95812-0806
Voice: (916) 327-2491
Fax: (916) 327-2509

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MCAS EL TORO
SSIC # 5090.3

MEMORANDUM

TO: Juan Jimenez
Office of Military Facilities (OMF)
Region 4, Long Beach

FROM: John P. Christopher, Ph.D., D.A.B.T.
Staff Toxicologist
Office of Scientific Affairs (OSA)
Human and Ecological Risk Section (HERS)

DATE: 30 June 1995

SUBJECT: MCAS El Toro: Engineering Evaluation and Cost Analyses for Sites 4, 7, 11, 13, 14, 19, and 20
Outcome: 02 PCA: 14740 Site: 400055-45

Background

Marine Corps Air Station (MCAS) El Toro is an active military facility in Orange County which is scheduled for closure. Remedial activities at this base are being directed by Naval Facilities Engineering Command, Southwest Division (SWDIV). The Navy has chosen to undertake several removal actions at the base, each of which is described in an Engineering Evaluation and Cost Analysis (EECA). Seven such EECAs were examined, all written in similar format. The comments below apply to all seven documents equally.

Documents Reviewed

We received a request from Region 4 OMF to review the following seven documents, all prepared by Bechtel National Inc., contractors to SWDIV:

1. "Draft Engineering and Cost Analysis, Site 4, MCAS El Toro, California", dated 25 April 1995;

2. "Draft Engineering and Cost Analysis, Unit 1 of Site 7, MCAS El Toro, California", dated 23 May 1995;

3. "Draft Engineering and Cost Analysis, Site 11, MCAS El Toro, California", dated 24 May 1995;

4 "Draft Engineering and Cost Analysis, Site 13, MCAS El Toro, California", dated 20 April 1995;

5. "Draft Engineering and Cost Analysis, Unit 1 of Site 14, MCAS El Toro, California", dated 23 May 1995;

6. "Draft Engineering and Cost Analysis, Unit 2 of Site 19, MCAS El Toro, California", dated 31 May 1995; and

7. "Draft Engineering and Cost Analysis, Units 2 and 3 of Site 20, MCAS El Toro, California", dated 23 May 1995;

Scope of Review

The document was reviewed for scientific content. Minor grammatical or typographical errors that do not affect the interpretation have not been noted. However, these should be corrected in the final version of the document. We assume that sampling of environmental media, analytical chemistry data, and quality assurance procedures have been examined by regional personnel. If inadequacies in this regard for the purposes of risk assessment were encountered, they are noted. Any future changes or additions to the document should be clearly identified.

General Comment

We have just one set of comments which applies to all seven EECAs. Estimates of the 99th quantile of ambient concentrations of metals in shallow soils are based on too small a sample size. We recommend that the database for these estimates be expanded to decrease the uncertainty of the estimates. We believe this can be done by applying familiar statistical methods to data the Navy has already collected.

Specific Comments

1. **Origin and Intended Use of the "Background" Data for MCAS El Toro:** As data quality objectives (DQOs) were identified for MCAS El Toro during 1992 and 1993, concentrations of metals at sites on the base were compared to parametric estimates of the 99th quantile of the distribution of the concentrations of metals in eleven samples of surface soil. The list of these 99th quantiles, shown in Table 2-1 of all seven EECAs, originally appeared in: "Marine Corps Air Station El Toro, El Toro, California, Installation Restoration Program, Phase II Remedial Investigation/

Feasibility Study, Draft Work Plan, 9 November 1993". Appendix A to this work plan contains an "Introduction to Data Quality Objectives". In Section A.6.3.1 of this appendix (pp. 18 ff.), a description is given of how twenty-one background samples were collected of which eleven were selected to represent ambient conditions for the base and how 99th quantiles of lognormal distributions of these metals were estimated. The estimates are summarized in Table A2a of this draft Work Plan. The DQO process was integral to the development of the Phase II Work Plan for the RI/FS; however, the list of 99th quantiles of background distributions was never used, because it was decided to analyze for metals at all sites during Phase II.

These eleven sets of values do not constitute an adequate basis for defining the upper tail of the distributions of ambient concentrations of metals, because the sample size is too small. The 99th quantile was calculated as the mean plus the *t*-statistic times the standard deviation. Because both the *t*-statistic and the standard deviation become larger as the sample population gets smaller, the use of small sample sizes inflates estimates of the 99th quantile.

2. **Techniques Used at Other Navy Bases:** Better estimation of the upper quantiles is possible without collecting and analyzing new samples from the field, as SWDIV has demonstrated at Marine Corps Air Ground Combat Center (MCGACC) Twentynine Palms and at Naval Station Long Beach. In both these cases, the Navy used data from soil samples already analyzed to expand the sample population for estimating ambient conditions. Plots of log concentrations vs. cumulative probability were then used for estimation of upper quantiles of ambient distributions.

At MCGACC Twentynine Palms many borings were advanced in areas which were thought possibly contaminated with petroleum products but for which analyses for total petroleum hydrocarbons proved negative. These same samples were also analyzed for metals. Thus, many data were available from areas which were apparently uncontaminated. Analysis of plots of the common logarithm of concentration vs. cumulative probability supported the presumption of lack of contamination. These data were then used to expand the sample population contributing to estimates of the 99th quantile of ambient concentrations from the original six designated background samples to over 200.

At Naval Station Long Beach the problem was somewhat different but the solution was similar. This base is located on Terminal Island in an industrial area where nearly all surface soil is hydraulic fill, thus making estimation of background conditions problematic. The Navy assembled all the data on analysis for metals in surface soils from the Site Inspection Report. The log-probability plots were then re-run, and the lowest mode of multimodal populations was identified graphically. This lowest mode was then defined as the background condition for the base and its

upper quantiles were estimated. "Background" could be identified with this technique, even in the presence of contamination. At Naval Station Long Beach, the population of background samples was increased from zero to over 180.

3. **Intended Use of Background Data in These EECAs:** Lastly, we wish to emphasize that the estimates of 99th quantiles in Table 2-1 of the report currently under review will serve as cleanup criteria for several metals. It is incumbent upon the Navy to define such criteria in the most reliable way, i.e. using all available data. Defining the extreme tail of a distribution is a highly uncertain undertaking with just eleven values. We have outlined above methods the Navy has used on other bases to decrease the uncertainty of such measurements. We believe the Navy should make a similar effort at MCAS El Toro.

Conclusions and Recommendations

The estimates of the 99th quantile of distributions of concentrations of metals are unacceptably crude and uncertain, owing to the small sample size employed. We recommend that the Navy expand the data set for calculating such quantiles by using analyses from on-base locations which are apparently uncontaminated. Statistical procedures are readily available and have been used by the Navy elsewhere to help verify that such an expanded data set does indeed represent uncontaminated soils.

Reviewer: Michael J. Wade, Ph.D., D.A.B.T.
Senior Toxicologist, HERS

Brian K. Davis
for MJW

cc: Jeff Paull, USEPA Region IX

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