

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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**MEMORANDUM**

TO: Juan Jimenez
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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:**DRAFT**

SUBJECT: ~~MCAS El Toro: Background Concentrations of Inorganics in Groundwater~~
Outcome: 02 PCA: 14740 Site: 400055-45

Background

This is a draft memorandum. It will be finalized upon receipt of comments from the project manager and the HERS peer reviewer.

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;

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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.

Comments

We have just one comment 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.

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. 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,

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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 report.

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 of 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.

Better estimation of the 99th quantile is possible without collecting and analyzing new samples from the field, as SWDIV has demonstrated at Naval Station Long Beach and at Marine Corps Air Ground Combat Center (MCGACC) Twentynine Palms. In both 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 such contamination 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.

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 soils are hydraulic fill, thus making estimation of ambient concentrations of metals problematic. The Navy assembled all the data on analysis of soils for metals from the Site Inspection Report, ran the log-probability plots, and identified graphically the lowest mode of multimodal populations, which was defined as the background condition in this instance. Thus, "background" could be identified, even in the presence of contamination.

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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.

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cc Jeff Paull, USEPA Region IX