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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
PETE WILSON, Governor

DEPARTMENT OF TOXIC SUBSTANCES CONTROL
301 Capitol Mall, 3rd 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 NO. 5090.3.A

MEMORANDUM

TO: Tayseer Mahmoud
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: 14 May 1996

SUBJECT: MCAS El Toro: Site 17
PCA: 14740 Site: 400055-45

Background

Region 4 OMF has asked OSA for continuing support on issues regarding risk assessment at Marine Corps Air Station (MCAS) El Toro. This is a closing base in Orange County which is also designated a Federal Superfund site. Remedial activities at this base are being directed by Naval Facilities Engineering Command, Southwest Division (SWDIV). Site 17 is a landfill in the northern portion of the base. It has significant ecological resources both on the sites and close by. Under the current reuse plan, future development for residential use could occur nearby.

Document Reviewed

We reviewed "Draft Remedial Investigation Report, Operable Unit 2B, Site 17, Marine Corps Air Station El Toro, California". This document, dated March 1996, was prepared by Bechtel National, Inc., contractors to SWDIV.

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 any future 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 Comments

1. **Overall Impression:** The risk assessments of human and ecological health are quite thorough but not always clear. OSA disagrees with some of the methods used. Several clarifications are required. The document can be made acceptable with respect to risk assessment upon adequate responses to the comments below.

2. **Ambient Concentrations of Metals:** The Navy used the maximum value detected in the set of background values for metals in soil, which might have led to inappropriate elimination of cadmium as an inorganic constituents of concern. The Navy's analysis of their set of background values for soil is incomplete.

3. **Human Health Risk Assessment:** The assessment is quite thorough and well written, but we believe the Navy has overestimated risks for the site. Potential exposures to organic chemicals were estimated using the maximum value detected instead of the recommended 95% upper confidence on the mean. Dermal intakes might have been overestimated.

4. **Ecological Risk Assessment:** We cannot accept the Navy's conclusions regarding non-human receptors because of questions about the methods used. Exposure point concentrations did not match those used to assess human health. The derivation of the toxicity criteria was not clear.

Specific Comments

1. **Ambient Concentrations of Metals, Appendix G:** OSA does not approve of the use of upper tolerance limit (UTL) for estimating quantiles of distributions of ambient concentrations of metals, as described on page G-2. The UTL, which is an upper bound on a quantile, can yield an inflated estimate when the sample size is small. For this reason, we recommend using a simple estimate of the quantile, provided the raw or transformed data can reliably be fitted to a normal distribution. If metals are selected as chemicals of potential concern with this procedure but these metals are actually present within the range of background, subsequent levels of decision in the process, i.e. risk assessment and risk management, can be used to correct inequities.

In fact, the method used for selection of inorganic constituents of concern was to compare the highest value detected (C_{MAX}) at the site to the highest detected value among 43 samples judgmentally determined not to have been impacted by site-related activities. OSA does not agree the use C_{MAX} for this purpose for two reasons. First, chemical analysis samples might reveal anthropogenic impacts where none were thought to occur. Second, simple statistical methods, such as plotting cumulative probability, are readily available to determine whether C_{MAX} is a reasonable estimator. These simple methods have been employed successfully at several other Navy bases in California.

Table G-4 presents the summary statistics for ambient metal concentrations. The column labeled "Calculated UTL Value" contains the value for C_{MAX} for 11 of 23 metals, which would seem to make "UTL" a misnomer. With the exception of cadmium, the values shown in this column are similar to values we have seen to represent the upper range of ambient conditions for other military bases in Orange County. The value for cadmium is extremely high; C_{MAX} for cadmium was perhaps one order of magnitude higher than we would have expected. We are accustomed to seeing the 95th quantile for cadmium between 1 and 2 mg/kg. The use of 11.4 mg/kg could have led to inappropriate exclusion of cadmium as a chemical of concern. The Navy should present a detailed analysis of ambient cadmium concentrations.

2. **Chemicals of Potential Concern (COPC) in Water, Secs. 6.1.3, Table RI-2:** The value for selenium in the upgradient well, 56.8 µg/L, is surprisingly high. Please explain this. It seems possible that this metal might have been inappropriately eliminated as a COPC.

3. **Exposure Point Concentration (EPC), Sec. 6.2.3, p. 6-8, p. R-1, Table RI-1:** A potential problem arises when C_{MAX} is used as the EPC. The rules described on page R-1 for selecting EPC seem reasonable, especially if high detection limits or very low frequencies of detection are encountered, because these conditions make estimates of the mean uncertain or artificially inflated. However, in Table RI-1 for Site 2, C_{MAX} is selected as the EPC for 34 of 44 detected organic chemicals, even though detection limits are acceptably low for nearly every chemical. Surely, something is wrong with such a method. The Navy and the agencies should meet to arrive at a consensus on this subject.

Table RI-1 also shows "Background UTL" values for six pesticides. We do not see any purpose for these values. They were clearly not used for selection of COPC. They cannot be used for estimation of risk in background, because this would

require 95% upper confidence limits on mean values as EPCs. Please remove this column from this table.

4. **Dermal Absorption Factor, Table RII-1:** We assume that the values in this table are intended for application into the equation on page R-14 for dermal contact with soil. As such, no value greater than about 25% (2.5E-01) is likely and no value greater than 100% (1E-00) is possible. However, many values in this table are greater than 50%, even much greater than 100%. We recommend that the Navy use the values in the Department's *Preliminary Endangerment Assessment Guidance Manual* (DTSC, 1994).

   It seems likely that dermal intakes for many chemicals might have been overestimated. We strongly urge the Navy to verify that reasonable values were used for estimation of dermal intakes.

5. **Risk Characterization, Sec. 6.4, pp. 6-16 ff.:** Figures 6-1 through 6-7 are particularly well done. The conceptual site model is easy to understand; contributions to risk and hazard by pathway and chemical are clearly and dramatically shown for each receptor group

   We do not disagree with the Navy's conclusions regarding human health risk as given in Section 6.4. However, the factors enumerated in comments 3 and 4 suggest that the Navy has overestimated human risks and hazards at Site 17, especially via the dermal route of exposure. We concur that the greatest cancer risk arises from residential exposure to arsenic and volatile organic chemicals in groundwater (Figure 6-3), while the greatest non-cancer hazard comes from exposure to metals in groundwater.

6. **Uncertainty in the Exposure Assessment, Sec. 6.5.2, p. 6-28:** Somewhere in this section, the Navy should present a discussion of how the use of C_{MAX} as the exposure point concentration might have overestimated risk or hazard.

7. **Chemicals of Potential Ecological Concern (COPEC), Sec. 7.2.2.3, p. 7-6, Table 7-1, Sec. T1.1, p. T-2:** Departmental guidance on ecological risk assessment, cited in the Navy's report, does present a discussion on why COPC do not necessarily have to match COPEC. We note that the following metals were selected as COPEC (Table 7-1) but were deselected as COPC for human health after comparison with background (Table RI-1): aluminum, antimony, cobalt, and vanadium. Comparison with background should yield identical lists of metals. Treatment of background concentrations of metals continues to be a problem; the Navy, the Department, and USEPA must resolve this confusion and controversy.

Using the rules on page S-1 and the frequencies of detection from Table RI-1, methoxychlor would not be selected as a COPEC due to low frequency of detection, while endrin and endrin ketone should have been included along with endrin aldehyde.

8. **Intake Factors, Table 7-3:** This table would be easier to read if scientific notation were used.

9. **Assessment Endpoints, Table 7-4:** For carnivores and raptors, the principal exposure is via prey items. Therefore, the information in the right-hand column should describe food chain modeling, bioconcentration, etc. Toxicity to the predator via direct contact is not likely to be relevant and toxicity to food items via direct contact should be covered in assessments of those trophic levels.

10. **EPC, Sec. S.1.4, p. S-4, Table S-11:** The very useful discussion of the rules for determining EPC is much more detailed than that presented in Section 6.2.3 for human health. Please state that EPCs used for Site 2 are shown in Table S-11. Many EPCs for soil shown in Table S-11 differ from entries Table RI-1 for the same chemical. This is extremely confusing and requires clarification.

11. **Toxicity Benchmark Values, Secs. S.1.4, S.4.4, Tables S-4 and S-17:** We are unable to decipher how the toxicity screening criteria and toxicity benchmark values were derived and how they are used. What is the column labeled "Dose" in Table S-4? Is this an administered dose from a laboratory study? If so, what is the literature reference for the study? Is a "Modifier" the same as an uncertainty factor? How does one link the values in Table S-4 to those in Table S-17? If an allometric extrapolation was performed, what values were used for body weights and where did they come from? The text in Section S.3.2, "Body Size Scaling", is not adequate to reproduce the derivation. Please present tables with complete derivations of these toxicity criteria. The same comment applies to Table S-9 and toxicity criteria for plants and invertebrates.

12. **Risk Characterization, 7.5, Table S-16:** The Navy claims that a comparison of hazard indices, chemical by chemical and species by species, for Site 2 versus the reference area yields no differences greater than an order of magnitude. The construction of Table S-16 made such comparisons very cumbersome. Please construct tables with data from the site and the reference area juxtaposed for each species, e.g. one table for each species or two species per table at most. Also, please present summed hazard indices for each indicator species.

The Navy seems interested in basing its interpretation of the ecological assessment on the number and magnitude of hazard quotients which exceed those seen for the reference area. If this is the case, it would be useful to create a summary table with all the hazard indices, by chemical and species, which exceed the reference area. This table should contain some representation of the degree to which the value in the reference area was exceeded.

13. **Ecological Significance, Sec. 7.5.2, p. 7-21:** We cannot agree with the Navy's interpretation of the results of the ecological assessment, because we are unsure of the COPEC, the EPC, and the toxicity criteria.

Conclusions and Recommendations

1. The Navy should complete its analysis of the 43 samples designated as background, especially for cadmium. Such analysis should include plots of cumulative probability. If additional data are required to resolve ambiguities for one or more metals, the data base may be expanded to include samples from other locations on the base. Such an expansion need not be limited to Site 17; it could include data from all the sites investigated in Operable Units 2 and 3.

2. The Navy has probably overestimated risks to human health by choosing the maximum value detected to represent exposure. The Navy should propose a method more in keeping with the concept of the "reasonable maximum exposure". We are unsure whether dermal intakes have calculated correctly.

3. The ecological risk assessment can probably be made acceptable upon clarification of how exposure point concentrations were selected, how toxicity criteria for non-human receptors were derived, and by presenting the risk characterization in a more intelligible format.

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

cc: Mr. J. Paull, USEPA Region IX
Dr. C. Callahan, USEPA Region IX