



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 9

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April 3, 1994

MEMORANDUM

SUBJECT: Review of Ecological Assessment  
Report, NAS Alameda

FROM: Clarence A. Callahan, PhD *Callahan*  
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TO: James Ricks, Remedial Project Manager

I have reviewed the above report and provide the following comments.

The material presented in the document defines the purpose: The ecological assessment (EA) "is designed to identify ecological impacts on biota that may be caused by hazardous materials used at, and disposed within, NAS Alameda."

GENERAL FINDINGS

Concentrations of toxic metals, organic compounds, and chlorinated organic compounds were measured in surficial sediments from 41 stations and in water collected from 14 stations located in all five study areas. "Samples of sediment and water from sites at NAS Alameda showed numerous instances of elevated chemical contaminant concentrations in all five study areas. The most contaminated portions for the various study areas were (1) in the vicinity of discharges in the Seaplane Lagoon; (2) in the West Beach Landfill Wetland along the perimeter of the former disposal area, and (3) in the Oakland Inner Harbor, particularly in the vicinity of existing pipeline discharges."

Based on the information presented at this time the Navy has essentially completed a Phase II ecological assessment. All three kinds of data (bulk chemistry, bioassay, and bioaccumulation) that were collected demonstrated positive impacts in the situations tested. The data presented have directly related toxicological impact to the contamination at the locations where samples were taken. I do not believe, however that these data are sufficient to define the

areal extent of the ecological impact nor can they be used to set clean up levels. The sample design and low numbers of samples does not permit the Navy to fully describe the concentration of the contaminants with sufficient precision to delineate the NOEL across the site. The next effort, Phase III should focus on the data requirements to describe the areal extent and the level of toxicity on the site such that the appropriate remedial action can be selected.

Areas addressed and the results of the Phase II effort include:

1) What are the contaminant concentrations in sediment and surface water samples collected from NAS Alameda?

The results of this Navy effort clearly shows that the contaminants have impacted the biological resources in the areas examined, the West Beach Landfill, the Seaplane Lagoon, the Nearshore Area on the bay side of NAS Alameda (Western Bayside) and Oakland Harbor on the perimeter of NAS Alameda.

2) What are the potential impacts on biota resulting from exposure to site sediments and surface water in the vicinity of NAS Alameda?

A fairly thorough effort is reported for the wetlands, the landfills, the shallow and the subtidal sediment areas. The apparently extensive efforts related to the least tern are not included as part of this report. It is not clear from the material presented that the upland sites have been adequately sampled and described. As From discussions at various meetings, the Navy will insure the development of a strategy to evaluate the areas where the least tern is nesting and propose a management plan for the least tern. The relatively short write-up does not offer any suggestion for habitat analysis such that toxicity impacts could be separated from habitat impacts.

3) What are the potential impacts from storm water discharges to Seaplane Lagoon?

Storm water discharges were sampled in three locations during one storm period, 12/13-14/93. Stormwater samples from these stations contained measurable concentration of metals and a limited number of organics, perhaps reflecting the very limited sampling effort of these contaminant sources.

4) What are the boundaries and characterization of two potential wetlands on

## NAS Alameda?

The extent of wetland habitat was addressed using techniques described in the "Corp of Engineers Wetlands Delineation Manual (U.S. Army Corp of Engineers, 1987) and by sediment and water samples collected to measure the chemical contamination and biological organisms present. This effort appears to be sufficient.

### STUDY DESIGN.

General Level of Toxicity. The choice of reference area and samples was not adequate and the study suffers from the lack of a general reference area.

Definition of contamination. The use of Effects Range-Median from Long and Morgan (1990) is not appropriate for at least a couple of reasons. First, as presented Long and Morgan state, "...the consensus ER-L and ER-M concentrations may be used by others as guidance in evaluating sediment contamination data, there is no intent expressed or implied that these values represent ... standards." These estimates are not the appropriate data to develop standards for determining whether contaminants exceed the safe level at NAS Alameda.

Significance Level. Secondly, the Long and Morgan ER-M data may not be appropriate because the median value as derived by the authors, "a concentration approximately midway in the range of reported values associated with biological effects" is an implicit assumption that the toxicological, biological and ecological impacts are directly related to the data summarized by Long and Morgan (1990) and that the ER-M as the "median" value is analogous to an LC50 or an estimate along the concentration response gradient of the data presented in the Long and Morgan report. A median value is not conservative enough to insure that for those areas of NAS Alameda where the concentration did not exceed this value, a biological impact would not be expected. If these data are to be used, I would prefer that the ER-L be used to identify COCs, in other words, any concentration above the ER-L value reported by Long and Morgan (1990) should be considered a contaminant of concern for the sediment data. Also, Long and Morgan data along with the appropriate endpoints can provide guidance for setting the detection limits for measuring levels of contamination.

Species Specific Endpoints. If the ER-L data are used, they should be used with

consideration of the specific endpoints for the NAS Alameda site. The data set is a compilation of many endpoints rather than the endpoint of concern at NAS Alameda and therefore less likely to have site and endpoint specificity. For instance, the data from Long and Markel (1992) is more relevant to the site having been derived from the San Francisco bay area rather than the entire U. S. continent as was done with the Long and Morgan (1990) data. The data set from Long and Markel (1992) can be used to select the data i.e., species tested and endpoints measured that best relates to the species tested at NAS Alameda. This avoids the comparison of other species data that do not relate to the test endpoints evaluated at the site. Because both data sets contain test results summarizing numerous species and tests for the particular chemical contaminant the data set should be sorted for contaminant first, then species second and endpoint last rather than use the summary of the contaminant data with a mixture of species (Long et al MS).

TRIGGER FOR CHRONIC TESTS. The trigger for Tier II tests, bioaccumulation, was based on the, "...detection of contamination i.e., levels above the Effects Range-Median in sediments or the determination that sediments from a particular station were toxic to selected indicator (bioassay) organisms i.e., mortality or depressed function at a level of 20 percent greater than the same response in control organisms. With the concentration of the contaminants at the ER-M level, the response of the organism is at the 50 percent level or is in a serious impact situation. The apparently arbitrary choice of 20 percent impact may be statistically important, but biologically the critical level for certain responses may be 10 to 15 percent. The critical response level must be selected for the particular species and endpoint being measured to represent the specific endpoints selected for the site, something that was not done for NAS Alameda.

The emphasis and use of only "significant" Tier I results to perform Tier II tests biases the results and limits the ability for evaluation of the "low" end of the impact spectrum. Because only those samples above ER-M were used to evaluate the bioaccumulation, there are no data from samples at or below the level of the ER-L that can provide the comparison of the no effects level and to fully interpret the results of Tier II results. In effect, the Navy cannot decipher the impact to ecological resources between contaminants and other causes.

APPROPRIATE ENDPOINTS. There is no mention concerning the identification of specific values that are being protected at NAS Alameda, nor is there specific discussion that the bioassays represent the appropriate values that

are important for the site. The identification of assessment and measurement endpoints are central to the risk assessment guidelines provided by EPA in the "Risk Forum" document and the later "SETAC" publication authored by the same group Norton et al, 1992.

The cores were sieved through a 1-mm mesh screen, preserved in 10 percent formalin, and taken to KLI in Santa Cruz to be archived for future benthic infauna analysis. A screen of 0.5 mm is preferable to a 1.0 mm screen because much of the sample is lost and therefore available information is lost. It is not clear what material was retained, that captured on the 1.0 mm screen or the water and presumably organisms that passed through the 1.0 mm screen.

In several places in the document, the citations are shown from a secondary source e.g., PSEP, 1989 or Puget Sound Estuary Program and PRC documents when the citations particularly for protocols should show the original, published reference not an internal report or another report for another site.

The list of "variables and indices" for infauna should be supported by citations for all indices (even though some of these are straight forward) with justification for the reasons why each particular index was selected. For instance, "species composition" could be the number of species per sample, the number of individuals per species, species per volume, species per area, etc. The authors must provide the list of analyses that were performed by "KLI" software. I can't find the results of the Bray-Curtis similarity evaluation i.e., the cluster analysis as dendrograms.

The Runway Wetland was the only location that showed contaminants in water samples which is curious because the source of contamination in this area is unknown.

The sediment bioassay testing was apparently "paired with chemical analyses enabling a direct comparison of bioassay results with chemical results" (p3-10) which should be presented in a summary table to demonstrate the possible relationship between chemical contamination and bioassay results. What is the relationship between the data for the sediment samples, the bioassay samples, and the community structure samples.

p3-33, There are significant contradiction of summary statements based on the data presented, "Chemical analyses demonstrate that the West Beach Landfill Wetland is affected by contaminants in the landfill. However, based upon the

results of chemical, biological, and bioaccumulation analyses conducted on samples from the Wetland Reference station at Skaggs Island, it is impossible to demonstrate any differences in the suitability of either site as a habitat; neither appears to be conducive to supporting diverse and abundant biological populations." This is an area with large breeding populations of several species of birds.

#### Ecological Assessment.

The use of an Apparent Effects Threshold (AET) is appropriate, however I don't see that the data collected and presented can be used to define the apparent threshold, that is demonstrate that concentration of contaminant(s) that are associated exclusively with sediments exhibiting statistically significant biological effects relative to reference sediments. Although on p7-1, the statement is made, all three kinds of data (bulk chemistry, bioassay, and bioaccumulation) that are necessary to complete an AET were collected, it is not clear that the Navy has fully evaluated what are the concentrations at NAS Alameda that have resulted in significant biological effects. These data must be presented in a manner that show the concentration and the results of tests to identify what the magnitude of response is at a certain concentration.

An important question concerns the number of samples to "adequately" delineate the zones of concern. For instance, with only seven samples in the West Beach Landfill and the level of contamination and the resultant impacts from all of the endpoints, what is the extent of the significant contamination? What is the suggested distance from the samples taken and evaluated that is assumed to include the significantly impacted area. The same question can be asked for the other areas.

I take issue with the statement, "Toxic areas were well-defined within the five study areas sampled during the ecological assessment. (p7-9)" Toxicity, however was well defined whereas the areal extent was not well defined. There was significant toxicity in the Oakland Inner Harbor showing a gradation. One of the more serious deficiencies relates to the doubt about the exact source of contamination (pp 7-11 and 12). At some of the sites, however the source is clear. The West Beach Landfill Wetland shows a gradient of toxicity from the site. While the sources of contamination at Station R3 in the Runway Wetland are unknown, the general sources of contamination at the Seaplane Lagoon are easily inferred. Apparently there is insufficient data to suggest the source of contaminants in the Western Bayside area, however I am not convinced that the

level of toxicity observed in this area might be a result of general contamination of the San Francisco Bay.

Since the physical characteristics of the sediment is mentioned here, the Navy should present sediment statistics for each site, in particular the median value which could be used in appropriate comparisons of chemical and biological information and might be very instructive in associations of certain biological/toxicological data with median sediment sizes. Statements like the ones made on page 7-13 concerning the variation of toxicity and chemical concentration and the suggestion that mortality might be due to "something" else suggest that all of the data collected should be utilized to help explain these results. The poor design in the work scope prohibited the evaluation of benthic samples and bioaccumulation for sediments that were not toxic i.e., no control. The Navy can't determine whether or not the community structure is a result of chemicals or other alterations.

What is meant by "harsh ecological conditions" on page 7-16, section 7.5?

Please call me at 4-2314 if you have any questions.

#### References

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Long, E. R. and L.G. Morgan, 1990. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52, Seattle, Washington.

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