UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

March 21, 1995

Mr. Robert Krivinskas
U.S. Department of the Navy
Northern Division - NAVFAC
10 Industrial Highway
Code 1823 - Mail Stop 82
Lester, PA 19113-2090

Re: Draft Ecological Risk Assessment Report (ERA) at Sites 05 & 08, former Naval Construction Battalion Center, Davisville, RI

Dear Mr. Krivinskas:

Pursuant to § 7.6 of the NCBC Federal Facility Agreement (FFA), please find attached the Environmental Protection Agency's (EPA) comments on the above referenced document.

There are a few clarifications needed before this report can be considered final. These issues should not be a cause for a delay in the overall schedule for this OU, however, an acceptable draft final report must be available to the public at the start of the comment period on the Proposed Plan for this OU. The EPA expects the Navy to respond to these comments by providing redlined / strikeout replacement pages and written response to comment, as appropriate, to facilitate a quick review of the draft final report.

Please call me if you have any questions about these comments at (617) 573-5736.

Sincerely,

Christine A.P. Williams
Remedial Project Manager
Federal Facilities Superfund Section

Attachment

cc: Rich Gottlieb, RIDEM
Tim Prior, US F&WL
Bob DiBiccaro, EPA
Scot Gnewuch, ADL

EPA COMMENTS ON Draft Ecological Risk Assessment for Sites 05&08

Comments are primarily on key technical issues that need to be resolved and methodological aspects of the ERA that need to be clarified in the final report for Sites 05 and 08. Some editorial comments also are offered to enhance the report's overall useability as a reader-friendly, stand-alone document, rather than as a supplement to or extension of the prior, site-wide ERA reports.

Key technical approach issues to be resolved/clarified include:

Contaminant fate and transport (F&T) discussions

Selection of contaminants of concern (COCs)

Appropriateness and presentation of the exposure model

Derivation of toxicity reference values (TRVs)

Calculation of average risks only

1. Contaminant Sources, Fate and Transport. The contaminant F&T discussions are conjectural as to the likelihood that Sites 05 and/or 08 contributed contaminants to downgradient sediments and/or surface water, and appear not to be supported by the evidence presented. For example, the reported detection of the highest DDT concentration found in Hall Creek sediments, at a location upstream from Site 05, does not support the conclusion in Paragraph No. 3 on Page 2-18, that "It does not appear that DDT has been transported to the Hall Creek watershed from Site 05." Although these data do show that other, off-site sources of DDT in Hall Creek sediments do occur upstream from Site 05, they do not rule out Site 05 as a potential, additional DDT source for Hall Creek.

An option for resolving this issue is discussed below, as an editorial recommendation for streamlining of the ERA report.

2. Selection of contaminants of concern (COCs). Although the overall COC screening method seems valid, the draft report lacks convincing scientific rationale for the selection of the protective screening criteria used to select COCs. Although the Navy noted that EPA had previously accepted the use of these criteria to select COCs at another Superfund site, that precedent may warrant review by EPA, to verify that these same screening criteria are equally appropriate for COC selection at Sites 05 and 08.

For example, Aroclor 1248 (Site 05) and Aroclor 1260 (Site 08)

were omitted as COCs, due to their presence below the 1.0 mg/kg concentration, which is cited in Tables 2-1 and 2-2 as the Dutch Soil Cleanup Interim Act (Protective) criterion for PCBs, above which, further evaluation is recommended. However, since the Navy cites a secondary source for these interim Dutch soil criteria (Beyer, 1990), which lacks a discussion of the receptors for which these criteria are protective, their suitability for use in COC selection at NCBC was not convincingly demonstrated.

For these reasons, more discussion is needed in the Final ERA Report to explain the intent, and document the adequacy and applicability of the screening criteria for ecological receptors at NCBC, specifically with regard to their ecotoxicological basis and related food chain exposure assumptions. As discussed below in the section on document improvements, additional information on the derivation of site background data also are needed in the final report.

3. Appropriateness and presentation of the exposure model. The Monte Carlo analysis was inappropriately used to estimate the mean exposure dose for the various receptors. Typically, for equations with uncertainty in one or more variables, Monte Carlo analysis is utilized to compute numerous potential outcomes and then present the range of potential results as a probability distribution. When properly presented, this analysis provides the context within which a discrete solution can be evaluated and aids in the decision-making process. In contrast, the Monte Carlo analysis in this ERA, was used to estimate the range of potential exposures and, from this range, only the mean exposure dose was used to estimate risk.

To correct this problem, the ERA should provide deterministic risk estimates for an average exposure scenario that is based on the arithmetic mean of each COC, and a maximum scenario that is based on the maximum detected concentration of each COC. These risk estimates should be provided in a tabular format that facilitates a review of all computations. The values used for critical terms (e.g., the soil concentration, the bioavailable soil concentration, the amount of contaminant in the diet, the amount of contaminant ingested in water) that yield the total exposure dose, should be provided so that these computations can be reproduced and verified. An example calculation would help clarify the presentation. As presented, it is not possible to verify the mean exposure concentrations presented in Table 3-6 without performing the Monte Carlo analysis.

A Monte Carlo analysis should then be conducted to illustrate the range of potential hazard indices. Probability distributions should be developed and presented as a cumulative distribution curve on which the hazard indices for the average and maximum deterministic scenarios can be indicated. This will provide a measure of the uncertainty in the assessment.

4. In addition, the following issues need attention, clarification and/or justification:

- Sufficient documentation has not been provided to justify the use of the Langmuir adsorption constants presented on Page 3-6. While discussing the factors that determine the bioavailable fraction of inorganics, the ERA references Bodek et al. (1988). A review of this reference indicates the authors also point out that "unlike the case for most organic chemicals, no species-unique attenuation or sorption constants can be applied to a broad range of soils and sediments....The effective sorption or attenuation constants for an inorganic species may vary by as much as two or three orders of magnitude." The application of the selected constants and bioavailable percentages (i.e, thallium), should be justified by presenting the data that substantiate the similarity between the test and site soil. In addition, this uncertainty should be included in the Monte Carlo analysis since the bias inherent in this approach is to underestimate the potential risk.

- The discussion does not state explicitly if/how surface water and/or incidental soil/sediment ingestion pathways were included in the exposure models, and which location-specific contamination data were used in these models. The deterministic tables for the average and maximum exposure scenario should clarify this issue.

- On Table 3-1, the components of the Shrew diet sum to 85% not 100%. If it is the authors' intent to assume that 15% of the Shrews diet is from non-contaminated sources, it should be stated and justified in Section 3.1.

- In the formula on Page 3-6 the fraction organic carbon is assumed to be 0.001 (0.1%). On Table 3-3, the organic carbon is assumed to be 1%. Which is correct? Were different carbon percentages used as input parameters in various aspects of the exposure modelling?

- The discussion does not state that in instances where multiple BAFs were identified in the literature for a specific matrix:species pairing, the average of these BAFs was used to estimate exposure. Please justify the averaging of the BAFs as opposed to selecting the most conservative or site-appropriate value.

- On Page 3-5, it states "...it was assumed that the potentially bioavailable concentration of a particular compound is equivalent to that potentially desorbed from solid matrices." However, in the first bullet, on Page 4-3 of the uncertainty discussion, there is a seemingly contradictory statement, that "...it was assumed that 100

percent of ingested chemical was incorporated into the receptor organism..." Clarification is required regarding which indicator species, exposure pathways, and dietary elements COC exposures were based on the 100 percent concentration versus the bioavailable fraction of the COC in soil or food items. This should become clear after the additional detail on the exposure model is incorporated into the Final ERA Report.

- In Section 3.1.2.2, Please clarify how and where these equations have been applied in this risk assessment. An appropriate application of this assimilation efficiency may be for vegetation, but EPA does not agree this would be appropriate for how much soil an ROC would ingest through its digestive track.

5. Derivation of toxicity reference values (TRVs). The discussion of the methods used to select and develop TRVs (Section 3.2.1) needs more clarification and justification, particularly for the choice of "a factor of five to account for inter-taxon variability." No criteria are given for either using, not using, or choosing an extrapolation factor (EF), to modify published TRVs for application across varying phylogenetic distances between the taxa concerned. It is unrealistic to apply the same EF to all situations, since physiological differences will increase as phylogenetic distances increase between dissimilar levels in any taxonomic hierarchy (e.g., species, genera, families, orders, and classes). Since the unnumbered summary table (Page 3-9) presents uncertainty factors for very protracted and taxonomically imprecise extrapolations (e.g., "animals-humans"), additional scientific and/or regulatory (guidance) justification should be provided in the Final ERA Report for the choice and application of chemical-specific EFs.

Although an EF of five may be appropriate to extrapolate TRVs across species or genera of rodents, it is probably much less physiologically defensible when applied across mammalian orders, and may be entirely inappropriate to extrapolate between classes of vertebrates (i.e., birds to mammals). The report text implies that this EF of five was to be used for all inter-taxon extrapolations, whereas most TRVs actually were derived without using an EF, as indicated below for some selected examples:

- Short-tailed Shrew and Cottontail Rabbit TRVs were derived from Rat or Mouse data, without an EF to account for inter-specific or inter-generic differences between these pairs of small mammal species

- The EF of five was used inconsistently (Pages 3-10 to 3-16):
  - It was not used for extrapolations within the Small Mammals receptor group
  - It was used to apply a Mallard Duck RTV (Beta BHC) to

American Robin
- It was used to derive RTVs for many PAHs, from Birds to Small Mammals

- The discussion of the Small Mammal TRV for DDT is confusing; the first sentence cites 0.4 mg/kg-bw/day as a "full life span NOAEL" but the last sentence cites the same value as the "full life span LOAEL," Also, why was the quoted LC-50 for DDT in Short-tailed Shrews not used here to develop a species-specific NOAEL for this COC/Small Mammal pairing? (Page 3-13)

- The Bird (American Robin) RTV for DDT is said to be derived from data for Bengalese Finches, but the Peakall and Peakall (1973) reference cited in the text is listed in the bibliography as a report on PCB effects on the eggs of Doves, not DDT effects on the Bengalese Finches. Please clarify. (Page 3-14)

Recommended Improvements for Document Quality and Useability

Several general and specific editorial comments are provided here to sharpen the focus of the ERA report, enhance its technical quality, and improve its useability for those readers who are not familiar with site features.

6. Contaminant Sources, Fate and Transport. The objectives of the report (Section 1.2) are overreaching for this ERA, since they include "a qualitative evaluation of the potential for off-site transport". Contaminant sources, F&T on site and off site, would be more appropriately discussed for individual sites in the Remedial Investigation (RI) report(s) for NCBC, on the basis of much more rigorous analyses than those presented in Section 2.5.2 of this Draft ERA. Any evaluation of contaminant F&T in the ERA should be made strictly within the context of ERA problem formulation, rather than as an attempt to support risk-based decisions about the management of Sites 05 and 08.

The most expedient resolution of these problems with the F&T discussion, which otherwise could delay acceptance of the ERA report, is to eliminate all F&T discussions from the ERA report. Because these F&T discussions are peripheral to the goal of documenting baseline, terrestrial ecological risks within Sites 05 and 08 proper, and their retention in the ERA report also may reduce the report's overall credibility, it is recommended that the ERA report be streamlined by eliminating the following:

- Qualitative F&T analysis objective of the ERA in Section 1.2

- Sediment (Section 2.3.5) and surface water (Section 2.3.4) contamination data tables and discussions for Hall Creek,

except for data needed in the dietary ingestion exposure assessment models for on-site terrestrial indicator species

- All F&T discussions currently presented in Section 2.5.2

Once rigorous F&T analyses are performed for all NCBC sites and affected watersheds within the site-wide RI, these discussions would be more appropriately presented, within the context of the problem formulation, as part of the forthcoming, site-wide ERA report.

7. Prior Studies of Background Soil Metal Concentrations. Previous studies of background soil metals concentrations at NCBC by TRC (1994a, 1994b) were only briefly mentioned in discussions of soil contamination and when describing the selection process for COCs, in Sections 2.3.3 and 2.5.1. For this to be a stand-alone ERA report, the sampling and analysis program and statistical data analyses performed by TRC should be explained in the text to support the tabulation and use of metals background data in the selection of inorganic COCs for soils at Sites 05 and 08.

8. Document Useability. To improve the report's readability and useability as a stand-alone document, the following is also recommended:

- Overlay site boundaries and add a North arrow on each of the site-specific aerial photographs to facilitate cross-checks against soil sampling location maps, raw data tables, and habitat descriptions

- Provide site maps showing the locations from which all physical media samples were collected for which analytical data were used in the exposure assessment models (many sample locations are discussed/described but not mapped)

- Provide specific literature references for each of the TRVs presented in Table 3-7, and indications as to which TRVs are species-specific versus extrapolated, and what effects endpoints are represented

- As noted above, modify the existing text and tables in Section 4.0, to present and discuss Hazard Quotients (HQs), Hazard Indices (HIs), and related risks from exposure to **both average and maximum** contaminant concentrations in physical media

9. Miscellaneous Inconsistencies. Apparent inconsistencies or contradictory statements within the report, which should be further clarified in the Final ERA Report, include the following:

- Page ES-1 - The Last sentence in paragraph 2 should be

deleted. Language in the last sentence of paragraph 2 and other instances of language of this type should be revised to indicate that further evaluation of the facility wide ERA will be addressed in the management of migration OU for these sites. These sites are not being "closed" with the source Control OU ROD to be signed this summer. The Sites 5 & 8 Management of Migration OU ROD will be included with the groundwater OU ROD to be signed next fall. At that time the Sites will be "closed".

- Page 1-1 - Please change all references to EPA Region 1 to EPA New England.

- Section 2.4 (Page 2-14, Para. 6) - The last two sentences of this paragraph cite the absence of creeks and wetlands from within Sites 05 and 08, implying that no surface water exposures will be addressed, but the dietary exposure models in Section 3.1 (also see Table 3-1) seem to include surface water ingestion by each indicator species. Please clarify.

- Section 2.5.2 - This section should be revised with some attention to the ability of some of these chemicals to bind to the organics in the soils and so therefore, they may not be mobile in groundwater.

- Page 3-13 - Which was the TRV used for small mammals for DDT, 0.4 or 0.04?

- Page 4-3; Section 4.4 - This section should be revised with the information of frequency of detection above screening levels across the site.

- Page 4-3; Section 4.4 - This section should include a discussion of the apparent conservative TRV selected for lead for small mammals. Please clarify why a back calculation using this TRV to a HQ of 1 or less results in a soil concentration that appears to be less than NCBC background.