



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1

JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

May 25, 1998

James Shafer, Remedial Project Manager
U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division, 10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

Re: EPA Comments on the Draft Preliminary Remediation Goals (PRGs) for Derecktor Shipyard/Coddington Cove at the Naval Education and Training Center, Newport Rhode Island

Dear Mr. Shafer:

I am writing in response to your request for EPA to review the *Draft Preliminary Remediation Goals (PRGs) for Derecktor Shipyard/Coddington Cove*, dated March 1998. EPA reviewed the document for technical sufficiency, adherence to applicable regulations, and EPA guidance. Detailed comments are provided in Attachment A.

Derecktor Shipyard is located at the southeastern end of Narragansett Bay. The western boundary of the site opens onto Coddington Cove in Rhode Island. The depth of the area ranges from approximately <1.5 meter in the northeastern portion, to 16 meters at the Cove entrance. The Cove is protected by the Coddington Cove break wall to the north. Habitat types in the Derecktor Shipyard area include fringe salt marsh, rocky intertidal, and open water estuarine habitats. Sediment contaminants in the area of the Derecktor Shipyard include metals, semivolatle organic compounds (SVOCs), polychlorinated biphenyls (PCBs), organochlorine pesticides, and butyltins.

The PRG development process described is conceptually reasonable as a way to identify the risk drivers following multiple lines of evidence, and, to a limited extent, to quantify the concentrations of various chemicals associated with modeled or measured risk. However, three problems are associated with the implementation of this approach:

- ◆ the reduction of the CoC list to a single risk-driving PRG is not sufficiently supported;
- ◆ the potential role of metals as risk drivers seems to be underestimated in this process; and
- ◆ the use of measured elutriate chemical concentrations in PRG development as representative of sediment pore water concentrations is a questionable practice.

The assumption that COCs are found in sediments at concentrations proportional to one another at all stations is central to the process of identifying a single “limiting PRG.” It seems highly unlikely that very different chemicals with different fate and transport properties, possibly present owing to releases widely dispersed through time and space, could be co-located in similar proportions across the Cove. Stations that show acute toxicity to amphipods, adverse effects on sea urchin development, and avian predator risk should be considered to pose a risk to ecological receptors. The fact that some stations are not recommended for final PRG implementation suggests a weakness in the PRG process, possibly resulting from an attempt to find a single risk-driving chemical that will protect a wide variety of human and ecological exposures.

The process for developing PRGs for metals is hindered by a lack of consistency in the type of data collected for these analytes. The association between metals concentrations and toxicity to amphipods does not appear to have been evaluated. Also, it is not clear how metals concentrations in either pore water or elutriate can be converted to bulk sediment concentrations. The equilibrium partitioning (EqP) process allows for conversion of pore water concentrations to bulk sediment concentrations for organic chemicals, but no such model has been offered for metals. Final PRGs expressed as a porewater hazard quotient can not easily be converted to bulk sediment concentrations for implementation. Perhaps as a result of these factors, the metals seem to disappear as contributors to risk in the later portions of this process, even when faced with evidence that ecological risk may exist as a result of metals contamination. The Simultaneously Extracted Metals-Acid Volatile Sulfide (SEM-AVS) calculations suggest that metals are bioavailable to benthic fauna in some locations, and the avian predator models suggest that metals may contribute to risk to these receptors.

It is difficult to assess whether the sediment elutriate chemical concentrations can be accurately associated with sediment pore water or bulk sediment concentrations, because of the substantial dilution that occurs in the process of obtaining an elutriate. The process of making an elutriate involves a four to one dilution of sediment with clean water, whereas pore water is obtained by separating sediment from pore water through mechanical manipulation such as centrifugation. The PRG process uses elutriate chemical data in exactly the same way as pore water data derived from bulk sediment data, without accounting for the fact that elutriate data represents a diluted sample medium. The elutriate tests may have served their primary useful purpose as indicators of relative toxicity among stations, but quantitative use of the elutriate chemical data may not be feasible.

Bulk sediment concentrations measured in a split of the same sample used in elutriate testing would at least allow for a qualitative association between effects on sea urchin larval development and specific sediment concentrations. Without such data, the ability to use elutriate data interchangeably with pore water or bulk sediment data in the PRG process needs to be better supported.

It is troubling that the areas ranked as high probability for ecological risk do not exceed the proposed PRGs. This calls into question the appropriateness of the proposed PRG approach.

The disconnect between the ERA findings and the results of the PRG implementation need to be outlined and considered. This consideration should identify differences between the ERA analysis and the PRG analysis. The proposed PRGs in Table 16 will need to be reevaluated after the disconnect between the ERA findings and the PRG approach are outlined and considered.

The sediment contaminant concentrations are not provided in the PRG document for stations 1 - 23. Figure 2 presents Thiessen polygons for all of the stations, but the data used to estimate the spatial polygons are not provided in the PRG document. Figure 3 presents the risk probabilities for the Thiessen polygons, but does not present risk probabilities for stations 1- 23. Appendix A of the PRG document includes data for stations DSY-24 through DSY-41, but comparable data are not provided for stations DSY-1 through DSY-23. Table A-2.2, however, does present calculated organic contaminant concentrations in porewater for stations DSY-1 through DSY-23. The sediment contaminant concentration and %TOC data must be provided in order to confirm the equilibrium partitioning.

The usefulness of retaining separate polygons for stations DSY-1 through DSY-23 is questionable because these stations do not have data comparable to the other stations. Data for stations DSY-1 through DSY-23 were not used in the Derecktor Shipyard Marine Final ERA Report (May 1997) or the Off Shore Human Health Risk Assessment Report (March 1998).

I look forward to working with you and the Rhode Island Department of Environmental Management toward the cleanup of Derecktor Shipyard. Please do not hesitate to contact me at (617) 573-5777 should you have any questions or wish to arrange a follow up meeting.

Sincerely,



Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

Attachment

cc: Paul Kulpa, RIDEM, Providence, RI
Kevin Coyle, NETC, Newport, RI
Susan Svirsky, USEPA, Boston, MA
Bart Hoskins, Lockheed, Lexington, MA
Jennifer Stump, Gannet Fleming, Harrisburg, PA
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Mary Philcox, URI, Portsmouth, RI
David Egan, East Greenwich, RI

ATTACHMENT A

<u>Page</u>	<u>Comment</u>
p. 3, §2	<p>The statement that all of the CoCs tend to be found in each environmental sample does not adequately support the “limiting PRG” concept that is central to the PRG implementation process. The idea that the “limiting PRG” should drive the remediation <i>at each location</i> is reasonable, however the application of a single limiting PRG to all locations tends to ignore CoCs that may be driving risk for another pathway at a different location. This process underestimates the role of metals as potential risk drivers. This is partly owing to the lack of a clear method for associating metals concentrations in elutriate samples with bulk sediment concentrations. Also, the role of metals in toxicity to amphipods was not evaluated. It seems somewhat unlikely that a polycyclic aromatic hydrocarbon (PAH) such as dibenz(a,h)anthracene would be co-located, and also found at proportional concentrations to arsenic, copper, or lead at all stations. Further evidence of this co-location is necessary to support the assumptions outlined herein.</p>
p. 10, §2.2 & Tables A-4.2 and A-4.3	<p>The text states that the sea urchin tests were segregated into toxic and non-toxic according to the criterion that successful fertilization or normal larval development of $\geq 70\%$ = non-toxic. This criterion is unclear, because the fertilization test and the larval development test endpoints do not lend themselves to interpretation through a single criterion. Table 5.2-1 of the Ecological Risk Assessment (SAIC, 1997) expresses the endpoint for fertilization as percent fertilized sea urchin eggs in elutriate, which agrees with the criterion for toxicity in the text of the PRG document. The larval development test endpoint, however, is expressed as a 10% Inhibition Concentration (IC_{10}), which is an estimate of the concentration of elutriate (% elutriate) that causes a 10% reduction in normal larval development. Please provide further information.</p> <p>Also, using the IC_{10} concentrations as the selective factor for toxicity versus non-toxicity results in very different segregation of samples in the larval development data set. For example, samples DSY-25, DSY-31, and DSY-33 have IC_{10} concentrations of 30.2%, 37.6%, and 19.3%, respectively, and are listed as “toxic” in Table A-4.2. Samples DSY-32, DSY-37, and DSY-41 have IC_{10} concentrations of 33.8%, 25.2%, and 39.0%, respectively, and are listed as “non-toxic” even though they bracket a range of concentrations similar to those of the “toxic” group. Further explanation of the selection criterion (or criteria) is needed. Recalculation of subsequent steps in the PRG process may be needed.</p>

p. 15, §2.4.3,
Equation (1)

Equation (1) presents a reduced form of the RME concentration for noncarcinogenic COCs. The equation uses a constant of 4302.7 in the numerator. However, verification of the values used in the equation indicate that the constant should be 4679.5, not 4302.7. In fact, verification of the values presented in Table 12 indicate that the 4679.5 value was actually used to calculate the RME values in Table 12. The constant value in the text should be corrected.

p. 16, §2.4.3,
First equation
on page

This equation states that Risk = LADI x RfD. This is not correct. To correct the equation, the parameter “RfD” should be replaced with the parameter “SF.”

p. 16, §2.4.3,
Equation (3)

Equation (3) presents a reduced form of the RME concentration for carcinogenic COCs and uses a constant of 10039.6 in the numerator. However, verification of the values used in the equation indicate that the constant should be 10918.8, not 10039.6. In fact, verification of the values presented in Table 12 indicate that the 10918.8 value was actually used to calculate the RME values in Table 12. Please correct.

p. 17, § 2.4.4, ¶1

The second sentence states that RME values for carcinogenic and noncarcinogenic COCs are estimated by Equation (1) and Equation (2), respectively. However, the RMEs for carcinogenic CoCs were derived by Equation (3) and the RMEs for noncarcinogenic CoCs were derived by Equation (1). There is no Equation (2) in Section 2.4.3 of the text. The reference in Section 2.4.4 should be corrected.

p. 17, §2.4.4, ¶1

The third and fourth sentences indicate that Table A-2.3 provides dry to wet ratio statistics for conversion of the RSV data to wet weight concentrations. The data indicates that an average of 14% dry weight (86% moisture) was used for the conversions. Table A-2.3 indicates that 0.14 is the mean proportion of moisture content, but defines moisture content as:

$$\frac{\text{g dry}}{\text{g live(wet) weight}}$$

This equation actually defines the proportion of solids, not the proportion of moisture. To clarify the document, the heading of column 2 in Table A-2.3 should be revised to indicate that the information presented is the solids content, not the moisture content. Also, the values presented for moisture are proportions, not percentages. Therefore, the final row of Table A-2.3 should be relabeled to indicate that it presents the mean proportion of solids and mean percent lipid contents.

- p. 20, §3.3 The three stations that exceed TEV-HQs for dibenz(a,h)anthracene are stated as being DSY-2, DSY-3, and DSY-26. According to table 15, station DSY-27 exceeds the TEV-HQ, not station DSY-26. Please correct. Also, it is stated that of the three stations that exceeded TEV-HQs, “implementation of the PRG finds a PRG exceedence at only one station (DSY-3).” Please clarify what is meant by the phrase “implementation of the PRG” in this sentence.
- p. 22, §3.3 The PRG document text states that a PRG for total PCBs to protect the avian predator exposure pathway is not recommended because of the use of conservative exposure assumptions. However, the ERA did not identify overly conservative assumptions related to assessment of PCB risk to avian receptors. The purpose of using conservative exposure assumptions is to assure protection during worst-case scenarios, not as a means of screening contaminants from being PRGs. Please clarify and provide more detail to support the recommendation of eliminating total PCBs as a PRG.
- p. 23, §3.3, ¶1 The mean biota lipid concentration is cited in the text as 4.9%. According to Table A-2.3, the correct value is 4.59%. This error should be corrected in the text.
- p. 23, §3.3, Table 16 The text provides a BSAF for PCBs for determining human health risk-based sediment PRGs. However, PCBs were not selected as a final CoC for human health protection. Benzo(a)pyrene (BaP) was selected as a final CoC for human health, yet the BSAF for this chemical has not been included in the text on page 23. In addition, footnote 5 in Table 16 indicates that a PRG is calculated for PCBs and not for BaP. Because PCBs have not been selected as a human health risk-based CoC, the text on page 23 following equation 6 and in footnote 5 of Table 16 should be modified to focus on BaP.
- p. 23, §3.3 The citation for “FDA, 1995” has not been included in the reference list. Please add.
- Table 1 The RAOs include minimizing future contamination from landfill constituents. Please discuss in the text the relationship of this RAO to the PRGs developed. It is unclear how the RAOs comply with 40 CFR 300.425(e)(2)(i).
- Table 4 This table presents Water Quality Criteria and derived water quality screening values. No values are presented for tributyltin. Saltwater acute (0.37 ug/L) and chronic (0.010 ug/L) ambient water quality criteria were proposed by EPA in 1997 (62FR42554). These proposed values should be

presented in the Table and considered for use as water quality screening values.

- Table 5 The term “nd” is not defined. Also, the apparent lack of metals analysis for the amphipod test is a major omission, because the amphipod test is one of the most direct and ecologically realistic measures of effects for benthic organisms. Failure to include the metals concentrations associated with toxicity would tend to underestimate risk.
- Table 12 Footnote 2 indicates that RMEs for carcinogenic CoCs were derived using Equation 2 in Section 2.4.3 of the text. There is no Equation 2 in Section 2.4.3 of the text.
- Table 15 The footnotes for the avian predator and combined exposure pathway rows for the DSY-1 through DSY-23 columns are not accurate since the “complete TEV-HQ values” are not presented in Table A-6. Please revise the footnotes to better reflect the evaluation of stations DSY-1 through DSY-23.
- §3.3 & Table 15 This section of the PRG process where the “limiting PRG” concept is explained is questionable at best. In the process of narrowing the PRGs to a single, limiting PRG, a number of risk indicators are discarded based on professional judgement. Avian exposure-based PRGs are discarded because the initial risk assessment is deemed to be overly conservative, even though the ecological risk is corroborated with risk determined by other measures. The PRG process is very late in the process for questioning the exposure parameters by which risk was measured in the ERA. A single PAH, dibenz(a,h,)anthracene, a relatively low-toxicity PAH, emerges as the single limiting risk driver. Zinc and PCBs, which show a risk to avian predators over much of the study area, are eliminated as risk-drivers because of the conservative exposure assumptions made for this pathway. This section should be re-evaluated. First, a further examination should be made of the relative weights assigned to measured adverse effects, such as sediment toxicity and benthic community analysis, versus modeled adverse effects and professional judgement.
- Table 16 This table requires further explanation. Arsenic, copper, and lead, both carry the notations “a” and “c”, in the second column: These footnotes indicate units of $\mu\text{g/L}$ and $\mu\text{g/g}$ dry weight, respectively. Therefore the notes are mutually exclusive. The avian predator column lists extraordinarily high PRG concentrations for copper (184), lead ($6.22 \text{ E}+5$), and silver (2342), regardless of which units are correct. These numbers suggest either a problem with the PRG derivation process for this pathway,

or that avian predators are so insensitive to high concentrations of metals in sediment that they are poorly suited to serve as a model ecological receptor for this type of ecosystem. Also, an aquatic PRG of 1.77 should be included for arsenic.

Table 16, PCB
PRG

Please confirm the calculated avian predator PRG for total PCBs. EPA calculated a PCB PRG of 35.6 using the equation specified in footnote 4, avian TEV of 0.77, the mean %TOC of 1.06 (Table A-2.4) and the mean % lipid of 4.59 (Table A-2.3).

Table 16

Three footnotes (a, b, and c) are provided in Table 16 to indicate the units for the PRGs. Footnotes "a" and "c" both appear next to arsenic, copper, and lead. The use of two footnotes for one chemical is not clear. Please present units next to each PRG value.

Figure 3

Figure 3 presents the overall summary of ecological exposure and effects-based risk probability ranking (Table 6.6-3 in ERA). The figure should note that stations DSY-1 through 23 are not ranked for risk probability because they were not evaluated in the marine ERA.

Figures 4, 5-1,
& 5-2

These figures depict polygons that exceed PRGs. Results for sediment locations 1 through 23 could not be verified because sediment concentration data for these stations were not presented in this document or in the ERA. These data should be included in the PRG document in order to ensure that the data quality is sufficient to meet project objectives.

Figure 6

This figure summarizes sediment locations exceeding the human health risk-based PRG for benzo(a)pyrene. Results for sediment locations 1 through 23 could not be verified because sediment concentration data for these stations were not presented in this document or in the HHRA. Please include these data in the PRG document to ensure that the data quality is sufficient to meet project objectives.

Figure 7

Figure 7 presents shading of polygons that exceed the recommended PRG value, instead of the PRG calculated based on an HQ of 1. The title should be corrected.

Appendix A

There is an inconsistency between the stations that exhibited toxicity and the stations presented in the PRG document as not exhibiting toxicity. In table 5.2-1 of the Dereecktor Shipyard Marine Final ERA Report (May 1997), Table A-4.2 stations DSY-32, DSY-36, DSY-37, DSY-40, and DSY-41 show toxicity in the sediment elutriate test using sea urchin larval development. However, these stations are included in table A-4.2 of the

PRG document which is for stations that exhibit no toxicity. Please correct. If appropriate, provide an explanation in the text and footnotes to Tables A-4.2 and A-4.3.

Table A-8

This table is not complete. The text refers to Table A-8 for PRG-HQ values (p. 21, ¶6, metals; p. 22, ¶2, total PCBs) but the only analytes listed in Table A-8 are benzo(a)pyrene and dibenz(a,h)anthracene. No other PRG-HQ data are provided in Table A-8. Please provide all applicable PRG-HQs. Also, no footnotes are provided to define the terms in Table A-8. Although footnote numbers are provided, the footnotes are missing. Please correct.