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Project Number 7752

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Reference: CLEAN Contract No. N62472-90-D-1298
Contract Task Order No. 0302

Subject: Responses to Comments to The Draft PRGs for Derecktor Shipyard/Coddington Cove, Derecktor Shipyard (Off-Shore)

Dear Mr. Shafer:

Enclosed you will find four copies of the responses to comments to the Draft Preliminary Remediation Goals (PRGs) for Derecktor Shipyard/Coddington Cove. These responses were prepared by our subcontractor, SAIC, who also co-authored the Ecological Risk Assessment (ERA) Report for this site.

The comments suggest that a revision to the PRG derivation process is in order, at least for this site, as it formerly did not identify the locations noted to have a higher relative potential for risk to ecological receptors as locations that should be considered for remedial actions.

The process has been extensively reviewed, and some changes in the valuation procedures in the data for the aquatic exposure pathway are proposed in Attachment A. These changes do not represent fundamental alteration of the process, but rather acknowledge that not one, but two sets of PRGs should be developed for aquatic risk: that being exposure to in-place (e.g., bedded) sediment and exposure to resuspended sediments.

These changes permit a more careful evaluation as to how aquatic PRGs will be implemented at the site. Previously, exposure scenarios were applied across the site without discrimination as to the likelihood for the exposure to occur. With the modified PRGs separated for bedded and suspended sediment, the process will be appended by evaluation of which stations are more likely to pose a risk (i.e. through sediment resuspension - near the piers and near the shoreline/bulkhead areas). A similar exposure evaluation will be performed for avian predators (i.e., identifying areas most likely used for feeding by the receptor), and for humans (i.e., areas where shellfishing is more likely to occur) . This evaluation will be applied at the final stage of the PRG process.

The separate consideration of the resuspension pathway for aquatic biota and delineation of locations of probable exposure for all receptors are expected to provide PRGs which more appropriately address areas where high probability of risk was predicted by the ERA report.

Responses to comments from USEPA (dated May 25, 1998) are presented in Attachment B; from RIDEM (dated May 15, 1998) are presented in Attachment C; from NOAA (dated April 20, 1998) are presented in Attachment D.

If you have any questions regarding this issue or any other related material, please do not hesitate to contact me.

Very truly yours,

Stephen S. Parker
Project Manager

SSP/pmp

Attachment

c: M. Griffin, NETC (w/encl. - 4)
K. Keckler, USEPA (w/encl. - 3)
P. Kulpa, RIDEM (w/encl. - 4)
K. Finkelstein (w/encl. - 1)
J. Stump, Gannett Fleming (w/encl. - 2)
D. Egan, TAG (w/encl. - 1)
Restoration Advisory Board (w/encl. - 4)
J. Trepanowski/G. Glenn, B&RE (w/encl. - 1)
File 7752-3.2 (w/o encl.)

bc: G. Tracey, SAIC (w/encl. - 1)
File 7752-8.0 (w/encl. - 1)

Attachment A
Primary Changes to the Draft Preliminary Remediation Goals
Derecktor Shipyard/Coddington Cove

The Navy acknowledges the uncertainty with regard to the disconnect between ERA findings and PRG implementation. The Navy believes the primary root cause of this discrepancy has been in the treatment of sediment and elutriate chemistry/toxicity results in PRG development as a single exposure pathway. In fact, the type of data (chemical matrix, biological endpoints) cannot be appropriately lumped and interpreted with a single criteria (e.g., TEVs), and that separate TEVs for distinctly different exposure pathways (bedded vs. resuspended sediment exposure, respectively) as often noted by RIDEM. The Navy is optimistic that the procedural changes put forward below will resolve the apparent discrepancies between ERA characterization and prediction of actionable areas based on PRG implementation.

Upon evaluation of the data and PRG process, the following steps will be taken in reevaluation of PRGs:

1. Aquatic TEVs for in-place and resuspended sediments will be evaluated separately but otherwise using the same PRG development process. Bulk sediment biotoxicity data (using amphipods) will paired with porewater and SEM:AVS chemistry measurements, while resuspended sediment biotoxicity data (using sea urchin endpoints) will be paired with elutriate chemistry data.

2. The separation of non-toxic and toxic samples for the sea urchin development tests will be based on the IC10% results presented in the ERA, not upon the % fertilization result as initially presented. The benchmark for demarcation of toxic from non-toxic samples will be 50% or less elutriate concentration causing 10% abnormal larval development (see ERA Table 5.2-1). This value was selected in consideration of the fact that clear exposure response relationships were not observed in biotoxicity tests at a more conservative threshold (e.g., 70% elutriate, see ERA Figure 5.2-3), and thus the responses are not likely to be CoC related.

3. The Amphipod NOEQ in PRG Table 5 will be interpreted as the bedded sediment No Observable effects Quotient (BED-NOEQ). The minimum of the sea urchin fertilization and larval development endpoints will be interpreted as the resuspended sediment NOEQ (ELU-NOEQ). The reporting of an overall Aquatic NOEQ will be dropped since the exposure pathways being represented are not intercomparable. The calculation of the 95% PW-EQ and 95% PW-EL values in Table 5 will be substituted with the maximum PW-HQ for non-toxic data where the number of nontoxic samples is 3 or less. This procedure will lead to a more conservative calculation of the NOEQ than the UCL approach because of the small sample size.

4. The reference comparison required for the development of the resuspended sediment TEV (ELU-TEV) must be performed separately from the bedded sediment TEV (BED-TEV), because elutriate and sediment concentrations from the same sediment are not expected to be the same, (although they are likely to be proportional to their respective bulk sediment concentrations). However, because an adequate data base does not exist for the elutriate media (only data at DSY ERA reference location JPC-1 is available), the 95% UCL for the metric will be scaled to that observed for the corresponding reference sediment database based on the JPC-1 elutriate/sediment concentration ratio. Statistical outliers will be assumed to be the same CoCs as those in the bedded sediment.

5. The Limiting CoC selection process summarized in Table 15 and supported by Appendix Tables A-5 to A-7 are based on identification of the CoC with the Maximum TEV-HQ by station and pathway. The process is repeated for all sampled locations to identify the collection of all possible limiting CoCs. This procedure greatly reduces the reliance on assumption of CoC co-location across the site since the broad spatial distribution of sampling locations minimizes the potential that a novel CoC (unique in distribution, concentration or speciation) would be missed and hence fail to be included as a limiting CoC. Although comment has not been received directly on this issue, the Navy's review of the PRG process has revealed a possible situation where an important Limiting CoC could be overlooked and proposes the following modification. Where the sum of TEV-HQs for a given station and pathway exceeds one, risk reduction may be possible even though the maximum TEV-HQ < 1. Hence, as part of a conservative approach, the CoC with the max TEV-HQ for the station-pathway will be selected whenever the station-pathway sum TEV-HQ > 1. This step is taken to further address the uncertainty in the co-location assumption by identifying any CoC, which might substantially contribute to risk at the site and could be effectively incorporated into a remediation strategy.

6. With respect to the translation of the Threshold Effect Value for porewater and elutriate media back to sediment-based concentrations, the primary intention is to derive a PRG number which both protects the receptor, and when applied to measured sediment chemistry, reflects a comparable degree of risk as indicated by the matrix-specific risk indicator (i.e., the TEV-HQ). For example, a sediment porewater concentration at a given location that is two-fold above the TEV (e.g., TEV-HQ = 2) should have a corresponding PRG concentration that, when implemented, will reduce the risk by a factor of two (e.g. from PRG-HQ = 2 to a PRG-HQ < 1). Inherent in this application of PRGs is the assumption that risk at a given location when expressed as a unitless quotient is the same regardless of whether the benchmark is TEV-based or PRG-based, thus:

$$\text{PRG-HQ}_{\text{Sta., CoC, Pathway}} = \text{TEV-HQ}_{\text{Sta., CoC, Pathway}} \qquad (1)$$

Where the risk equivalency assumption in Equation 1, above holds true only for a given location, CoC and exposure pathway.

The concept of cross-matrix risk equivalency is not new, This approach, for example, was used in the ERA to assess risks due to CoCs in tissues (from Shepard, 1998) based on WQC, wherein the tissue concentration in the biota achieved at the water-based effects threshold (e.g., WQC-chronic) is the relevant tissue-based effects threshold, because CoCs must reach the site of toxic action (e.g., tissues) to exert their effect. Similarly, the degree of risk associated with porewater/elutriate concentration of causing the effect in bedded/resuspended sediment (i.e., TEV-HQ) must equal the risk associated with bulk sediment concentration (PRG-HQ) responsible for generating (via partitioning) that porewater concentration:

The relationship described in Equation 1 can be used to solve for the location-CoC-pathway as follows. Substituting for PRG-HQ:

$$\frac{[\text{Sed}]}{\text{PRG}} = \text{TEV-HQ} \qquad (2)$$

Thus, given the TEV-HQ and associated sediment concentration ([SED]), the PRG concentration can be solved:

$$\frac{[Sed].}{TEV\text{-}HQ} = PRG \quad (3)$$

Note that the same approach will apply for any exposure pathway be it based on porewater, elutriates or tissue as the primary vector of CoC exposure.

In the revised PRG document, the Navy proposes to use the above estimation procedure by calculating individual PRG concentrations for stations with TEV-HQ > 1, and calculate statistics about the mean PRG value as the site-wide PRG concentration.

Previously, models were used as the primary method for back calculation, and will still be needed since the inherent matrix-specific concentration to sediment concentration partitioning relationship is key to the accuracy of the PRG. For example in is anticipated that characteristics of a particular media sampled at a given location (e.g., TOC content of sediment, inert CoC materials such as metal fragments) may result in an estimated PRG which is outside the expected range about the value at PRG-HQ = 1. In these instances, the resultant values can be validated against modeled predictions of sediment concentration using EqP (porewater), modified EqP (elutriates), and BAF/BSAF (bioaccumulation) models, and factors contributing to potential outlier data can be addressed in relation to the modeled parameters, and atypical (high or low) PRG values can be isolated.

In summary, the important distinction in the revision of the PRG back-calculation method is that the measured risk data will now be used to derive the PRG value, and models will be used as necessary to assess the appropriateness of the calculated PRG concentration on a station-CoC-pathway basis. Previously, the process was reversed; models were used to calculate PRGs, and application of PRGs to site sediment was performed to assess appropriateness.

The Navy believes that this modified approach will lead more rapidly to a consensus on PRGs as it will segregate discussion about appropriate risk exceedence benchmarks expressed as TEV-HQs (and the majority of the PRG document devoted to its derivation) from the perfunctory process of deriving the same number in sediment-based units and will allow better evaluation of final, sediment-based PRGs that are adopted from the risk data.

Attachment B
Responses To Comments from USEPA Dated May 25, 1998
On the Draft Preliminary Remediation Goals
Derecktor Shipyard/Coddington Cove

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

G1. 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.*

Response:
The objective of the PRG process is intended to identify Limiting COCs and associated concentrations that will address the majority of site related risk as per EPA guidance. The process is not intended to identify all risk drivers; rather only those CoCs once addressed, will result in acceptable risk reduction caused by all CoCs. Specific responses to these points are addressed in comments G2-G18 below.

*G2. 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.*

Response:
See comment response A1.

G3. 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.

Response:
The Navy concurs that such evidence would suggest risk. The needed discussion centers around what risk is considered actionable. PRGs are intended to delineate areas of the site which require action and which do not. There exists, for example, little support for active remediation of sediments based on avian predator exposures given that the existence of any risk via this pathway is highly unlikely.

G4. 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.

Response:
As indicated in the document, the final recommendations are based upon best professional

judgment and are presented on a CoC by CoC basis. No attempt was made to find a single risk driving chemical, nor would there be any advantage in doing so. Several useful comments are discussed below which will likely affect the developed PRGs.

G5. *The process for developing PRGs for metals is hindered by a lack of consistency in the type of data collected for these analytes.*

Response:
The Navy would concur that the use of both sediment and elutriate data for calculation of sediment-based PRGs has complicated the interpretation of the data, but of course was constrained to the measurement endpoints as agreed upon in the approved work plan. The Navy proposes to re-interpret the data with respect to relevant exposure pathways the PRG process was intended to protect, e.g., in-place sediment CoC exposure (bulk chemistry and amphipod toxicity) resuspended sediment CoC exposure (elutriate chemistry and sea urchin toxicity) and food chain CoC exposure (tissue chemistry and avian/human health models).

G6. *The association between metals concentrations and toxicity to amphipods does not appear to have been evaluated.*

Response:
Potential effects of metals on amphipods will be addressed through examination of co-located SEM:AVS and toxicity data. This analysis had been omitted in the previous draft. Impacts of metals in resuspended sediments were addressed in elutriate testing.

G7. *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.*

Response:
The task of conversion of water based units to sediment units for metals will be proposed if metals are identified as aquatic PRGs. For in place sediments, SEM:AVS and co-located toxicity data did not suggest metal-related effects were the primary cause of toxicity, at least for divalent metals (Cu, Cd, Pb, Ni, and Zn). Hence, the adoption of a metal PRG for in place sediments is not expected. If a sediment-based metal PRG was identified, a site-specific study of sediment/porewater partitioning might be required if a sediment -based number was absolutely necessary. Alternatively, the Navy proposes that direct porewater measurements be performed for metals if needed. EPA-ORD has recently recommended that porewater data be measured to infer sediment toxicity, and the collection and analysis procedures are not burdensome or costly. As it is likely that porewater data will become even more conventional in the future, porewater monitoring should be considered a viable approach for assessing PRG compliance.

Calculation of PRGs for resuspension scenarios (i.e. ELU-PRGs) for either metals or organics cannot rely upon EqP modeling since a resuspension event (or the elutriate preparation meant to mimic resuspension chemistry) does not represent an equilibrium condition. Hence, the same difficulty exists for converting ELU-PRGs to sediment-based units as does for PRGs developed for sediment exposure (SED-PRGs). Thus, if an ELU-PRG was identified, a site-specific study of sediment/elutriate partitioning might be required if a sediment-based number was absolutely necessary. Alternatively, the Navy proposes that direct elutriate measurements be performed if absolutely needed. Given however, that elutriate testing is typical for dredged material evaluations and even the common TCLP testing involves an elutriate-type preparation, it seems plausible that monitoring of sediments at risk to resuspension could be based on elutriate/TCLP type preparations.

G8. *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.*

Response:
The Navy has no difficulty in recommending aquatic-based PRGs for metals where appropriate and has done so for the McAllister Point Study. As stated above, the lack of metal-based PRGs should not be unexpected given that no stations exhibited SEM-AVS values greater than the recommended EPA benchmark.

G9. *The Simultaneously Extracted Metals-Acid Volatile Sulfide (SEM-AVS) calculations suggest that metals are bioavailable to benthic fauna in some locations,*

Response:
As discussed above, no stations exhibited SEM-AVS values greater than the recommended EPA benchmark. Hence, there is no data to suggest that metals pose an unacceptable risk to benthic fauna.

G10. *and the avian predator models suggest that metals may contribute to risk to these receptors.*

Response:
Slight exceedences of toxicity reference values were observed for modeled consumption of metals and PCBs in fish/shellfish by avian predators. However, TRV-Dose HQ calculations show no CoC-prey combination exceeded the benchmark by more than ten-fold, and many exceedences were matched by comparable exceedences at the reference locations (ERA Table 6.3-3). Given the unlikely exposure scenario (e.g., fish consumed at station year round), these exceedences (as included in the ERA) do not suggest significant risk to avian predators.

G11. *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.*

Response:
There is no difficulty associating the sediment, porewater and elutriate data since they were derived from the same sample (i.e., sample splits). The reviewer should note that a 4-fold dilution is highly conservative See also response to General Comment #5. considering the degree of sediment dilution that would occur during a sediment resuspension event. The important difference that effected the previous conversion of water-based values into PRGs is that the EqP model cannot be assumed to apply to a resuspended sediment since equilibrium does not apply. This fact will be taken into account in the revised PRG document.

G12. *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.*

Response:
The preparation of elutriates involves mixing of sediment with seawater. In the process, porewater is diluted, but the opportunity for sediment partitioning into water is enhanced by 60 minutes of mixing. In addition, AVS is likely lost in the process since the dilution water is oxygenated. Thus, it cannot be assumed that reduced chemical exposure due to dilution is the only chemical reaction taking place. Rather it can be argued that the preparation process leads to greater water based metal bioavailability than was present in the original porewater. See also response to General Comment #6.

G13. *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.*

Response:
As discussed above, sediment, porewater and elutriate data as well as toxicity data since were derived from the same sample such that quantitative use of the data is maximized.

G14. *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.*

Response:
The reviewer is asked to refer to Attachment A of the Response Summary.

G15. *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.*

Response:
These document revisions will be provided as itemized in specific comment responses in Appendix A.

G16. *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).*

Response:
The Navy concurs that a data comparability assessment be conducted between DSY 1-23 data (by URI) and ERA data analyzed by the same laboratory using the same methods, particularly because of sampling depth issues between the two studies. However, if data can be shown to be comparable, then the Navy feels the data is relevant and should be used just as new data for PRG compliance would be used.

ATTACHMENT A: SPECIFIC COMMENTS

Page *Comment*

A1. *p. 3, §2 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 at each location 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.*

Response:
The Navy does not believe that key CoCs driving risk have been ignored. The PRG approach selects all CoCs which drive risks at any station; it is theoretically possible that as many CoCs as sampled stations could be identified by the PRG development process, were it true that relative mixtures of CoCs varied substantially from location to location. It is true that the validity of the assumption of co-located CoCs is a function of the spatial distribution and number of sampling locations. For the present investigation, 24 sampling locations were used to develop PRGs. Given the large number and spatial distribution of stations, the possibility that "hot spots" characterized by CoCs not among those found to be limiting at sampled locations is considered highly unlikely. Hence, the process has produced a comprehensive assessment of limiting CoCs.

A2. *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.*

Response:
The analysis presented in the draft PRG document had assumed that the partitioning of metals between elutriates and sediments would be the same as would occur for porewater-sediment. In the Navy's re-evaluation of the data, this assumption is not likely to be true, such that risks due to metals in sediments and elutriates must be treated separately because of the different exposure pathways these measurements are intended to represent. For sediments, SEM:AVS and co-located toxicity data did not suggest metal-related effects were the primary cause of toxicity, hence the selection of a PRG for sediment metals is unlikely. (Note that SEM-AVS data was omitted, and will be included in the revised document, see response to General comment G6).

A3. *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.*

Response:
As discussed above, the possibility that "hot spots" characterized by metals as Limiting CoCs not among those found to be limiting at sampled locations is considered highly unlikely. Still, the Navy recognizes the importance of the co-location assumption and will provide further discussion/analysis in the revised PRG document (see comment G-19, above).

A4. *p. 10, §2.2 & Tables A-4.2 and A-4.3 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 >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 (IC10), which is an estimate of the concentration of elutriate (% elutriate) that causes a 10% reduction in normal larval development. Please provide further information.*

Response:
The selection of data for PRG development was intended to allow the both the fertilization and larval development data be evaluated by a single criterion. For this reason, the % successful larval development endpoint at 100% elutriate concentration was selected for PRG development. The Navy concurs that the endpoints are different and the plan for use of %successful development is inconsistent with the endpoint assessed in the ERA. Hence, the analysis will be revised to use IC10 endpoint presented in the ERA. See also response to comment A5, below.

A5. *Also, using the IC10 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 IC10 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 IC10 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.*

Response:
The Navy concurs that in order to maintain consistency with the ERA interpretation, stations DSY-32,
DSY-37, and DSY-41 having IC10 concentrations < 50% should be reclassified as toxic. This value was selected in consideration of the fact that clear exposure response relationships were not observed in biotoxicity tests at a more conservative threshold (e.g., 70% elutriate, see ERA Figure 5.2-3), and thus the responses are not likely to be CoC related. PRGs will be recalculated accordingly.

A6. *p. 15, §2.4.3, 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.*

Response:
The text will be adjusted as recommended.

A7. *p. 16, §2.4.3. This equation states that Risk = LADI x RfD. This is not correct. First equation. To correct the equation, the parameter *RfD* should be replaced on page with the parameter *SF.**

Response:
The text is correct as stated. Note that the parameter "SF" is contained in the expanded formula to the right of the LADI x RfD equality.

p. 16, §2.4.3 Equation (3) presents a reduced form of the RME concentration for Equation (3) 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.

Response:
The text will be adjusted as recommended.

A8. *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.*

Response:
The text will be adjusted as recommended.

A9. *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: g dry/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.*

Response:
The text will be adjusted as recommended.

A10. *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.*

Response:
The text will be adjusted as recommended.

A11. *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.*

Response:
The text was meant to indicate that the comparison of the PRG vs. sediment chemistry reveals exceedence at only one station (DSY-3). The relevance of this statement will be re-assessed after PRG recalculation resulting from comment A5, above.

A12. *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.*

Response:
The ERA did in fact note that the assumptions for avian predator exposure were highly conservative (Section 6.3, p 6-28, last P). The Navy concurs with EPA's interpretation and will revise the text accordingly to indicate that the potential habitat disruption that would result to address PCB-related risks to aquatic predators would not appear to be justified given the low level of risk posed by this incomplete exposure pathway.

A13. *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.*

Response:
The text will be adjusted as recommended.

A14. *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.*

Response:
Revision of the Human Health Risk Assessment has resulted in the inclusion of PCBs for the subsistence fisherman consumption scenario. The text and tables will be adjusted accordingly.

A15. p. 23, §3.3 The citation for "FDA, 1995" has not been included in the reference list. Please add.

Response:
The citation will be added.

A16. 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).

Response:
The stated RAO is in error since there is no landfill-related CoC source in Coddington Cove. The Table will be adjusted accordingly. The RAOs will be revised to state "Prevent exposure of receptors to sediments with CoC concentrations exceeding PRGs".

A17. 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.

Response:
The proposed criteria for TBT are draft. In addition, TBT was not a major chemical constituent of sediment or biota. Hence, after consideration of the comment, the Navy elects not to present these values in Table 4.

A18. 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.

Response:
The footnote ND = No Data will be added. The table will be revised to add the analysis of SEM:AVS data in relation to the amphipod test. The Navy concurs that porewater data for metals would have been preferred, however Trustee's opted for elutriate metals data in lieu of porewater metals data. Hence, the analysis must rely on SEM:AVS results. Still, the Navy does not believe this is a major data gap, since metals (particularly non-divalent metals) were generally not key CoCs in the ERA (see Table 6.6-1).

A19. 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.

Response:
Equation 3 will be renumbered as Equation 2 to resolve the discrepancy.

A20. 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.

Response:
The footnote ND = No Data will be added, and ND inserted into tables *to* better reflect the lack of data for evaluation of stations DSY-1 through DSY-23 for avian and human health pathways.

*A21. §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 judgment. 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.*

Response:
The ERA did in fact note that the assumptions for avian predator exposure were highly conservative (Section 6.3, p 6-28, last P). While the WoE approach used in the ERA included the avian aquatic predator assessment as an indicator of overall aquatic risks, no analysis was intended to conclude that risks on other assessment endpoints would contribute to risks to avian predators other than that explicitly stated.

The Navy is in complete agreement that manipulating the PRG process is not acceptable means for addressing heretofore-unmentioned issues regarding the risk assessment approach presented in the final ERA.

A22. 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 judgment.

Response:
The Navy disagrees with EPA's assessment of dibenz(a,h,)anthracene toxicity. With the exception of fluorene, it is the most toxic PAH as identified by the NOAA ER-M benchmark. The Navy concurs that further discussion regarding the likelihood of zinc and PCB exposure to avian predators as a complete exposure pathway should be brought forward from the ERA to substantiate the elimination of these CoCs as PRGs. However, a recalculation of PRGs based on the re-analysis of sea urchin toxicity data and other revisions are expected to change the PRG CoC list.

*A23. 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 ug/L and ug/g dry weight, respectively. Therefore the notes are mutually exclusive.*

Response:
Footnote "a" was unnecessary and will be deleted.

A24. The avian predator column lists extraordinarily high PRG concentrations for copper (184), lead (6.22 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.*

Response:
The Navy disagrees with the reviewer's assessment. The Cu number (184 ng/g dry wt sediment) is intermediate between NOAA ER-L and ER-M, and hence is very conservative as a PRG. Values for silver and lead are high because site-specific bioaccumulation factors for the metals into tissues of food species were very low. The Navy also disagrees that the selected avian predators are poorly suited given that they were considered representative species as identified in the approved work plan.

A25. Also, an aquatic PRG of 1.77 should be included for arsenic.

Response:
The Navy acknowledges that discussion of arsenic identified as a candidate PRG at a single station (DSY-40) was inadvertently omitted. This CoC will be added to Table 16, and discussing addressing the merits of this CoC will be included in the text. This revision, however, is dependent on the recalculation of PRGs based on the re-analysis of sea urchin toxicity data and other revisions are expected to change the PRG CoC list.

A26. 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).

Response:
The value is correct as calculated. The mean %TOC reported in Table A-2.4 is 2.76% not 1.06% as suggested by the reviewer.

*A27. 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.*

Response:
Footnote "a" was unnecessary and will be deleted.

A28. 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.

Response:
The figure will be modified accordingly.

A29. 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.

Response:
An appendix Table summarizing the URI data for polygons 1-23 will be included.

A30. *Figure 6. This figure summarizes sediment locations exceeding the human health risk-based PRG for Benz(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.*

Response:
An appendix Table summarizing the URI data for polygons 1-23 will be included.

A31. *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.*

Response:
The title will be corrected.

A32. *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 Derecktor 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 that 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.

Response:
The Navy concurs that in order to maintain consistency with the ERA interpretation, stations having IC10 concentrations < 50% should be reclassified as toxic. PRGs will be recalculated accordingly. See also comment response A5, above.

A33. *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 Benz(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.*

Response:
The Table will be revised to include all PRG-HQ calculations, and footnotes added accordingly.

Attachment C
Responses to Comments from RIDEM Dated May 15, 1998
Draft Preliminary Remediation Goals
Derecktor Shipyard

1. General Comment

A number of parameters were utilized during the evaluation conducted under the Ecological Risk Assessment. These parameters included sediment chemistry, water chemistry, biotoxicity test, tissue analysis, biota condition analysis and modeling. This comprehensive evaluation was deemed necessary as no single parameter was considered adequate in an ecological risk assessment.

Response:

The Navy concurs. To elaborate further on the need for multiple WoE, the ERA has approached risk characterization (following EPA guidance) as the extent of joint occurrence of potential for adverse effects (e.g., exposure-based WoE, predicted from site chemistry) and the measured occurrence of adverse effects (biological effects WoE).

As an illustration, chemical analysis of the sediment may not reveal a problem that would be evident through a biota condition analysis.

Response:

The Navy agrees that factors unrelated to sediment chemistry could affect biota condition, however, the ERA is conducted to assess the potential adverse effects of sediment-associated, site-related CoC on indigenous biota, and was not (primarily) designed to discern the cause of such "problems" if they are unrelated to chemical exposure via the sediment (including resuspended sediment).

However, the process developed for the PRG derivations has relied heavily upon essentially two parameters, chemistry and modeling. This is of concern as it was realized that all of the aforementioned parameters were needed to conduct the risk assessment. However only a limited number of parameters were used in the PRG process. This may be the reason why there is a disagreement between the output of the ecological risk assessment and the PRG document. As such, it may warrant a significant revision in the PRG derivation process. The Office recommends that the Navy evaluate whether the comments below will address the discrepancies in the PRG process or whether a totally revamped process is required.

Response:

The Navy wishes to comment on RIDEM's assessment of the data used in the PRG process. Three of the parameters mentioned (chemistry, biotoxicity, tissue analysis) were used directly in the candidate PRG calculation (e.g., PRG Derivation). The PRG implementation data takes into account the remaining WoE as contributors to the risk conclusions reached for each location. Thus, all measured parameters directly of indirectly (as Woe contributing to the risk finding) contribute to PRG development.

The Navy's evaluation of RIDEM's comments has helped to resolve the discrepancy between the draft PRG results and risk assessment findings, discussed below.

2. ***General Comment***

The Ecological Risk Assessment has assumed that static condition will prevail at the site, that is, there will not be any resuspension of contaminated sediments. This Office has repeatedly questioned this assumption in written correspondence and in meetings held for the Ecological Risk Assessment. The Office's position is that storm action, ship traffic or other factors will result in a resuspension of contaminated sediments, thereby generating a greater risk than predicted by the Ecological Assessment. The Office stated that this assessment should be evaluated during the Ecological Risk Assessment.

Response:

At RIDEM's request, elutriate chemistry and toxicity testing were performed to address the potential effects of CoC release and subsequent adverse effects on marine biota. The Navy's responses to RIDEM's comments on this issue and the action taken as reflected in the incorporation of elutriate results as a principal driving factor in assumed risks in the Final ERA report provides ample evidence of the Navy's commitment to address RIDEM's concerns.

The Navy indicated that such an assessment would be in conflict with the schedule for the site and proposed performing the evaluation during the next step of the process, i.e. Feasibility Study and/or PRG development. In the interest of expediting the process, and reducing overall cost, the Office agreed to this provision. However, the Office clearly stated in correspondence dated 20 March 1997, that the Ecological Risk Assessment will not be considered finalized until this issue is addressed. A review of the Derecktor Shipyard Offshore Feasibility Study and Preliminary Remediation Goals Document reveals that the Navy has not provided the agreed to resuspension evaluation. Accordingly, the Navy has not finalized the Ecological Risk Assessment for the site. It, therefore, follows that any document based upon this assessment, Feasibility Study or Preliminary Remediation Goals Report will be of limited utility.

Response:

The Navy has undertaken studies to address ecological risks posed by resuspended sediments via elutriate chemistry and toxicity testing. RIDEM has not previously indicated that the ERA findings were not sufficiently conservative. Discussions must be held to reach agreement as to precisely what issues regarding resuspension were not adequately addressed from a risk-based perspective. Given this agreement, the FS process, including PRG development can proceed effectively. It cannot be expected that the FS can address risk issues that have not been identified in the ERA.

3. ***General Comment***

Historically Pier One was the location where Derecktor Shipyard moored the two large floating dry docks. This was an area where contaminated blast grit, sludges, oils and other debris were routinely dumped as part of normal shipyard activity. The material disposed of at this location was considerable in that it was later found that the waste changed the sediment contours at this location. This illegal action resulted in a criminal investigation against the Derecktor Shipyard. During the ecological risk assessment process this area was discussed. However, as this was a known area of contamination, the Ecological Risk Assessment did not evaluate this location.

Response:

RIDEM's comment to The Draft Final Report (Comment Dated 3-20-97, in our response letter dated April 18, 1997 page 4), states that the Office requested at meetings and in correspondence that the area under the Dry Docks was used for disposal, and asked that the data from the previous ACOE studies in this area be included in the report. We responded to that comment by stating that we would (and did) add new text in the Final Report (Section 4.2.2, a new table (4.2-3) and a new Figure (4.2-8), as requested. In this manner we did address the "contaminant area" referenced in this comment in the ERA, exactly as requested by RIDEM. The reviewer is also referred to the following response.

Please indicate how the current PRG process has addressed this area.

Response:

As a general response to the above comment, The Navy's intention is to develop PRGs that will include all limiting CoCs that substantially contribute to site-wide risk. Including the URI data, a database comprising 42 sampling locations in the harbor was incorporated into the PRG development process. In this manner, the investigation provided a broad and intensive spatial coverage of the harbor, which was designed to should identify any CoC released to the environment that would substantially contribute to risk.

Specific to the above comment, the CoCs reported in the dry dock investigation (only copper, zinc and lead were measured) were identified in PRG derivation. In PRG implementation, this potential CoC hot-spot was addressed because the area where the dry docks were stationed (indicated in Figure 4.2-8) is co-located with URI stations DSY-2 and DSY-5. By comparing the PRGs to this data, PRG implementation addressed the area. Finally, one of the high hit stations sampled by the Army is not far (less than 40 meters) from the ERA station DSY-28 (an intermediate risk station), also indicating that the area was adequately addressed in the PRG process. Hence, it is the Navy's position that the PRG process is sufficient for RIDEM's environmental concern, i.e., to identify whether contamination is high enough and covers a sufficient area (represented by polygons) to constitute an environmental concern for consideration in the Feasibility Study.

4. ***Section 2,2, Aquatic PRG Derivation:***
Page 8.

This section of the report indicates that EPA WQC values were used in the PRG development. Please be advised that RIDEM WQC values are used throughout this State. Therefore, in order to be consistent, RIDEM's WQC values must be used in the PRG derivation process.

Response:
The Navy concurs that RIDEM WQC are ARARs for surface waters. RIDEM has not provided the requested documentation that State WQC are ARARs for sediment. Other trustees have formally stated their opinion on this issue (i.e., WQC are not ARARs for sediment porewater). The Navy still awaits RIDEM's legal determination. In order to keep the process moving forward, the Navy must assume that a lack of such documentation by RIDEM in response to the Navy's request indicates concurrence with the Navy's approach. Until such documentation is provided, the Navy will maintain consistency with the EPA WQC values used in the ERA for purposes of PRG development.

5. ***Section 2,2 Aquatic PRG Derivation:***
Page 8.

This section of the report states that an EqP model was used to estimate the porewater concentrations using TOC sediment concentrations at each location. It is routine to check the *validity of a model by comparing the model output to actual porewater concentrations. In this case the porewater concentrations predicted by the model may be compared to known results. This comparison was not found in the report. As this is a necessary step in the PRG process, please indicate which section of the report contains this comparison.*

Response:
The Navy does not concur that site-specific Kow derivation is a necessary step in the PRG development process. The RIDEM is of course aware that the requested predicted vs. measured porewater comparison is not contained in the report such that the section reference cannot be provided, since such analysis was not needed because partitioning coefficients used in the calculation were agreed upon as being suitable for prediction. The Navy has forwarded the Kow values to RIDEM and has assumed concurrence by RIDEM since no objections were raised. NOAA also evaluated the data with assistance from EPA-Narragansett and concluded that the values were appropriate. In order to keep the process moving forward, the Navy must again assume that a lack of comment by RIDEM in response to documentation submitted at RIDEM's request indicates concurrence with the Navy's approach.

6. ***Section 2,2, Aquatic PRG Derivation:***
Page 8.

This section of the report refers to sediment benchmarks. This report is a public document and as such these benchmarks as well as any other referenced material should be included. In addition, in the final analysis, the PRG values should be included in a table with the aforementioned benchmarks.

Response:
NOAA ER-L sediment benchmarks used for derivation of Water Quality Screening Values in Table 4 will be included in the table and referenced appropriately in the revised document.

7. ***Section 2,2, Aquatic PRG Derivation:***
Page 8.

This section of the report discusses the biotoxicity test conducted at the site. The report is a public document and it should indicate whether a biotoxicity test was conducted at each location where a chemistry sample was collected, i.e. whether only one type of sample (chemistry) was collected. If this is not the case the report should include a discussion to address this issue.

Response:
The following sentence will be inserted into p. 9, Par. 4 " An amphipod and sea urchin biotoxicity test was conducted at each location where a bulk sediment or elutriate chemistry sample was collected, respectively."

8. ***Section 2,2, Aquatic Derivation:***
Page 10.

This section of the report has compared the results of the biotoxicity test in the evaluation of whether contaminated sediment represents a threat. In numerous meeting this Office has indicated that due to variability in biotoxicity test and sampling, the biotoxicity test may be used as an indicator of contamination. It <u>cannot</u> be used as a stand-alone test in the determination as to whether contaminated sediments represent a problem. The PRG document has used the biotoxicity test to discount contaminated sediments. The biotoxicity test performed at the site *would not have sufficient rigor to meet this task and should not be used as such. Please modify the report accordingly.*

Response:
The Navy concurs that the biotoxicity test should not be used as a stand-alone test in the determination as to whether contaminated sediments represent unacceptable risk. By similar logic, sediment chemistry also cannot be used as a stand-alone test, or any other indicator for that matter. Still, the selected toxicity tests were agreed upon as assessment endpoints whose responses were intended to adequately represent and protect benthic species. A WoE approach is used in the ERA to provide multiple lines of evidence linking exposure with effects such as toxicity to increase the certainty in the determination that sediment associated CoC are responsible for any observed effects.

9. Section 2,2, Aquatic PRG Derivation:
Page 10, Paragraph 2.

This section of the report appears to state that the No Observable Effect Quotient represents the highest concentration of contaminants for which adverse affects are unlikely. As stated, this method does not appear to be conservative, in that instead of using the lowest or average concentration of a contaminant that does not produce an adverse affect, the highest concentration of the contaminant is used. This approach is normally not used in assessments of this nature. Please clarify how No Observable Effect Quotients were developed.

Response:
The statistical method for deriving the NOEQ is clearly outlined in the PRG document (Section 2.2, p.9-11) and has been presented at several earlier EAB meetings. This is the same process as used at McAllister Point and Allen Harbor. The Navy believes the approach is appropriate for PRG development and has gained RIDEM concurrence on the method at other sites, (presumably by the same RIDEM reviewers), with highly comparable assessment endpoints and exposure pathways. The conservatism of the approach is demonstrated by the comparability of the NOEQ estimate with WQC values. In addition, the Navy believes its calculated PRG values are highly conservative as demonstrated by favorable comparison against correlative benchmarks (e.g., NOAA values). Hence the Navy rejects RIDEM's assertion that the procedure is not sufficiently conservative.

In considering RIDEM's comments, however, and as stated at the EAB meeting, the Navy understands that the intent of the comment is directed toward resolving the disconnect between calculated PRGs and risk assessment findings. The Navy has further evaluated the procedure/data and has proposed modifications of PRG process believed to be the root cause of the discrepancy (see also Attachment A of this response summary).

10. Section 2,2, Aquatic PRG Derivation:
Page 10, Paragraph 1.

This section of the report discusses the use of the bioassay in the determination of whether sediments at the site were contaminated. As previously stated this is beyond the function of a biotoxicity test. Furthermore, a host of other tests were performed in addition to the biotoxicity test. Therefore, please modify the report such that the emphasis is not placed upon the biotoxicity test.

Response:
The referenced paragraph discusses the segregation of toxicity data into toxic and non-toxic data sets and matching of results with co-located chemistry measurements. To address RIDEM's comment, new text introducing the paragraph will be added as follows:

"For the Derecktor Shipyard ERA, the selected toxicity tests (amphipod survival, sea urchin development) provided two assessment endpoints whose responses represent benthic species. Because the primary function of a biotoxicity test is to determine whether CoCs in site sediment are bioavailable at toxic concentrations, biotoxicity responses will be used in PRG development to identify those CoCs most likely to be contributing ecological risk at the site. The additional benthic measures, including benthic community structure, bivalve condition, and P450 activity in fish which were also investigated in the ERA will be incorporated into the PRG development process through comparison of candidate PRGs to risk assessment findings."

The Navy requests concurrence that the above text provides proper emphasis on the use of biotoxicity data for PRG development.

11. ***Section 3.1, Implementation Methods:***
Page 18.

This section of the report discusses the derivation of the contaminant polygons. In this endeavor the results of the URI study were employed. This sediment depth used in this study was 0-2 cm. As a result they may be inappropriate for the derivation of contaminant polygons.

Response:
The Navy would concur that the vertical contamination distribution is a relevant factor in the acceptability of URI data (measured 0-2cm) for the present PRG development. The Navy will perform an analysis of data comparability between URI and ERA data sets to confirm (or reject, if necessary) that the data are sufficiently comparable to meet the data requirements for PRG development. This analysis will be provided in the revised PRG document.

12. ***Section 3.3, PRG Assessment:***
Page 19.

This section of the report summarizes the PRG assessment. As indicated in the cover letter there is a disconnect with the findings of the Ecological Risk Assessment and the PRG document. This disconnect is clearly demonstrated for sampling station 27. The Office recommends that station 27 be evaluated in an effort to resolve this problem.

Response:
The commentor is asked to refer to Attachment A of the response summary.

Attachment D
Responses to Comments Received From NOAA dated April 20, 1998
Preliminary Remediation Goals
Derecktor Shipyard/Coddington Cove

Note: The Navy has revised aspects of the PRG process, specifically relating to the treatment of elutriate testing results for evaluation of a resuspended sediment exposure pathway. This revision will most likely alter the list of Limiting CoCs and associated PRGs. Please review Attachment A of the response summary.

G1. *The method for developing PRGs at the Derecktor Shipyard/Coddington Cove is consistent with that used at the McAllister Point Landfill, and thus the same comments made in regard to this approach for the McAllister Point Landfill still hold true. NOAA's earlier concern that this method may result in PRGs that are too conservative may not be accurate, rather it appears the approach may not, under certain circumstances, be conservative enough. Specifically, in comparing the proposed PRGs for o,p'-DDE and dibenz(a,h)anthracene to their ERLs and ERMs (Table 2), it can be seen that the PRGs for both compounds are much greater than the ERM concentration, indicating that there is a potential for impacting aquatic biota.*

Response:
In general, the Navy does not support the adoption of NOAA ER-L/ER-M as cleanup goals, nor does Long et al., recommend that they should be. It should also be noted that there is a range of uncertainty around the ER-M as a predictive threshold. Long et al. Study did identify effects for p,p'-DDE in 12 of 24 cases when sediment values exceeded the ER-M. Hence, even at the "probable" effects concentration, there is only a 50/50 chance an effect should be expected. For dibenzo(a,h)anthracene the Long et al. study did identify effects 16 of 24 cases when sediment values exceeded the ER-M. In the DSY ERA, only one sediment (DSY-27) exceeded the p,p'-DDE ER-M (by a factor of two), and although this station was found to be toxic to amphipods, the sediment was also high in a number of other constituents that likely contributed to the toxicity. Hence, there does not exist extensive evidence that DDE is a primary risk driver for the site. Similarly, for dibenzo(a,h)anthracene, only one sediment marginally exceeded the ER-M and this sample was non-toxic to amphipods. Thus it is not likely that substantial risk reduction would occur if the PRG for dibenzo(a,h)anthracene was set at the ER-M concentration. Instead, it should be expected that a PRG higher than the ER-M should be adopted in order to obtain true risk reduction.

G2. *This approach, although accounting for site-specific conditions and based on sound principles, does not take into account the uncertainty in extrapolating from sediments to porewater concentration using EqP theory. A major disadvantage of EqP is that it attempts to predict bioavailability based solely on the physical and chemical interactions of sediments and their associated chemical constituents. Although the authors did pair sediment toxicity tests with the predicted porewater concentrations to better define the potential toxicity of the sediments, some discussion should have been provided on the uncertainty associated with their approach, particularly in light of the fact that the PRGs that are being proposed are substantially greater than the ERM values for o,p'-DDE and dibenz(a,h)anthracene.*

Response:

The Navy disagrees with the stated disadvantages of EPA's model for derivation of sediment quality criteria. In fact, the disadvantages listed are the primary advantages of the approach; true chemical bioavailability is being addressed and found to be more predictive than reliance on correlative criteria based on a limited number of investigations. The above discussion of relevance of ER-Ms in relation to site chemistry is a case in point which points out the weakness of ER-M values for use in more than screening applications.

G3. *Although sediment toxicity test data are useful, they do not always provide the type of information needed, particularly at those site contaminated with low concentrations of chemicals that biomagnify through the food web, such as o,p'-DDE. Benthic macroinvertebrate data, for example, could have been used to strengthen the sediment toxicity data and may have provided some indication of the possible effects of long-term exposure to sediments of Coddington Cove.*

Response:

The Navy would concur that additional discussion of the merits of recommended PRGs in relation to the Weight of Evidence presented in the ERA supporting the risk determination for the site should be provided. Note again that the PRG list is likely to change as a result of reviewer comments outline in the attachment.

G4. *On page 20 of the document, the authors make the argument that o,p'-DDE should not be adopted as an aquatic PRG due to the fact that virtually all of the apparent TEV exceedances were due to concentrations measured in elutriate samples, while in only one instance did the porewater-based concentration approach the TEV value. Although not discussed in the document, it is assumed that the argument the authors are trying to make is that undisturbed, bedded sediments will not be subjected to the vigorous disturbance needed to produce elutriate samples, thus it is unlikely that sediment-bound constituents would be released to the porewater. This may be true, but one consideration that the authors fail to mention is that benthic organisms exposed for long periods of time to very low concentrations of chemicals that biomagnify may accumulate significant concentrations of these chemicals in their tissues. These organisms will then be preyed upon by higher trophic level organisms, so that chemicals may move through the food web. Unless the authors can provide a stronger argument to indicate that o,p'-DDE is unlikely to biomagnify, it is recommended that a conservative approach be adopted and o,p'-DDE be retained as an aquatic PRG.*

Response:

As discussed above, the relevance of sediment resuspension as an exposure pathway will be more directly addressed in the revised PRG document. With respect to the biomagnification issue, it is of course known that DDE is among those chemicals which can biomagnify in food chains. However, with respect to the exposure pathways evaluated in the ERA, the only relevant biomagnification pathway addressed was that for avian predators. The bioaccumulation factor of DDE in receptors of concern for the present investigation is approximately 3.9 using the BSAF model, and no effects of food chain status among infaunal, epibenthic, scavenger or benthically coupled fish were discernible (ERA Figure 6.3-2). In addition, the WQC value of 1 ng/L (adopted from DDT was derived based on protection of impacts on birds via biomagnification. The aquatic effects concentration is likely to be far higher (for example, the LC50 for DDE effects on Ampelisca was 1.66 ug/L (acute), or 1000x higher than the benchmark adopted for the present investigation. Hence, there is considerable evidence that risks due to DDE because of biomagnification are being adequately addressed with the present PRG process.

G5. *One general issue with the document is the fact that raw sediment data were not presented only calculated porewater concentrations. In its present form, readers must take on faith that the authors have correctly calculated the sediment porewater concentrations.*

Response:
Appendix Tables including the raw sediment data will be included in the revised report.