



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

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NCBC DAVISVILLE
5090.3a

February 15, 1996

Mr. Philip Otis
U.S. Department of the Navy
Northern Division - NAVFAC
10 Industrial Highway
Code 1811/PO - Mail Stop 82
Lester, PA 19113-2090

Re: Draft-Final IR Program Site 09, Phase III Remedial Investigation (RI) Report, January 1996, Former Naval Construction Battalion Center, Davisville, RI

Dear Mr. Otis:

Please find attached the Environmental Protection Agency's (EPA) comments on the above referenced document.

I look forward to working with you and the RIDEM to produce a draft-final RI. Please contact me to set up a meeting to discuss the Navy's responses to these comments at (617) 573-5736.

Sincerely,

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

Attachment

cc: Richard Gottlieb, RIDEM
Walter Davis, NCBC
Tim Prior, USF&WL
Ken Finkelstein, NOAA
Andy Beliveau, EPA
Bill Brandon, EPA
Jayne Michaud, EPA
Scot Gnewuch, ADL
Nick Lanney, EA



EPA COMMENTS ON DRAFT FINAL PHASE III RI-SITE 09

General Comments

1. Overall, the Navy has sufficiently answered the questions pertaining to the ground water flow beneath Allen Harbor (via MODFLOW modeling). However, some questions pertaining to the contaminant transport (RAND3D modeling) remain. The initial questions pertaining to the contaminant transport were basically as follows:

1. What surface water concentrations have resulted from ground water, beneath the landfill, discharging to Allen Harbor?
2. What sediment concentrations have resulted from ground water, beneath the landfill, discharging to Allen Harbor?
3. What would the maximum sediment concentrations be that would result from ground water beneath the landfill discharging to Allen Harbor if the ground water were allowed to continue leaching?

The first question appears to have been sufficiently answered. The Navy has indicated that ground water discharging to the surface water of Allen Harbor does not produce significantly high concentrations.

Although the information appears to be available from the modeling, it is not completely clear that questions 2 and 3 have been sufficiently answered. A table should be provided that answers to these questions by presenting what could be referred to as "present sediment concentrations", and "future sediment concentrations" that result from ground water discharge to Allen Harbor. The answers for question 2 would be obtained from the modeling results of the 30 year simulation and/or similar calculations to those presented in Section 5.6 where present day ground water concentrations could be used to calculate (using a K_d) sediment concentrations. The answers for question 3 could be obtained from the results of the modeling conducted to determine present day mass contaminant flux. However, it should be kept in mind that the sediment concentrations associated with the present day mass flux represent only one instance in time and that chemicals would accumulate in the sediments over time.

2. In addition, it is also not certain at this time that a complete list of appropriate contaminants was modeled. This will not be known until the revised Ecological Risk Assessment for Allen Harbor is submitted, and the associated revised list of contaminants of concern (COC). Once the list of COCs is completed, all compounds should be included when answering the above questions. Therefore, the EPA cannot agree with the Navy's conclusion that there is no threat to the environment from the groundwater at this site.

3. In general, a reasonable conceptual model of the site has been formulated on the basis of hydrologic and water-quality data, (see following comments on peat and metals). The numerical model of the site yields reasonable fluxes of ground water to Allen Harbor and the wetland west of the site. Calibration of the model using a transient approach enhances confidence in the results. Major uncertainties, as discussed in the report, relate to the distribution of ground-water discharge to Allen Harbor. Discharge of most of the shallow ground water (layer 1 of the model) at or near the shoreline is reasonable. The major uncertainty relates to the distribution of discharge from deeper layers (layers 2 and 3 in the model). The distribution is controlled mainly by the vertical hydraulic conductivity of sediments under the harbor. The approach used, which was to extend the values of vertical conductance determined by model calibration in the landfill area into the harbor, is reasonable. Nonetheless, as explained in subsequent comments, it may be advisable to conduct a limited sensitivity analysis on these values (i.e. vary V_{cont} within reasonable limits; see comment 26, below).

4. Peat Layer: EPA acknowledges the Navy's inclusion of Figures 3-8 and 3-9 which present penetration and elevation data for peat units encountered in the subsurface beneath the landfill and adjacent harbor and wetland areas. On the basis of this data, EPA's analysis concludes that considerable ambiguity still exists concerning the following:

- a) The lateral and vertical extent of the peat units, particularly the thickness of the seaward extent of the deeper peat layer penetrated at locations D5 and D6.
- b) The degree of connection between the shallow peat layer which fringes the site shoreline and the peat encountered at locations D1 and D2 within the channel south of the site.
- c) The physical properties of the peat which may be relevant to ground water flow and/or contaminant transport such as hydraulic conductivity, contaminant attenuation properties (e.g. per cent organic carbon, etc.), including the variability of these types of parameters.

EPA continues to contend that this issue is highly relevant to the RI/FS and as such bears further scrutiny. At this point in the process, modeling presents the best means of reducing the degree of uncertainty presented by these data. In this respect, several modeling runs will need to be prepared in which the peat extent, thickness, hydraulic properties, and contaminant attenuation factors are varied within reasonable limits. A scenario where peat is absent (i.e. "normal" silty substrate) might represent a suitable "base case" from which one could draw comparison to the other scenarios.

5. Approach for modeling fate and transport of metals: The Navy has acknowledged that it is difficult to model the environmental fate and transport of metals. Behavior of metals in ground water is a function of many factors which include pH, Eh, dissolved oxygen, COD, BOD, partitioning, attenuation, colloidal transport, cosolvency effects, etc. The Navy also

acknowledges that various chemical-induced and bio-induced transformations may serve to alter the solubility/mobility of various chemicals in the environment.

EPA generally concurs with the difficulty involved in accurately modeling fate and transport. However, EPA has specific concerns regarding the approach used to model metals migration from the landfill to Allen Harbor. Specifically, the approach used does not include the "mobilization" potential of certain metals (e.g. arsenic) which commonly occurs in conjunction with biodegradation of various organic chemicals including chlorinated VOCs. This is particularly pertinent in that the modeling has demonstrated that a chlorinated VOC plume, including degradation products, extends from the landfill some distance beneath the harbor. In this context, EPA questions the validity of applying the "source term" concept for the metals contamination. Metals occur ubiquitously within the natural aquifer materials and sediments and would thus not be appropriately modeled the same way as TCE, for example, which clearly has a "source term" within the landfill boundaries. In this conceptual framework, one would expect metals to be mobilized from the native aquifer materials along the entire length of the contaminant plume, or at least significant portions of it. These arguments suggest that the Navy needs to reexamine the approach used for the contaminant transport modeling, particularly as it relates to the metals.

6. Please provide all input files for the contaminant transport model RAND3 in the appendices, as we requested for, "...each model run(s) used in the report and provide a reference as to where in the report each run is discussed...", in the EPA comment letter from Christine Williams to Phil Otis dated October 12, 1995.

7. This document is an improvement over previously submitted versions but still lacks continuity, specifically in the acetone issue and in the site specific data/modeling results of impacts to sediment and to surface water from groundwater.

8. The RI indicates that shallow groundwater is definitely reaching Allen Harbor through a relatively direct route. The solvents in the other landfill layers have probably migrated under the harbor. The document mentions that there is some potential for a vertical component to the ground water flow. The document acknowledges that the chlorinated volatiles are biodegrading and are forming smaller more volatile, more mobile, and less dense compounds. These compounds may rise to the surface over time and may be another component adding to the volatile compound concentrations entering the harbor directly. The document should include the possibility that this may happen. This document should state that the ecological risk of these volatiles will be discussed in a later document.

9. Use of the term "Potentiometric" is preferred to the outdated term "piezometric".

10. *Editorial Comments*

Please spell check the report and correct punctuation and syntax errors.
Report uses both "ground-water" and "ground water".

Specific Comments

11. Table of Contents; Section 6.2.1.4; Text is missing.
12. Pg. ES-4, ¶ 4; "trace of little silt" ?
13. Pg. ES-6, ¶ 2; Does layer 3 ground water generally flow to the south or the southeast ? Presentation is unclear.
14. Pg. ES-7, last ¶; "feet feet".
15. Pg. ES-8, ¶ 2; Data may or may not indicate an "increasing trend" for VOCs in ground water between this data set and previous ones. Nonetheless, data from the phase III data set show a clear concentration gradient of VOCs from the landfill to the harbor, which is consistent with the conceptual model for the site. For example, MW09-07D, MW09-14D, and MW09-09D indicate a concentration gradient for vinyl chloride (20,000 ug/l @ -07D; 2000 ug/l @ -14D; and 110 ug/l @ -09D) which is consistent with a source area near MW09-07D, and discharge toward the harbor.
16. Pg. ES-12, 1st ¶; Source term approach may not be appropriate for metals. (See previous comment)
17. Pg. 2-1, Section 2.1.2. the list of data gaps presented appears to be incomplete. For example, data for the glacial till aquifer was a clear data gap left from previous studies, yet it is not mentioned here.
18. Pg. 2-2; The techniques listed for DNAPL identification do not identify residual DNAPL, which is more likely to be present at a site with these characteristics than "pooled DNAPL". As such the text is misleading because it overemphasizes the "pooled" DNAPL.
19. Pg. 2-11; ¶ 3; The fact that the wells recharged at a rate which "appeared not [to] cause ground water to vigorously cascade down the inside of the screen," does not demonstrate that the sampling effort was successful in approximating low-flow sampling procedures via the "modified lowflow sampling technique."
20. Pg. 2-12; Hydrological Testing; What injection pressure (max) was used to attempt the packer testing ?
21. Section 3; A table should be which summarized the K values used as input for the model so the reader can easily compare to the values presented in Tables 3-4A through 3-9.
22. Page 3-1, ¶ 3; The topographic elevation discussion is a good addition to the text. It would be useful to add one sentence which describes the elevation of the upland areas to the west of the wetlands west of the site.

23. Page 3-4 through 3-6, Figures 3-8 and 3-9; Peat Layer: The Navy has adequately presented the existing data concerning the configuration of the peat layer. Nonetheless, substantial data gaps and ambiguity persist. As such, multiple interpretations can be offered which explain the data. Further, EPA's current interpretation of the data contains slight, yet significant differences from the one offered here by the Navy.

First, EPA does not concur fully with the description of the peat as "very discontinuous". The unit is certainly not continuous across the site, yet some generalities can be made. For instance, in general, the peat unit which occurs proximal to the site is at elevations ranging "from about 2-3 feet above MSL along Sanford Road to about mean sea level to 3 ft below MSL along the east side of the site." EPA interprets this peat to be a shallow peat layer ("shallow peat layer"), as opposed to a deeper peat unit ("deep peat layer") which is present beneath the harbor. This shallow peat is generally present along the southern, eastern, and western margins of the landfill area. With some exceptions, the shallow unit nearly continuously fringes the landfill in these areas, and even appears to extend beneath the shallow channel to the south of the site as indicated by borings D1 and D2. Data irregularities, such as the example provided for MW09-20I, PZ-2, and SP-2 (peat detected in MW09-20I but not at PZ-2, SP-2) could be explained by inconsistent sampling depths, poor recovery, etc. Such problems would be exacerbated by the lack of thickness of the peat which is reported to be as little as 2 inches thick (The Navy's explanation for the variability, due to the landfilling operation, is also valid). Nonetheless, the shallow peat unit does not appear to extend seaward to any significant distance beyond the landfill perimeter and as such is probably not exerting any great effect on shallow groundwater discharge distribution patterns in this area. The exception to this occurs in the channel area south of the landfill where borings D1 and D2 suggest that peat is continuous in this area and thus may be exerting an influence on ground water discharge here.

EPA is also concerned with the deeper peat unit which was penetrated by borings D-5 and D-6. The Navy acknowledges that this may represent a deeper unit with top-of-peat elevations ranging from 11.1 to 13.3 feet below MSL at D-5 and D-6, respectively. It is clear that the deeper unit does not extent beneath the landfill itself. However, the distance between D-5 and D-6 is over 300 feet, which if continuous, suggests a substantial area is underlain by peat. Beyond this, there is simply insufficient data to draw any conclusions as to the lateral and vertical extent of the deeper peat (The Navy's interpretation of the D-7 through D-10, and D-14 borings represents but one of many interpretations of the data). EPA is concerned that a deep peat unit of these dimensions, or greater, depending on it's hydraulic and contaminant attenuation properties, could play a significant role in relation to both groundwater discharge from deeper layers (i.e. layers 2 and 3) as well as the resulting contaminant fate and transport.

24. Pg. 3-9; Language should be included here as well as other portions of the text which relate the layer designations used in the model to the geological zones targeted by the drilling conducted for this investigation. For example, Layer 3 is described here as "the till unit", whereas earlier discussions (e.g. page 2-2) discuss this zone as the "lower portion of the gray silt unit". These designations apparently refer to the same thing in some cases, yet not

always. It is EPA's preference that the till unit be described as "the till unit" at all appropriate places in the text. Please clarify.

The next to the last paragraph on that page that distinguishes between flow in confined and unconfined aquifers is not clear. For both types of systems, flow is in response to hydraulic gradients. The discussion about hydrostatic pressure and its relation to tidal efficiency is not clear

25. Chapter 3, page 18, item 12.

Clarification is needed as to why the small stream along the southwest corner of the modeled area is not connected to layer 1. The justification provided is not sufficient and does not consider other evidence. For example, groundwater flow maps indicate the general flow from the northwest to the southeast, from the site to the stream. This is further substantiated with the fact that, along this stream in the vicinity of MW5, the same contaminants which were detected in the groundwater/subsurface at elevated levels, were also found in the stream sediments at LANDS and SD9. Therefore a direct discharge from the landfill layer 1 seems to be intuitively obvious.

26. Chapter 3, page 18, item 6

In EPA comment #11 transmitted by a letter from Christine Williams to Phil Otis dated January 17, 1996, subject: Revised Response to Comments Document for Comments on the Revised Draft IRP Site 9, Phase III RI Report (August 1995), Dated 27 December 1995, Former NCBC, Davisville, RI, EPA requested the Vcont be raised and lowered by 1 order of magnitude in order to assess the effects of the higher and lower values on modeled groundwater flows and resulting contaminant fluxes. The Navy responded by varying the Vcont between 0.0011 and 0.0019 l/day. This is insufficient. See comment on Section 3.7.8.8.

27. Chapter 3, page 21.

The first line on this page refers to "water use data". It is not clear what is meant by water use.

28. Chapter 3, page 24.

It is not clear if negative differences reported in the last paragraph on this page indicate that the simulated heads are lower, on average, than measured heads or if measured heads are lower. Clarification is needed.

29. Chapter 3, page 28, section 3.7.8.3.

Although not stated, it is assumed that density contrasts between seawater and freshwater do not affect ground-water flow. The effects of this contrast could have been simulated by converting heads in the harbor to freshwater heads. For example, in places where the harbor is 10 feet deep, the equivalent freshwater head would be about 0.25 foot above sea level. This adjustment might have caused somewhat higher simulated heads in layers 2 and 3 and might have caused somewhat higher discharges near the shoreline than was

shown in the report. However, the difference would be small relative to other uncertainties. Nevertheless, it is worth stating that the effects of density were assumed to be negligible.

30. Pg. 3-28, Section 3.7.8.8; See also Sections 3.7.8.5.1 through 3.7.8.8 and figures 3-34 and 3-35; Text acknowledges that hydrogeological data for layers 2 and 3 to the east of the landfill contains some uncertainty. EPA feels that it would be appropriate to vary the V_{cont} values used for model input beyond the narrow range used (suggest raising and lowering V_{cont} values by one order of magnitude). This would serve to simulate scenarios where hydrologic conditions result in ground water discharge from layer 2 to the harbor, which may not be dispersed in the "linear" manner depicted on Figures 3-34 and 3-35. This current scenario may be artificially dispersing the modeled contaminant fluxes over a wider area. A worst case should be included which simulates discharge of all ground water (from all layers) to a narrow zone proximal to the shoreline. Fate and transport modeling should then be re-run based on these resultant ground water fluxes.

31. Chapter 4, Section 4.2, page 1 and in the executive summary.

The new text on the source of solvents in the landfill is confusing and should be rephrased for clarity. As stated, there is no specific documentation on solvent disposal, so the information provided seems to be speculative. Please clarify--is the historical practice of burning solvents to dispose of them based on anecdotal evidence or the best approximation of what might have occurred at this site?

In the last sentence, change 'are' to 'area'.

32. Chapter 4, Section 4.5.1.5 in general.

The revelation that acetone was found as a contaminant in the isopropanol(IPA) used for decontamination of the soil sampling equipment and that the sampling was performed in the winter conditions explains why there was large quantities of acetone found in some of the soil samples. The concentration of 42 ppm may be conservative as IPA breaks down in sunlight/ Ultraviolet light to form acetone. Residual IPA on the split spoons would not evaporate but would break down if left out to dry in the sun. The text states that the concentrations of acetone in the soils do not correlate with those found in corresponding groundwater samples. We agree that there should be a correlation.

One issue that is not noted in this document is whether the data presented for acetone was validated using the blank action criteria (10X) for the highest value of all (Trip blank, field equipment blank, method) blanks associated with the individual samples. The text states that rinsate (equipment) blanks contained significant quantities acetone, toluene, xylene, and trichloroethylene. However, since the blank concentrations for acetone were multiplied by 10, many of the samples were considered undetected. Many of the acetone detections have (J) flags noted in the tables. However these results were frequently estimated due to poor calibration -- most often due to relative standard deviation (RSD) of the initial calibrations greater than 30%. The document must once and for all resolve whether acetone is or is not real.

In two validation memoranda reviewed, the validation was performed correctly and correctly documented in the worksheets, validation memoranda, and data summary tables but incorrectly summarized in the recommendations summary tables. Please check all of the validation recommendations summary tables for consistency.

33. Chapter 4, section 4.6.2.3 in general

Many wells show little or no petroleum hydrocarbon (BTEX) contamination. This fact may be due to the analytical sample dilution required to quantitate the very high levels of chlorinated solvents. The fact is there is no way to determine the levels of BTEX in these samples but the BTEX is probably there. The Marine ERA has identified unacceptable ecological risk in the southern end of the landfill near where the higher levels of BTEX were found in ground water.

34. Chapter 4, Section 4.6.3 in general

The Navy should include a discussion of the leachate seep sampling results in this section. Although the samples were turbid from the slow flowing seeps, the Navy should provide a discussion of all previous ground water data collected.

35. Chapter 5, page 5, Section 5.1.2.3 and pg. 5-27, ¶ 2 (environmental fate)

The Navy's treatment of the environmental fate of metals does not consider the mounting weight of scientific evidence which supports the "mobilization" of certain metals (e.g. arsenic) resulting from a change in oxidation state of the metal accompanying biologically mediated degradation of various VOCs, including chlorinated VOCs.

36. Chapter 5, Section 5.1.6.3 & 5.1.6.4 in general

Since acetone is an artifact of the sampling process then there is no reason to believe that there is any potential cosolvency issues. Without the presence of acetone in soil or groundwater the cosolvency discussion can be removed. One should note that the use of naphthalene as an example of cosolvency with acetone instead of using TCE may not be a concrete argument. Naphthalene is a solid and must first be dissolved in some manner to enable the test to be performed. If the test compound is first dissolved in acetone then that solution is introduced into water, more compound of concern can be solvated into the water. If the acetone is mixed with the water first and then the compound of interest is introduced into the acetone/ water, less of the compound can be introduced. How the cosolvency tests were performed is not known. TCE is a liquid and can easily be dispersed in acetone or water thus it may have a greater potential for cosolvency (especially if it were mixed with acetone first). For NCBC purposes TCE would have been a better choice for testing.

37. Chapter 5, Section 5.2.2, Ground water

Density, salt vs fresh, should have been added as a pertinent ground water criteria, however, as was noted in our discussion for section 3.7.8.3, a more qualitative discussion may be added at this point in the process.

38. Chapter 5, Page 22, last paragraph

The references, SRC 1995, and Howard 1990, are not provided in the reference section. These are essential since their citation implies that the metal K_d values were obtained from these references. Either the references, or both the references (if they do not sufficiently explain how K_d was obtained), and an explanation regarding how the K_d values for metals were obtained, must be provided. Actual factors that produce the retardation of metals during transport, such as cation exchange capacity, pH, redox potential, solute and ligand concentrations in the water etc., should be also described, and how they were utilized to estimate a K_d .

39. Tables 5-7 and 5-18.

It is not apparent why the K_{oc} values reported in table 5-18 are different than the values reported in table 5-7. The K_d values for arsenic and zinc appear to be reversed in the two tables. All calculations need to be double checked using the appropriate value of K_d .

40. Table 5-18

It is not clear what value for $1/n$ was utilized in these calculations. If n is assumed to be 1, then the calculations are incorrect.

41. Chapter 5, page 24 and table 5-8.

It is not obvious why the simulated concentration of vinyl chloride that discharges vertically is so much higher than concentrations in layers 1,2, and 3. An explanation would be helpful.

42. Table 5-9; A direct calculation method was used to compute mass fluxes to Allen Harbor, as summarized in Table 5-9. The table summarizes the flow-averaged concentrations and total fluxes for layers 1 and 2 in the model. However, it would be helpful to know how the concentrations and fluxes are distributed along the length of the landfill. A map or table that summarizes concentrations and fluxes between the landfill and harbor area along the length of the landfill would help identify areas of concern if all of the ground water flowing toward the harbor were to discharge at the boundary between the landfill and the harbor, which is a worst-case situation.

Further, what if the fluxes summarized in table 5-9 were to discharge at a single 60 ft by 60 ft node (a nearly worst-worst case). Would there be a problem?

43. Chapter 5, Page 26, Section 5.3.6 in general

It is unclear why the 30 year simulation was conducted. The fundamental questions that the modeling was attempting to be answered are included in the text on page ES-12, but should be reiterated at the beginning of this section. In addition, it is not clear why only seven compounds were simulated. No rationale is provided regarding how these particular seven were chosen. The simulated compounds should have been chosen on the basis of ecological risks. That is, what compounds are, or could potentially be, posing a risk to the environment.

44. Chapter 5, Page 27, second paragraph

Retardation coefficients of 270, 440, and 1500 are reported for arsenic, copper, and zinc respectively. How were these determined, and are they relevant to the site conditions observed at Allen Harbor landfill. Please clarify text.

45. Chapter 5, Page 27, Section 5.3.6.2; Source Term, and page 5-34 Section 5.5: Potential Harbor Sediment Concentrations;

The approach used by the Navy for estimating metals concentrations in harbor sediments due to ground water migration is not complete. Particularly, the "source term" approach for metals does not allow for the possibility that naturally occurring metals such as arsenic may be mobilized from native aquifer materials by processes such as biodegradation of VOCs. In other words, the VOC plume(s), which extend beyond the landfill perimeter, are likely to be undergoing degradation in conjunction with migration via ground water. These processes may be mobilizing metals from the aquifer matrices which would not be accounted for by the metals added as "source term". As a result, the resulting sediment concentrations reported by the Navy may be too low. The Navy must revise the modeling effort and provide copy of the resulting model runs in tabular and graphic outputs.

46. Chapter 5, Page 33, Section 5.4 in general

This section seems to leave the conclusions out. The comparison of the resulting fluxes to the appropriate criteria made during the December 13, 1995 meeting at NCBC was not referenced in this section. At a minimum, the Navy should include a table and a figure in the RI that explicitly indicates the fluxes of the Marine ERA COCs compared to applicable criteria. Additionally this discussion must be included in the revised Marine ERA.

The modeling for the contaminant transport appears to show a continuous flow of groundwater entering the harbor from a somewhat constant source. If unknown barrels of solvent waste were to release due to degradation of the container, then there would be another new source that would eventually find its way to the harbor through the same pathways. A new release of concentrated waste cannot be ruled out at this time, and may impact the concentrations of VOCs in the harbor. If there were further influences in the future, what would be the limit that the harbor could absorb without a toxic effect on humans or marine life? Please discuss briefly here and include a more detailed discussion in the FS. The possibility of future contamination should also be discussed in the Ecological Risk Assessment Report.

47. Chapter 5, Page 34, Section 5.5 in general

This section describes how sediment concentrations were obtained by utilizing the 30 year model simulations. Essentially, using the 30 year simulation provides for determining what sediment concentrations are currently present as a result of contaminants leaching from the landfill since their initial disposal 30 years ago. This is important information because it provides for distinguishing between that portion of the observed sediment concentrations resulting from ground water discharging into the harbor versus that portion of the observed

sediment concentration that resulted from surface runoff from the landfill. However, it is not clear from the text that the maximum water concentration was used in the calculations and the associated sediment concentrations are possibly too low. Please clarify.

48. Chapter 5, Page 34, paragraph beginning "Table 5-18"

It is inappropriate to relate the poor comparison of model results with actual samples only to biodegradation and volatilization. A number of factors could produce the discrepancy (such as sediment heterogeneity, lack of knowledge regarding the subsurface characteristics which were not accounted for in the model, the presence of peat below some of the sampling locations etc.). This statement should either be expanded to include a larger list of possible reasons, or removed completely.

49. Chapter 5, Page 35, first paragraph

The reference, Baes et al (1984) is not provided in the reference section. This reference is essential since it implies that the metal K_d values were obtained from it. As previously noted (comment above regarding Chapter 5, Page 22, last paragraph), the sorption and associated retardation of metals is very site specific and the uncertainties pertaining to the use of these cited values should, at a minimum be provided. A value calculated from site specific information would more appropriate if this calculation could be done. In addition, why are Baes et al(1984) cited here, while SRC (1995) and Howard (1990) were cited for the same information previously?

50. Chapter 6, page 5

Under Phase II Sampling, 3rd paragraph has incorrect punctuation. Is the sentence complete? Under Shellfish Sampling, capitalize the genus for each organism in order to be consistent with the way the organisms are named in the ERA.

51. Chapter 6, page 10, para.3 new text.

In order to present a fair representation of the shellfish consumption pathway risk assessment, the following sentence should replace sentence #2 (which begins with "Prior to eating..."):

"The Navy has assumed, for the purposes of this risk assessment, that shellfish consumers will sufficiently rinse and/or soak (i.e., depurate) the shellfish as part of food preparation, prior to consuming the shellfish. This type of depuration process removes sand, grit, and particulate matter."

52. Chapter 6, page 10, last para.

What are the implications of the method for converting PCB concentrations to equivalent concentrations of Aroclors? Please discuss the uncertainties and implications in Section 6.5.3.1, Sampling and Analysis Uncertainties. Discuss which of the more toxic coplanar congeners have contributed more to the risk at the site.

53. Chapter 6, page 75

In Section 5 page 3, the fate of volatile compounds in the vadose zone at the landfill is

evaluated and flux rates to air are estimated. Please explain the meaning of the flux rates in terms of the assessment of inhalation exposures to landfill contaminants during excavation.

54. Chapter 6, page 81, new text 3rd para.

Delete the last sentence; it is out of place in this section. Discuss in more detail in Section 6.5.3.4, Exposure Assessment Uncertainties. Provide the technical memo in an appendix or reference the report where the Site 9 surface soil metal results and the background surface soil ranges were statistically manipulated to determine that arsenic is not statistically elevated above background.

55. Chapter 6, page 8, last para.

Worker exposures to shallow groundwater may also include inhalation and dermal contact. Therefore, the potential for these exposures should also be discussed here.

56. Chapter 6, page 89, new text 2nd para.

Provide the reference (in the Navy's RI reports) for the non-depurated shellfish tissue data set. The comparison provided here should involve arithmetic average tissue concentrations, not geometric mean. Please clarify. Also, provide a comparison of the maximum tissue concentrations in this paragraph.

57. Chapter 6, page 89, new text 3rd para.

The comparison of averages indicates that depurated tissue had higher concentrations than non-depurated tissue--is this correct?

58. Chapter 6, page 89, new text 4th para.

In general, EPA *disagrees* with the assertion that there is a lack of reasonable basis for including non-depurated shellfish data in the risk assessment. To clarify, EPA's justification for including non-depurated shellfish data in human health risk assessments is that the depuration process, which may result in a decrease of contaminants in shellfish tissue, could result in an underestimation of risk if local shellfish consumers do not depurate the shellfish. The Navy's evaluation asserts that the average tissue concentrations in depurated and nondepurated tissues are similar; therefore, the estimated risks to consumers (who do not depurate) is likely to be a minimally underestimated.