



**Response to Comments to  
EPA Review of Phase III (Draft) RI for IR Program Site 07,  
Calf Pasture Point**

**and**

**Responses to RIDEM'S Review Comments  
Draft Phase III Remedial Investigation IR Program Site 07, Calf Pasture  
Point  
Naval Construction Battalion Center  
Davisville, Rhode Island**

**March 1997**

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**Response to Comments to  
EPA Review of Phase III (Draft) RI for IR Program Site 07,  
Calf Pasture Point**

**GENERAL COMMENTS**

**COMMENT 1:**     **Conceptual Model:** The Draft RI is generally a well-prepared and thorough document. However, an overview of the entire Site 07 database contained in this report suggests numerous inconsistencies exist with respect to ground water flow and contaminant transport. With respect to these anomalies, which are addressed in specific comments below, an internally-consistent conceptual model needs to be formulated which ties together the following issues:

- A general three-dimensional representation of ground water flow;
- The general nature of ground water/surface water interaction;
- Salinity issues;
- Potential for multiple source areas;
- Adequacy of the monitoring well network with respect to assessing the viability of intrinsic remediation (IR) at the site.

**RESPONSE:**     Refer to Section 4.7 (Site Conceptual Model).

**COMMENT 2:**     **Nature of Ground Water/Surface Water Interaction:** The mechanism(s) and locations of ground water discharge to surface water, and how they relate to contaminant transport, are not well understood on the basis of the current Draft RI. This is a significant item which needs to be addressed first at the conceptual level (See General Comment 1, above). After a viable conceptual model is formulated for the site, additional explorations/sampling (e.g. borings, piezometers, push-point samples, EM logging, monitoring wells, etc.) may be required in the local discharge areas. Sampling in these areas will serve to confirm/refine the conceptual model. Risk assessment sampling locations for the various media evaluated in the HHRA and ecological risk assessments (e.g. marine organism tissue, intertidal sediment, etc.) will need to be checked in order to confirm their appropriateness relative to the actual discharge locations, once they are established. Limited additional sampling of the various media needed to support the risk assessment may be required. Needless to say, this may impact the risk values, but selection of an appropriate remedy requires a greater level of

understanding (less uncertainty) in the critical areas of contaminant discharge.

**RESPONSE:**

Please refer to the updated Sections 3.7.5.2 ("Interpreted Ground-Water Flow Direction, Evaluation of Impacts from Saline/Salt-Water Wedge), 4.6.1.4 (Salinity), 4.6.2.3 (Phase III RI, VOC in Ground Water), 4.6.3.3 (Phase III RI, Metals in Ground Water), and 4.7 (Site Conceptual Model). These sections indicate that the ground water beneath the site appears to discharge to the adjacent surface water bodies over a broad area in the zone located within a few hundred feet of the site shoreline. The samples collected offshore from Site 07 for the Marine Ecological Risk Assessment (MERA) are located within this estimated zone of ground-water discharge (including the areas offshore from site well clusters MW07-21, -23, and -25), and therefore, are appropriately located. Additional, offshore samples are not necessary.

**COMMENT 3:**

**Salinity Issues:** A key component to preparing a comprehensive conceptual model for the site, particularly in the area of ground water/surface water interaction will need to consider the effects of salinity (see General Comments 1 and 2, above). With respect to the salinity issues, EPA offers the following observations. First, numerous data (Figures 4-14, 4-15, 4-16, and Appendix A-4, Figure 29) clearly point to intrusion of high salinity/conductivity ground water beneath the Site 07 land mass. The degree of intrusion is most pronounced along the eastern and southeastern portions of the site where a zone of increased salinity extends inland for hundreds of feet. Along the southern/southwestern shoreline (i.e. portion of shoreline roughly extending from the MW07-23S to MW07-24S area) saline intrusion is suggested by the data, but on a much more limited scale. The western/southwestern shoreline is dominated by "fresh" ground water or ground water with only minor increases in salinity. The general patterns hold for all 3 principal ground water zones (i.e. shallow, deep, and bedrock), but the extent of the saline intrusion appears to be greater in the deeper zones. That is, saline ground water intrudes the farthest lateral distance into the site in the bedrock zone, and least in shallow zone. This information strongly suggests the presence of a dense wedge of seawater. The measured salinity gradients are therefore likely to represent a transitional zone from "fresh" ground water to seawater, both laterally and with depth.

EPA believes that density-related factors can readily explain many troubling aspects of the site ground water and contaminant migration data. For instance, nearly all ground water contamination has been identified in wells in the west central and southwestern portions of the site, despite apparent general ground water flow gradients to the

southeast in the deeper units. Although shallow flow directions are more variable, the majority of ground water contamination appears to be in the deeper units. (RESPONSE: the direction of ground-water flow is generally south, not southeast)

On the other hand, with minor exceptions, virtually all contaminated ground water at the site is found at locations where salinity values of less than 10 PPT prevail. This suggests that salinity rather than the ground water head gradients, as depicted on Figures 3-12 through 3-20, is a dominant factor in explaining the nature and extent of the ground water contaminants. This in turn suggests that the observed data which suggests discharge of contaminants near/along the southwestern and western shorelines may not be "anomalous", but rather the head distribution maps may lack sufficient control to capture the complexities of the flow system in the fresh and salt water mixing zones, particularly in three dimensions.

The conceptual model for the site needs to be updated to explore the importance of the saline ground water. Of particular importance is the nature and location of contaminant discharge zones at or near the site shoreline.

**RESPONSE:** Refer to the response to Comment #2.

**COMMENT 4:** Source Area Characterization; Potential for multiple source areas: Various issues remain concerning the adequacy of the source area characterization. One example concerns shallow contamination in the MW07-26, -19, and -21 areas, which is not clearly explained by the current site conceptual model. Various hypotheses have been offered at meetings by EPA and Navy representatives, including the following explanations: 1) additional unidentified source(s) upgradient from MW07-26, or 2) upward discharge of contaminants from deeper units. Other possibilities exist such as the specific concept of a thin high-concentration "core" plume extending down-gradient from the known source areas in the shallow zone. Dr. John Cherry has presented this concept recently at the National Symposium on Natural Attenuation of Chlorinated Organics in Ground Water (Dallas, Texas - September 1996). Simply stated, very thin finger-like zones containing high concentrations of dissolved contaminants have been identified at various sites, including "simple" aquifer systems, extending hundreds of feet downgradient from the source zone. In many instances, the thin core zone was not identified with conventional monitoring wells. Instead, transects of closely-spaced probes were needed to locate the zone. This particular phenomenon may or may not be relevant to Site 07, but what is relevant is that all source zones and areas of high-concentration

dissolved contaminants be identified and integrated into a viable conceptual model for the site including ground water flow and contaminant transport. This is particularly important in the context of IR, which is addressed in the following comment.

**RESPONSE:** Refer to Section 4.7 (Site Conceptual Model).

**COMMENT 5:** **Adequacy of the monitoring well network with respect to assessing the viability of intrinsic remediation (IR) at the site:** EPA supports the Navy's proposed evaluation of the site for intrinsic bioremediation potential (IR). It should be acknowledged up-front, however, that current IR research would not place this site among the best candidates for successful demonstration of IR due to the heterogeneity/complexity of the aquifer system, lack of an obvious supply of electron donor material (e.g. fuel hydrocarbons), etc. EPA's comments above, concerning various issues pertaining to the conceptual model for the site, underscore the difficulties in producing a credible IR evaluation for a site as complex as this one. Most importantly, any IR assessment is necessarily dependent on thorough characterization and understanding of the flow system in three-dimensions and assurance that the monitoring well network is truly reflective of flow system. For example, wells need to be located both parallel and perpendicular to the plume centerline. The current lack of agreement between contaminant distribution and ground water head gradients suggest that additional work may be needed to demonstrate that the current monitoring well network is or is not adequate with respect to performing an IR evaluation. These issues notwithstanding, the IR evaluation is worth pursuing. It may be possible to make some improvements to the monitoring well network, if needed, as part of later phases of the project such as LTMP. For that matter, trends which may become apparent in the data over time during the course of implementing an LTMP (for IR or otherwise) may shed light on these issues.

**RESPONSE:** Refer to Section 4.7 (Site Conceptual Model). Monitoring wells are already located parallel and perpendicular to the plume centerline. The LTMP will be addressed in the feasibility study.

**NO NUMBER 6**

**COMMENT 7:** **Plume maps and cross sections:** As a starting point for resolving the general issues listed above, compound-specific as well as total VOC plume maps and cross sections need to be prepared. This exercise may shed light onto the possibility of additional sources, but at a minimum, compound-specific detail will be needed for an IR evaluation, particularly trends in the individual compounds which may emerge as

time progresses. Numerous specific comments listed speak more specifically to this issue.

**RESPONSE:**

Refer to the updated Sections 3.7.5.2 ("Interpreted Ground-Water Flow Direction, Evaluation of Impacts from Saline/Salt-Water Wedge), 4.6.1.4 (Salinity), 4.6.2.3 (Phase III RI, VOC in Ground Water), 4.6.3.3 (Phase III RI, Metals in Ground Water), and 4.7 (Site Conceptual Model). The main VOC detected are 1,1,2,2-PCA, TCE, and 1,2-DCE, plus much lesser detections of PCE and 1,1,2-TCA which are readily seen on Figures 4-14 through 4-16. Additional figures are not necessary at this time.

**COMMENT 8:**

As discussed in a specific comment to follow, very little discussion is included in this report regarding the presence of NAPL in the Site soils. Section 5.1.3 lists a set of five characteristics which can indicate the presence of NAPL; however, the site specific evaluation in Section 5.1.3.3 details just one of the five characteristics. The analysis indicates that "...residual NAPL may be present in the subsurface soil," but the section conclusion indicates, rather definitively, that NAPL was not measured during the field activities. It is not made clear as to why the analytical results and field results would produce opposite observations regarding the presence of NAPL. Please clarify.

**RESPONSE:**

The soil sample analytical data suggest the presence of "residual" NAPL in an area beneath a portion of the site. It is true that NAPL has not been measured in any of the site monitoring wells during the field investigations. To be measurable in a well, the NAPL would have to be of sufficient amount to "flow freely" into a well to be measured within the water column. "Residual" and "free flowing" NAPL do not have to both be present, and that is the condition at Site 07. Also, refer to the response to Comment #93.

**COMMENT 9:**

Contaminated ground water could discharge to the land surface in low areas and wetland areas. The Navy should provide a discussion of the possibility of ground-water discharging to the various wetlands/low areas on the site and an evaluation of the impacts of such a discharge.

**RESPONSE:**

The only area onsite (inland from the shoreline areas) where VOC have been detected in ground-water samples from a shallow well that is also in a low lying area is MW07-19S. The ground surface elevation at MW07-19S is 4.9 ft (above) MSL. The ground-water table elevations measured so far in MW07-19S range from 0.88 to 3.10 ft (above) MSL. Therefore, the data support that ground water is not discharging in this low area.

**COMMENT 10:** It is not clear from the information presented in the report if the contamination observed in shallow wells at wells MW07-26S, MW07-19S, and MW07-21S is from a separate source or reflects a shallow tongue of contaminants from the known disposal area. We question if there are enough shallow sampling points (both geologic and ground water chemistry data) between the known source area and MW07-26S to exclude the possibility of a shallow tongue of contaminants off the main plume.

**RESPONSE:** There are sufficient sampling points. Refer to the updated Sections 3.7.5.2 ("Interpreted Ground-Water Flow Direction, Evaluation of Impacts from Saline/Salt-Water Wedge), 4.6.1.4 (Salinity), 4.6.2.3 (Phase III RI, VOC in Ground Water), and 4.7 (Site Conceptual Model).

**COMMENT 11:** The Navy's conceptual model of the southward extent of the plume is questionable. For transport modeling it was assumed that the plume extended into the harbor area several hundred feet. That was an appropriate assumption for the problem that was being addressed. Conceptually, however, groundwater may flow vertically along a fresh water and saline water interface to discharge somewhere near the shore. The relatively saline water that is observed in well MW07-21R along with high concentrations of VOCs suggests that this well may be in a mixing zone at or near the interface and that lateral movement of contaminants is limited beyond the area of this well. Additional data, such as the use of point sampling and EM logging, would be needed to more clearly understand the movement of contaminants near the shore.

**RESPONSE:** Refer to the updated Sections 3.7.5.2 ("Interpreted Ground-Water Flow Direction, Evaluation of Impacts from Saline/Salt-Water Wedge), 4.6.1.4 (Salinity), 4.6.2.3 (Phase III RI, VOC in Ground Water), and 4.7 (Site Conceptual Model).

**COMMENT 12:** Fate and transport issues have started to be addressed, albeit in general terms in many instances. Sections such as 5.1.4, 5.1.5, 5.2.1, and 5.2.2 present sufficient description of the parameters which affect fate and transport issues; however, they lack a discussion of site specific details or insight into the potential sources of the contaminants discussed or the role of the environmental characteristics (e.g., porosity, organic carbon content, etc.) in the distribution of contaminants at the site. The addition of this type of discussion is necessary to adequately address fate and transport issues.

**RESPONSE:** Sufficient detail has been provided in the draft report for the RI evaluation. Additional information regarding source area(s) and salinity impacts have been added to the updated Sections 3.7.5.2 ("Interpreted

Ground-Water Flow Direction, Evaluation of Impacts from Saline/Salt-Water Wedge), 4.6.1.4 (Salinity), 4.6.2.3 (Phase III RI, VOC in Ground Water), and 4.7 (Site Conceptual Model).

**COMMENT 13:** Throughout the document, specific portions of the site are referred to by terminology such as, "northwest portion of the Site" or "southern portion of the Site." At times, this terminology is difficult to follow because of the tendency for some locations to be considered in multiple areas (i.e., northwest and west). An improved means of distinguishing site locations should be developed, perhaps utilizing a reference to cross-sections A-A' through H-H' detailed in Figures 4-4 through 4-10.

**RESPONSE:** Generally, these text portions seem to be referenced (within the related paragraph) to some plot plan view figure where the area can be seen. We disagree with referencing cross sections, because they show the vertical distribution of information/data and not geographic locations.

**COMMENT 14:** With respect to the HHRA section of the report, the effects of butyltin were not adequately addressed. Organic forms of butyltin are easily biomagnified and are both neurotoxic and immunotoxic at relatively low doses.

**RESPONSE:** Butyltin is not a Site 07 (onsite media) COC, rather it is only for offsite (offshore) media sampled during the Marine ERA. A literature search on human toxicity of organo-tin compounds was performed, and in the absence of toxicity values for butyltin compounds, potential health effects to the consumers of shellfish in Harbor Island was qualitatively discussed in the HHRA section (Chapter 6) of the report.

**COMMENT 15:** The discussion of PCBs and risk assessment needs to be updated using the current IRIS and the new slope factors for PCBs in contaminated media. The congener specific data can be used because the new slope factors apply to total PCBs (or total Aroclors) or congener-specific data. The correct slope factors to be used in risk assessment will depend on the medium (i.e. soil, sediment, air, water, or fish tissue).

**RESPONSE:** The Navy has followed the recent EPA guidance documented in the report entitled "PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures, EPA/600/P-96/001A, January 1996" to update the PCB risk assessment results in the draft final RI report (Chapter 6).

*Specific Comments:*

**COMMENT 16:** **List of Abbreviations and Acronyms.** The abbreviation "PPT" (parts per thousand) should be added to the list.

**RESPONSE:** "PPT" will be added to the list

**COMMENT 17:** **List of Abbreviations and Acronyms.** The abbreviation "AWQC" (ambient water quality criteria) should be added to the list.

**RESPONSE:** "AWQC" will be added

**COMMENT 18:** Executive Summary, general comment: For the purpose of an executive summary, the data are adequately presented. Conclusions, however, are lacking. Please add a "Conclusions" section to the document to address this deficiency.

**RESPONSE:** Chapter 7 is the "conclusions" section of this RI document

**COMMENT 19:** **Page ES-1, ¶ 2;** Source area characterization and ground water/surface water interaction are still in need further understanding (See general comments 1 through 4, above).

**RESPONSE:** Refer to the responses to Comment #s 1 through 4.

**COMMENT 20:** **Page 3, Executive Summary, Introduction and Objectives.** The last paragraph states that "DANC solution" is an oxidizing solution and readily breaks down to release chlorine. However, paragraph does not state the other break down products that are formed after chlorine is released. Identify these products in the text and evaluate their existence in the plume. Do the break down products change the water chemistry? If so, evaluate these effects.

**RESPONSE:** 1,3-Dichloro-5,5-dimethylhydantoin on contact with water will liberate hypochlorous acid (HCL O<sub>4</sub>), a very weak acid and strong oxidizing agent. In general, it can be used as a chlorinating agent, disinfectant, or industrial deodorant. In water treatment, it has been used as the active ingredient in powdered laundry bleach such as Sage's Dry Bleach and Colgate's Pruf. Hypochlorous acid can be used as a disinfectant (Budavari, 1989).

**COMMENT 21:** **Page ES-3, ¶ 2;** The three reported incidents do not preclude the possibility of other incidents which were not reported.

- RESPONSE:** This section only states the facts obtained through the early investigations of the site.
- COMMENT 22:** **Executive Summary, Page 3, Last Paragraph.** "The cans were reportedly buried at an undetermined location..." In many sections later in the document, the "DANC disposal area" is mentioned. The location is often described relative to monitoring wells and other site specific landmarks ("At MW07-31I and SB07-03 in the vicinity of the DANC disposal..."); therefore, it can be inferred that the general location is known. Though the spot may not be known for certain, it is suggested that this paragraph and the Site Map (Figure 1-2) indicate the approximate location of the DANC disposal area.
- RESPONSE:** The statements about the disposal activity obtained during the early investigations of this site have been stated and can not be changed. However, through follow on investigations, the approximate location of the disposal area has been inferred.
- COMMENT 23:** **Page ES-3, last ¶;** The potential negative effects of these "oxidizing agents" vis a vis reductive dechlorination processes should be assessed during any assessment of IR.
- RESPONSE:** Ok, but it seems that the "oxidizing" action probably ended long ago.
- COMMENT 24:** **Page ES-5, ¶ 1;** Missing word, "...layer of sand".
- RESPONSE:** The word "layer" has been changed to "layered".
- COMMENT 25:** **Executive Summary, Page 6, Paragraph 3.** "...forming a hill with 15-30 ft of relief and is approximately 31 to 36 ft in thickness." This topographical error should be corrected by inserting a space to read, "...approximately 31 to 36 feet in thickness."
- RESPONSE:** The type has been corrected.
- COMMENT 26:** **Page ES-6, ¶4;** Missing word, "...comprised of bedrock".
- RESPONSE:** The first sentence has been changed to: Bedrock is comprised "of" quartzite...
- COMMENT 27:** **Page ES-7, ¶2;** Absence of the confining silt unit in the MW07-19, -21, and -26 area would appear to be consistent with a hypothesis which explains contaminants in shallow ground water in these areas to be a function of upward discharge from the deeper zones. This hypothesis

should be explored as the conceptual model for the site ground water is refined.

**RESPONSE:** Refer to Section 4.7 (Site Conceptual Model).

**COMMENT 28:** **Page ES-8; ¶ 1;** Statements concerning the limited potential for vertical flow, though potentially correct, both generally and locally, are not well-supported with specific data. The assertion is particularly problematic with respect to "flow between the upper sand unit and the till unit" near wells MW07-19, -21, and -26, where the intervening silt layer is absent.

**RESPONSE:** The MW07-19, -21, and -26 area referenced, appears to be impacted by a salt water-wedge that appears to be located just offshore from the Site. Refer to Sections 3.7.5.2 (last paragraph) and 4.7 (Site Conceptual Model).

**COMMENT 29:** **Page ES-8; Tidal Stages and Ground-Water Flow; Salt-Water Intrusion Assessment:** EPA is skeptical concerning the Navy's conclusion that brackish and saline ground water beneath the site can be explained by deposition of "saline dredge material". The area appears to have been a salt-water marsh prior to deposition of this material. In general, the issue of salt-water intrusion is of major importance to the site and will require considerable additional analysis. The issue of tidal fluctuation is related and needs to be re-examined in light of EPA's hypothesis (Please see general comment 3, above) that a considerable wedge of saline water appears to have intruded the subsurface beneath the site.

**RESPONSE:** Refer to the Response to Comment #s 28 and 95.

**COMMENT 30:** **Page ES-8; last ¶;** "No petroleum VOC were detected in the samples from this unit." This finding may be relevant to the viability of IR at this site. Please note.

**RESPONSE:** Comment has been noted and will be considered if IR is selected for the Site.

**COMMENT 31:** **Executive Summary, Page 9, Paragraph 2.** "The only petroleum VOC detected in the samples from this unit was toluene..." According to the analytical results summary in Table 4-2, benzene was detected in MW07-10 at a concentration of 5 µg/kg (14-16 ft bgs). The text should be modified accordingly.

**RESPONSE:** The detected benzene has been added to the referenced sentence.

**COMMENT 32:** Page ES-9; ¶ 2; "No petroleum VOC were detected in the samples from this unit." This finding may be relevant to the viability of IR at this site. Please note.

**RESPONSE:** Refer to Response to Comment #30.

**COMMENT 33:** Executive Summary, Page 9, Paragraph 3. "Chlorinated VOC were detected in 22 of the 35 samples collected." Upon review of Figure 4-3, there appear to be 23 samples containing chlorinated VOCs. If methylene chloride is not included in the count because it is believed to be a laboratory residual, that fact should be evaluated with the appropriate laboratory validation procedures and stated in the text.

**RESPONSE:** The detected methylene chloride may have been introduced at the lab.

**COMMENT 34:** Page ES-9; ¶ 3; "No petroleum VOC were detected in the samples from this unit." This finding may be relevant to the viability of IR at this site. Please note.

**RESPONSE:** Refer to Response to Comment #30.

**COMMENT 35:** Page ES-10, ¶ 3 and 4; Page ES-11, ¶ 1; The nature of the shallow ground water contamination in wells MW07-19, -21, and -26 is not conclusively demonstrated by the Navy's analysis offered here, although it is one possible explanation. Alternative explanations which account for three-dimensional flow, density/salinity variation, the potential for a high-concentration "core" plume, absence of the confining silt unit in the MW07-19, -21, and -26 area, etc. have all been offered as alternative explanations (Please see general comments 2, 3, and 4, above). Given the temporal variability with respect to tidal stage, recharge events, etc., there is insufficient data to verify the Navy's conclusions based on the relative concentrations of the various VOCs. Additional sampling may need to be performed on a quarterly or, when groundwater elevations and resultant chemical changes are understood, on a seasonal basis.

**RESPONSE:** These paragraphs have been revised based upon Sections 3.7.4.2 and 4.7.

**COMMENT 36:** Page ES-10; ¶ 2; "Petroleum hydrocarbon VOC were not detected in the bedrock ground-water samples." This finding may be relevant to the viability of IR at this site. Please note.

**RESPONSE:** Refer to response to Comment #30.

**COMMENT 37:** Page ES-11, ¶ 3; The plume appears to be within the bedrock aquifer as well.

**RESPONSE:** The referenced paragraph is about deep ground water which is defined within the paragraph as being within the till unit, lower sand unit, and/or the lower portion of the silt unit. The bedrock findings are presented in the section that follows the one referred to by the reviewer.

**COMMENT 38:** Page ES-11, ¶ 3 and Figure 2-1; EPA concurs with the conclusion that the bedrock "valley" appears to have controlled in some fashion the distribution of CVOC in the subsurface. However, in this context, the adequacy of the source area characterization becomes an issue. An examination of Figure 2-1 shows that there is a broad bedrock "low" roughly in the area contained by wells MW07-11D, -13D, -27D, -17D, -09D. There is no data which refutes the possibility that DNAPLs have may migrated into this large uncharacterized area, or perhaps eastward from MW-09D. The Navy needs to address this issue in the text.

**RESPONSE:** The following sentence has been added to the sentence in the referenced paragraph: The material appears to have migrated vertically downward through a sandy facies in the overlying silt unit into the till unit, and then, along the apparent valley in the bedrock surface "until the DNAPL flowed down into fractures in the bedrock, but apparently not to as far as MW07-09 because analytical results of Phase III RI samples of the till from MW07-09 do not suggest the presence of residual DNAPL".

**COMMENT 39:** Page ES-11, ¶ 3; EPA concurs with the conclusion that discharge of contaminated ground water to the southwest/western shoreline with Allen Harbor is an issue. However, EPA strongly believes that additional work is needed in the general area of ground water/surface water interaction at the site. This work will likely require additional data acquisition in discharge areas once they are better understood. In any event, the extent of contaminated ground water in this portion of the site is not well constrained by the current data and will likely require additional work. Please see general comments 1 through 4, above.

**RESPONSE:** Please refer to the updated Sections 3.7.5.2 ("Interpreted Ground-Water Flow Direction, Evaluation of Impacts from Saline/Salt-Water Wedge), 4.6.1.4 (Salinity), 4.6.2.3 (Phase III RI, VOC in Ground Water), 4.6.3.3 (Phase III RI, Metals in Ground Water), and 4.7 (Site Conceptual Model).

**COMMENT 40:** Page ES-12; ¶ 1; "Petroleum hydrocarbon VOC were not detected in the bedrock ground-water samples." This finding may be relevant to the viability of IR at this site. Please note.

**RESPONSE:** Refer to the Response to Comment #30.

**COMMENT 41:** **Page ES-12; Ground-Water Modeling:** What are the Navy's conclusions from the modeling ? This section should include conclusions, not merely re-iteration of methods.

**RESPONSE:** The results of the modeling have been added to this section.

**COMMENT 42:** **Page ES-13; Human Health Risk Assessment (HHRA):** What are the Navy's conclusions from the HHRA ? See comment above.

**RESPONSE:** The HHRA conclusions will be added from Chapter 7.

**COMMENT 43:** Page 1-4, last para.; Do ground water data present elevated levels of iron or chloride ion in the areas where these compounds are reported to have been buried ? If these constituents have been "leached" and flushed downgradient, why would "saline fill" be expected to remain as such?

**RESPONSE:** The information available on the storage of an "unidentified chloride compound" does not indicate the location of the storage area, but it may have been in the vicinity of the munitions bunkers. Based upon the Phase III RI ground-water sample results, relatively higher concentrations of both iron and chlorides were detected in samples from wells MW07-02S, -05S, -06S, and -31I (figures - to -). However, these concentrations are considerably lower than those detected in samples from wells located in the eastern and southern portion of Site 07 where the ground water is in the saline range. With regard for the leaching of this material vs the dredged saline fill, the stored chloride compound containers would have been a considerably smaller volume and located topographically higher than the dredged saline fill which covers perhaps the eastern half of the site in an area closer in elevation to mean sea level where the slope of the ground-water table is flatter and ground water would flow slower.

**COMMENT 44:** Page 1-4 through 1-7; Potential exists for unknown releases which are not associated with metal containers.

**RESPONSE:** The section reports the facts obtained through the early investigations to the site and stated in related reports.

**COMMENT 45:** **Chapter 1, Page 5, Paragraph 1.** See comment for Executive Summary, Page 3, Last Paragraph above. (duplicate text)

**RESPONSE:** Refer to the response to Comment #22

- COMMENT 46:** Page 1-1, p.2; Ground water/surface water interaction. Please see general comment 2, above.
- RESPONSE:** Refer to the response to Comment # 2.
- COMMENT 47:** Page 1-8, p.1 and 3; Again, past investigations perhaps placed too much emphasis on “buried metal objects” and “magnetic anomalies”. Liquid wastes could have been directly introduced.
- RESPONSE:** The scope of the past investigations can not be changed. However, you should note that there was also a soil gas study and that the supplemental Phase II RI micro-well investigation was effective in evaluating the location of the DANC (liquid) disposal area.
- COMMENT 48:** Page 1-9, p.3; EM data supports EPA’s interpretation that salt water intrusion is occurring at the site. Please see general comment 3, above.
- RESPONSE:** The Navy agrees that there is salt (saline) water beneath portions of the site as noted in Section 4.6.1.4 of the draft version of the Phase III RI report.
- COMMENT 49:** Page 1-10, last p., Typo. “chlorinate”.
- RESPONSE:** The word has been changed to “chlorinated”.
- COMMENT 50:** Page 2-2 to 2-3; EPA concurs that residual and/or free-flowing DNAPL are a continuing source for dissolved-phase contaminants. The extent of the DNAPL zone may require further definition as it is only very generally delineated in some areas. See general comment 4, above.
- RESPONSE:** The only area identified during the Phase III RI as potentially having residual DNAPL is in the vicinity of deep wells MW07-04D, -05D/R, -15D and -17D as previously stated in Section 5.1.3.3 of the Draft Phase III RI Report. EPA’s reference to comments #4 is related to wells “MW07-26, -19, and -21 areas” where the soil and ground-water sample concentrations do not suggest the presence of residual DNAPL.
- COMMENT 51:** Page 2-3; EPA understands the difficulties involved in designing a field program in keeping with earlier generations of data collection. It is questionable, however, whether or not the level of detail used in phase III is sufficient to understand ground water/contaminant transport in the “deep” (intermediate) zone. Further refinement may be needed within this intermediate zone.

**RESPONSE:** The Navy believes that the “level of detail used in the Phase III” along with the December 1996 USGS borehole geophysical logging results do provide sufficient understanding.

**COMMENT 52:** Page 2-5, bottom; Missing text. “Phase \_\_\_”.

**RESPONSE:** The sentence continues at the top of page 2-6 and is complete.

**COMMENT 53:** Page 2-6, top; It is unfortunate that a figure was not prepared for the intermediate zone. As mentioned above, this is the unit that is most complex, contains the highest levels of contaminants. Further refinement may be needed within this intermediate zone.

**RESPONSE:** This “intermediate” depth hydroprobe sampling zone is not “complex”. As stated at the top of page 2-6, the samples were collected from more than one geological unit, ie. not one common horizon (depth) within the silt unit as was planned. Please refer to the sentences added to the last paragraph of Section 2.3.2.2.

**COMMENT 54:** **Chapter 2, Page 6, Paragraph 1.** “Seven of the hydroprobe-collected ground-water samples were also sent to CEIMIC Laboratories for confirmation analyses (Table 2-2).” Upon examination of Table 2-2, it does not appear as if it includes CEIMIC laboratory data. The correct table number which includes the CEIMIC sample results should be indicated.

**RESPONSE:** The reference to Table 2-2 has been changed to Table 2-1.

**COMMENT 55:** **Page 6, Section 2.3.2.2, Stage 2 (Hydroprobe Survey) and Table 2-1, Summary of Field and Laboratory Results...** The confirmation samples that were analyzed by CEIMIC Labs are higher than the field laboratory results. The section needs to give an explanation for the difference in the results and how it affects the field data.

**RESPONSE:** Field lab detected concentrations that were above the GC calibration range are biased lower than actual. For each sample, if the analyzed concentration was higher than the field lab GC calibration range, the sample was diluted and reanalyzed. Further dilution and analysis was not performed by the field lab because this was a screening activity to provide quick, preliminary data to locate the VOC plume and provide input to the selection of locations for additional monitoring wells.

**COMMENT 56:** Page 2-6; Subsurface Soil; More detail is needed concerning what specific methods were used to assess the presence of DNAPL.

- RESPONSE:** The following has been added to the end of the first bullet under "Subsurface Soil": via field observations (e.g. solvent rather than ground water draining from a soil sample and/or presence of anomalously high soil sample headspace measurements), presence of observable separate phase in water samples from wells, and the soil and ground-water sample lab VOC analysis results.
- COMMENT 57:** Page 2-7; Weathered Bedrock; The investigation appears to have ignored the weathered bedrock unit. What are the hydrologic properties of this unit? Has a significant unit with respect to ground water/contaminant transport been overlooked?
- RESPONSE:** Split-spoon sampling was performed to refusal and then coring was performed to confirm the presence of competent bedrock. Screens for deep wells were generally installed to the top of competent bedrock, allowing the inclusion of a weathered bedrock zone, if present, to be included in testing and sampling.
- COMMENT 58:** Page 2-8; Drilling; Methodology would have missed thin (1-3 feet thick), but potentially significant weathered bedrock units.
- RESPONSE:** As indicated in the response to Comment #57, screens for the deep wells were generally installed to the top of competent bedrock, allowing for the inclusion of a weathered bedrock zone, if present, to be included in testing and sampling.
- COMMENT 59:** **Page 9, Section 2.4.1.1, Sample Collection.** The section states that samples were collected using a bailer and duplicate samples were collected for the field and CEMIC Labs. The section needs to add the procedure which was used to collect the duplicate samples.
- RESPONSE:** The following has been added to the next to the last sentence in Section 2.4.1.1, "collected at selected locations" at the same time and with the same bailer as used for the related sample collected for the analysis by the mobile laboratory at NCBC.
- COMMENT 60:** **Chapter 2, Page 10, Paragraph 4.** "For deep (D) wells, after refusal, a rollerbit was used to confirm bedrock for a few feet (generally 1-3 ft) error to coring." Suggest that for clarity, the sentence be modified to read, "For deep (D) wells, after HSA refusal, a rollerbit was inserted to advance the borehole a few feet (generally 1-3 ft) to verify the top of bedrock."

- RESPONSE:** The sentence will be revised to: "For deep (D) wells, after HSA refusal, a rollerbit was inserted to advance the borehole a few feet (generally 1-3 ft) to verify the top of bedrock prior to beginning coring."
- COMMENT 61:** **Chapter 2, Page 11, Paragraph 5.** The level of detail in the remainder of this section would indicate that information on the calibration of field instruments may be appropriate.
- RESPONSE:** The following sentence will be added to the end of that paragraph: "The PID and CGI/O<sub>2</sub> instruments were calibrated in accordance with the Work Plan.
- COMMENT 62:** Page 2-15, last p.; The text suggests that metals data for Phase III are low-flow, but filtered (45 micron filter). This complicated the assessment of the true dissolved metals load in the ground water. In this respect, the methodology needs to be pointed out in subsequent sections where the metals data are evaluated.
- RESPONSE:** The following sentence will be added to Section 4.6.2.3 (Phase III RI) after the first sentence: "The sample portions collected for metals analysis also included field filtering to further minimize the inclusion of "fines" in these samples".
- COMMENT 63:** Page 2-17; "Bouwer and Rice" is the correct methodology. Please cite the specific reference.
- RESPONSE:** "Rise" has been changed to "Rice". The method is a specific option within AQTESOLV<sup>R</sup>.
- COMMENT 64:** Page 2-19; Please specify the collection
- RESPONSE:** The four rinsate samples collected during the ground-water sampling were collected near the end of the sampling event. Duplicate samples were collected at a frequency of 10% for soil and 11% for ground water.
- COMMENT 65:** Page 3-2, top; These dramatic shifts in recharge patterns should be kept in mind if an IR assessment and/LTMP is designed. Monitoring frequency will need to be sufficient to capture this variability.
- RESPONSE:** Although the shifts in recharge patterns are not dramatic, these variations will be kept in mind if an IR assessment and/or LTMP is designed. However, much of the ground surface of this site is near mean sea level with only a few feet of vadose zone to recharge precipitation. The site is a peninsula surrounded on three sides by surface water bodies which are anticipated to lessen the impacts of seasonal precipitation

recharge. Additionally, the VOC plume detected in ground water is deep rather than shallow and recharged precipitation is anticipated to have less impact on it.

**COMMENT 66:** Chapter 3, Page 2, Paragraph 4. "Canton soils are extremely acid through strongly acid while Charlton soils are very strongly acid through medium acid." A discussion should be included in this section detailing the potential effects (if any) that soil acidity will have on the contaminants present (e.g., effects on types of soil bacteria present and their potential role in biodegradation, and behavior of inorganic contaminants of concern, especially metals).

**RESPONSE:** These soil types (as stated in the draft Phase III RI Report) are located in a relatively small area of the northern portion of the site where the VOC plume is deep and below the silt unit. The surficial soil units are not expected to impact the VOC plume.

**COMMENT 67:** Page 3-3, p.2; Distance to nearest mapped fault ?

**RESPONSE:** The last sentence will be revised to: ..., there are no mapped faults within at least 2 miles of NCBC Davisville Main Center.

**COMMENT 68:** Page 3-3, p.3; Shouldn't bedrock depths refer to MSL here ?

**RESPONSE:** The reference to 55 ft will be revised to MSL. The reference to 84.5 ft bgs is correct, but will be changed to "approximately -78ft MSL".

**COMMENT 69:** Page 3-4, Site Geology; A paragraph is needed to describe the character of the dredged fill material which covers a large percentage of the site. How variable is this material ? Grain size ? Hydraulic conductivity, etc.?

**RESPONSE:** The dredge fill material was not readily discerned (not obvious) in the field from the underlying sandy material. The detected VOC plume is not within this material. While the specific characteristics of this man-placed material would be interesting, it overlies a thick silt unit below which the VOC plume was detected in most areas where the dredge fill was apparently placed. Further detailing of the dredged fill material is not anticipated to better the understanding of the VOC plume or evaluation of potential remedial alternatives.

**COMMENT 70:** Page 3-5, p.3; Site Geology; More detail is needed to describe the character of the till material which plays such a significant role in contaminant transport. Density ? How variable is this material ? How adequately does the current site model capture this variability?

- RESPONSE:** The variability of the till was stated in the draft. The current site model does sufficiently capture the variability.
- COMMENT 71:** Page 3-5, p. 4; The weathered bedrock unit should be discussed here (nature, configuration, character, hydraulic properties, etc.).
- RESPONSE:** During the Phase III RI, till (not weathered bedrock) was typically encountered above competent bedrock surface. For 67% of the Phase III RI deep borings/wells, samples were collected from just above the competent bedrock surface. Additionally, refer to responses to Comment #'s 56 and 57 which indicate that the screened interval of "deep" wells typically cover this zone of till and possible occasional weathered bedrock.
- COMMENT 72:** Page 3-5, p.4; Seismic control of the top of bedrock surface is limited to the east of MW08-9D to -11D.
- RESPONSE:** Agreed
- COMMENT 73:** Page 3-6; p.2; The text implies that there are no private water supply wells in Rhode Island?
- RESPONSE:** The following sentence will be added: There are also an unknown number of private, residential water supply wells.
- COMMENT 74:** Page 3-9; Deep Ground-Water Zone; Assignment of the "deep" ground water zone is consistent with Phase II RI, but it is questionable as to whether this approach has resulted in a level of detail in this important zone sufficient to understand the inherent complexity.
- RESPONSE:** The Navy feels that the Phase III RI level of detail along with the results of the USGS borehole geophysical logging in December 1996, is sufficient to evaluate hydrogeology and nature of the VOC plume beneath the site.
- COMMENT 75:** Page 3-9, Bedrock Ground-Water Zone: Please add a discussion of the weathered bedrock's hydraulic regime/properties.
- RESPONSE:** Refer to the response to Comment # 71.
- COMMENT 76:** Page 3-10 and Table 3-3; EPA does not concur with the Navy's assessment of the vertical gradient data in Table 3-3. For example, MW07-21S/D has generally upward vertical gradient, albeit slight. Similarly, -19 S/D, -20S/D, and -23S/D are described by the Navy as generally having "downward" vertical gradients, but Table 3-3 shows

both upward and downward gradient for these wells. It is EPA's belief that the presence of a wedge of saline water beneath the site is complicating the assessment of flow in three dimensions. A better understanding of the interactions between ground water and surface water (i.e. fresh and salt water) is needed before a general understanding of the flow system can be made, specifically the vertical aspect of flow. Please refer to general comments 1-3, above.

**RESPONSE:** The sentence referring to MW07-21 S/D has been revised to: very "slightly upward" to no vertical gradient. Seven of the nine measurements (78%) for MW07-19 S/D, -22 S/D, and -23 S/D are downward, therefore, stating "generally downward vertical gradients have been recorded..." is felt to be a true statement.

**COMMENT 77:** Page 3-10, last 3 paras.; Misplaced text?

**RESPONSE:** Agreed. They will be struck out.

**COMMENT 78:** Page 3-11, Section 3.7.5.4; This discussion needs to be related more directly to site 07.

**RESPONSE:**

**COMMENT 79:** Page 3-11, last para.; Misplaced text ?

**RESPONSE:** Agreed. It will be struck out.

**COMMENT 80:** Page 3-12, Section 3.7.6; This entire section needs more discussion of the results; methodologies are discussed, but results and analyses regarding site 07 are limited.

**RESPONSE:** The results have been presented in the tables and Appendix J.

**COMMENT 81:** Chapter 3, Page 12. The references to Gregg (1966) and Carr and Van der Kamp (1969) are not included in the list of references.

**RESPONSE:** These references have been added to the reference list:  
Carr, P.A., and Van Der Kamp, G.S. 1969. Determining Aquifer Characteristics by the Tidal Method. Water Resources Research 5(5):1023-1031.

Gregg, D.O. 1966. An Analysis of Ground-Water Fluctuations Caused by Ocean Tides in Glynn County, Georgia. Ground Water 4(3):24-32.

**COMMENT 82:** Page 3-14, para. 1-3; The conclusions concerning the vertical component of flow are not well supported. What "feature" is referred to?

**RESPONSE:** Refer to revised Section 3.7.5.2 where the results of preliminary modeling including a salt wedge is presented.

The word "feature" has been changed to "mixing."

**COMMENT 83:** Page 3-14; It is EPA's belief that the presence of a wedge of saline water beneath the site is complicating the assessment of flow in three dimensions. A better understanding of the interactions between ground water and surface water (i.e. fresh and salt water) which accounts for the salinity gradients is needed before a general understanding of the flow system can be made, specifically the vertical aspect of flow. Please refer to general comments 1-3, above.

**RESPONSE:** Refer to the Response to Comment #74. Also, refer to Section 4.7 (Site Conceptual Model) of the draft final RI report.

**COMMENT 84:** Section 4. Nature and Extent; The section presents a good overview of the sample results, but interpretation, analysis, and discussion of the data/results should be expanded. Additionally, the persistent lack of petroleum/fuel VOC detections in soil and ground water media should be noted in regard to any future assessment of IR.

**RESPONSE:** Please refer to Section 4.7, Site Conceptual Model.

**COMMENT 85:** **Chapter 4, Page 2, Paragraph 3.** "Background concentrations of components of interest for ground water at NCBC Davisville have not been established at this time." The Navy has recently proposed inorganic background values, please use the proposed values in the RI. The EPA believes that organic compounds should not be found in the groundwater as naturally occurring constituents and will not endorse the use of "background" for organics.

**RESPONSE:** The referenced sentence has been revised to: "Background concentration for inorganic analytes in ground water at NCBC Davisville have been proposed (Table 4-1B)."

**COMMENT 86:** **Page 3, Section 4.5.4.1, Quality Control Summary.** This section states that the soil field duplicates were less than 50 percent difference except for those samples collected from MW07-05S. The data shows for trichloroethene in sample pairs MW07-05R/MW07-05R DUP (Table 4-2; 110 J & 36 J ug/kg) and MW07-19S/MW07-19S DUP (44 J & 22 J ug/kg) greater than 50 percent difference. These are the only duplicate

samples where trichloroethene was detected. A discussion of why the trichloroethene data are outside of criteria needs to be included in the section.

**RESPONSE:** The following has been added to the next to the last sentence: "MW07-05R (29-31 ft bgs; for TCE) and MW07-19S (16-18 ft bgs; for TCE)". The following has been added to the last sentence of the referenced paragraph: "because the samples collected for VOC analyses were not mixed prior to placing in individual sample containers. Duplicate samples were collected from as similar material as possible as the related sample from within the split-barrel sampler."

**COMMENT 87:** **Chapter 4, Page 3, Paragraph 6.** "If acetone is not considered, then acceptable field precision of less than 50 percent difference was observed..." The report does not indicate whether or not the duplicate samples were collected from the same soil horizon. It is suggested that soil information be incorporated detailing similarities/differences between grain size, organic composition, clay content, etc. between the original samples and duplicates. This information would help validate QA precision.

**RESPONSE:** Refer to response to Comment #86.  
Additionally, grain size analyses were not performed.

**COMMENT 88:** **Chapter 4, Page 3, Paragraph 7.** "The field QC blanks consisted of two field rinsate blanks and two trip blanks." In addition to the rinsate and trip blanks, field blanks should have been collected to aid in the estimation of bias caused by contaminants introduced during field sampling and lab analysis, and to compare with lab method blanks to determine the potential source of contamination.

**RESPONSE:** Comment noted, but field blanks were not in the work plan.

**COMMENT 89:** **Page 4, Section 4.5.4.1, Quality Control Summary and Page 10, Section 4.6.2.3, Phase III RI, Quality Control Summary.** These sections state that the method blanks contained contaminants. There needs to be a discussion of the effects of these contaminants on the quality of the data and any corrective actions taken to reduce blank contaminant level during the survey.

**RESPONSE:** The results of the laboratory's method blanks were provided as part of the laboratory report and were not available during the related sample collection activity.

**COMMENT 90:** **Page 6, Section 4.5.4.3, Acetone Reported in Phase III Subsurface Soil Samples.** The section states that the isopropanol use by the field crew to decontaminate the split-barrel soil samplers contained acetone. "It is believed that the presence of acetone in the soil samples is due to incomplete drying of the split-barrel sampler prior to collecting the next soil sample, resulting in the introduction of decontamination fluid isopropanol to the sample." It is good practice in decontamination of field equipment is to rinse the equipment with deionized/distilled water after a solvent rinse to remove any residual solvent adhering to the equipment (isopropanol and acetone are both water soluble). If this practice is not being performed, it should be perform on future samples.

**RESPONSE:** Rinsing with distilled water was performed.

**COMMENT 91:** Page 4-6 p. 1 and Tables 4-2 and 4-3; What does the distribution of contaminants suggest about potential mechanisms for contaminant migration.

**RESPONSE:** The detected TOC concentrations (Table 4-3) fall within a narrow range between approximately 0.5 and 1.1% across the site both horizontally and vertically and do not seem to have a direct correlation with the location of the VOC plume in ground water. The detected VOC in soil samples helps to infer the source area and that a key mechanism for the plume location is related to the downward movement through the soil of the original DNAPL release under the influence of gravity.

**COMMENT 92:** **Chapter 4, Page 7, Paragraph 3.** "...it is not possible to compare the data between the RI phases." Although it is understood that specific comparisons are not possible due to the fact that different depths, horizontal locations, and analytical programs were used between RI phases, it seems plausible that a general comparison of the soil sampling results from the each phase could be performed. Such a discussion, even a generic one, could provide insight into the potential path of the contaminant plume(s) over time, degradation of contaminants in certain areas of the Site, etc. It is understood that soil heterogeneity in the soils may prevent this type of comparison throughout the site, but based on the number of samples which have been historically taken in and around SB-1, SB-2, and SB-3, some general discussion may be possible.

**RESPONSE:** The Navy feels that comparison of these data collected from different locations, depths, and strata by different firms and analyzed by different labs separated by a few years would be speculation with many interpretations possible, because of variations in sample collection and analyses; and heterogeneity of the soil.

**COMMENT 93:** Chapter 4, Page 7, Paragraph 6. “No DNAPL or LNAPL was observed in the Site 07...” Since the investigation of the presence of DNAPL was one of the primary objectives of the RI, this section should contain a more detailed discussion on what methods were employed in the investigation of possible presence DNAPL or LNAPL. It would also be pertinent to include a discussion of what criteria were used to determine that no DNAPL or LNAPL were present.

Methods the Navy did use to assess DNAPL/LNAPL presence not discussed in sufficient detail to allow “confirmation” of these “results”.

**RESPONSE:** Refer to the response to Comment #56. The following sentence has been added: “During the Phase III RI field work, solvent rather than ground water was not observed draining from the soil samples collected and separated phase fluid was not observed in the water collected during the well development and purging activities, nor in the ground-water samples.”

**COMMENT 94:** Chapter 4, Page 8, Paragraphs 2, 3, 4. Sections 4.6.1.1, 4.6.1.2, and 4.6.1.3 should expand their discussions of chloride, sodium, and TDS levels respectively, to include how the values: impacted the investigation, affect the analytical results for the contaminants of concern, and affect distribution of contaminants throughout the Site.

**RESPONSE:** The referenced sections, along with Section 4.6.1 have been revised in the draft final RI report text.

**COMMENT 95:** Page 4-8, Sections 4.6.1.1 through 4.6.1.4; It is EPA’s interpretation that the presence of a wedge of saline water beneath the site can best explain the three-dimensional configuration of chloride, sodium, TDS, and salinity values demonstrated by the site database. Presence of “saline fill” does not fully explain the data, particularly since the filled area was apparently a salt water marsh prior to being filled. Please see general comment 3, above.

**RESPONSE:** The “saline fill” was not intended to “fully explain the data”. The first part of the referenced sentence refers to the pre-1940 site conditions (ie. much of the site was part of Allen Harbor).

**COMMENT 96:** Page 4-9, last para.; What were the chloride results? Did they show any anomalies which were distinct from the salinity related trends in the data?

**RESPONSE:** The chloride results were and are summarized on Table 4-5. New Figures 4-11A through 4-13A show increasing concentrations beneath

the eastern and southern portions of the site; i.e., similar to that shown for salinity (Figures 4-11B through 4-13B). This has been added to the text.

**COMMENT 97:** Page 4-10, Quality Control Summary; Conclusions?

**RESPONSE:** The Phase III data are valid and useable for evaluation of the Site 07 subsurface conditions.

**COMMENT 98:** Page 4-11; last para; Conclusions concerning the concentrations in the "underlying well" are not convincing. There is no deep or rock well at MW-26, but at -27D, the next 'upgradient' deep well, total CVOC concentrations are 10 times higher than at MW-26S. This data must be considered in three dimensions. Vertical gradient data are ambiguous in this area, and therefore can not be used convincingly to demonstrate a lack of "connection" between the high levels at MW07-27D and the -26S, -19S, and-21S areas.

**RESPONSE:** The following will be added to the end of the last paragraph of the referenced section: "However, based upon additional evaluation, including the geophysical borehole logging by the USGS in December 1996, the VOC detected in samples from MW07-19S and MW07-21S could be related to an arm of the original deep plume (which begins in the northern portion of the Site) that may be within "brackish" ground water that is flowing up along the interface with "saline" ground water in that area. Refer also to Section 4.7."

**COMMENT 99:** Page 4-13; last para. Confusing, please reword this paragraph.

**RESPONSE:** The following has been added: "That is, the acetone detected in some soil samples (collected during drilling from an interval that was subsequently screened by a monitoring well) was substantially higher than the ground-water sample from the related well. Because acetone is very soluble in water, if high concentrations of acetone are actually present in the subsurface, then a similar acetone concentration would be expected to be detected in the related ground-water sample. However, acetone was "ND" in most related ground-water samples."

**COMMENT 100:** Chapter 4, Page 14, Paragraph 1. "The Phase III RI results are higher than the Phase II RI results for MW07-03D, -05D, and -09D." This section should provide a discussion of potential explanations for the higher results at these locations.

**RESPONSE:** The last sentence of this paragraph presents an explanation beyond which the Navy feels that further speculation is not appropriate.

**COMMENT 101:** Page 4-14, 1st para.; The increasing contaminant trends in some wells may be real. It is simply to early to tell. More time-series data is needed.

**RESPONSE:** Refer to the response to Comment #100.

**COMMENT 102:** **Page 14, Section 4.6.3, Metals in Ground Water.** Add a quality control summary similar to the organic quality control summary to the section for the metals in ground water.

**RESPONSE:** A QC summary has been added to Section 4.6.3.3.

**COMMENT 103:** Page 4-14, last Para.; Are the elevated metals attributed to turbidity ?

**RESPONSE:** Turbidity may have had an impact.

**COMMENT 104:** **Chapter 4, Page 15, Heading.** "4.6.3.3 Phase III RI" The typographical error in this heading should be corrected.

**RESPONSE:** The additional "." has been removed.

**COMMENT 105:** Page 4-15, top; Briefly preface this paragraph with a description of the low-flow methodology, and filtering, used to collect this data.

**RESPONSE:** The following was added after the first sentence: "These samples were collected using low-flow methodology and field filtered (Section 2.4.6.2)".

**COMMENT 106:** **Chapter 4, Page 15, Section 4.6.3.3.** This section includes a discussion of the metals found in groundwater in excess of the MCLs. It should also include a discussion of the potential sources of these materials (e.g., regional geology, contamination).

**RESPONSE:** Please refer to revised Section 4.6.3.3. Based upon the understanding of releases at the Site, there are no apparent Navy sources for the detected metals. They appear to be related to natural conditions.

**COMMENT 107:** Page 4-15, last para.; Iron and manganese concentrations appear to be elevated in ground water, perhaps due to redox-controlled reactions which may accompany IR of CVOCs. The Navy needs to verify that the metals are not accumulating in intertidal/subtidal sediments. It is not particularly surprising or illuminating that the surface water, which is highly oxygenated, did not detect high levels of these metals. The metals would be likely to accumulate in the sediment.

**RESPONSE:** Iron and manganese were not identified in the Marine Ecological Risk Assessment of Allen Harbor as causing risk, and therefore, are not an issue for Site 07.

**COMMENT 108:** **Chapter 4, Page 16, First Paragraph.** "Thallium was detected in the water samples collected from Allen Harbor and Narragansett Bay at concentrations of 32  $\mu\text{g/L}$ ." This sentence should be deleted and replaced with the last sentence in this paragraph, "Thallium was detected at 32  $\mu\text{g/L}$  in the Allen Harbor water sample (NCBC-AH1) and at 31.6  $\mu\text{g/L}$  in the water sample from Narragansett Bay (NCBC-NB-1)." Thallium discussion appears to provide further support the hypothesis of salt water intrusion beneath the site.

**RESPONSE:** The sentence has been replaced as requested. The original sentence presented the data rounded off to the nearest whole number.

**COMMENT 109:** Section 5. Fate and Transport; In general, the conceptual model for ground water/contaminant transport needs to be better understood before a modeling effort of this type is done. The modeling approach used is limited in that it does not consider the potential for contaminant discharge to surface water and sediment along the western site shoreline, but rather focusses only on the Allen Harbor entrance channel. Also, the model conceptually does not allow for the upward discharge of contaminants "through the till and possibly lower sand and silt units [page 5-33, p. 2]". This assertion is not supported by any data. The contiguity of the various units beyond the limits of the shoreline are not known at this time. Most importantly, the dynamics of fresh and saline ground water is expected to have a major impact on the nature and distribution of contaminant discharge. Also, the modeling needs to consider potential accumulation of metals in sediments over time. The results of the modeling are not conclusive at this time, but it appears that both VOCs and metals are problematic. Also the Navy should use the arithmetic mean rather than the geometric mean in the evaluation. The site maximum should also be used in the evaluation. The Navy has only 2 rounds of data from this site and the site average and max may not be known at this time. Additional rounds of data will be required during the LTM as part of the eventual remedy.

**RESPONSE:** The Site conceptual model is presented as Section 4.7 and the Sutra model has been used to examine the potential effects of salinity on ground-water flow (Section 3.7.5.2). The scope of work as outlined in the technical memorandum of understanding incorporated in the Draft RI report was to evaluate via hand calculations and/or "simple" models selected worst-case scenarios such as the direct discharge to surface

water of VOC from the shallow zone at wells MW07-19S/-21S. This work has been performed.

The statement that the model does not conceptually allow for discharge to surface water and sediment along the western shoreline or does not allow the upward discharge of contaminants is not accurate. Any modeling performed as part of first and second step screening represents only a small portion of the site such as the several hundred foot distance from wells MW07-19S/-21S to the shoreline. Not showing results for shallow movement of ground water to the west does not imply that this is not an allowed pathway, but only that the screening analysis was focused on the area of maximum detected concentration. Beyond the shoreline, all flow streamlines from an upland area must intersect Narragansett Bay.

The key metal for which some risk was noted in the Marine Ecological Risk Assessment (EA 1996) was arsenic in the intertidal sediment. Please refer to the revised Section 4.6.3.3 which shows that Site ground water is not a pathway from the Site to the sediment for arsenic.

**COMMENT 110:** Page 5-5, P. 4; Typos. “..has suggests that some of..”.

**RESPONSE:** The word “has” has been deleted.

**COMMENT 111:** **Chapter 5, Page 8, Fourth Paragraph.** “However, NAPL was not measured in any of the wells during the installation, development, purging, or sampling of the monitoring wells.” According to the discussion presented in Section 5.1.3, the presence of NAPL is assessed almost entirely based on review of analytical results; however, the statement above seems to indicate that only field observations played a part in the decision that NAPL are not present at the Site. This section should provide significantly more detail regarding the NAPL investigations and the processes involved in determining if they are present.

**RESPONSE:** Refer to the response to Comment #56 which will also be added to Section 5.1.3.3.

**COMMENT 112:** **Chapter 5, Page 9, First Paragraph.** “Compounds with high water solubility remain in solution...” Suggest this sentence is changed to read, “Compounds with high water solubility tend to remain in solution...”

**RESPONSE:** Sentence will be revised as suggested.

**COMMENT 113:** Chapter 5, Page 9, Second Paragraph. Suggest that this paragraph indicate the relationship between  $K_{oc}$  and solubility and mobility class as these characteristics are key to transport of dissolved contaminants.

**RESPONSE:** A sentence will be added which reads: Low partition coefficients indicate that the compound has a preference for the aqueous phase which results in increased mobility due to the movement of ground water. Compounds such as VOC are soluble and when in the aqueous phase tend towards a dissolved form.

**COMMENT 114:** Chapter 5, Page 10, Second Paragraph. "Longitudinal dispersivity of a compound is affected by the aquifer heterogeneity." Dispersivity is also a function of solute concentration. The discussion should reflect this.

**RESPONSE:** Mechanical dispersion is not a function of solute concentration. Molecular diffusion, which is concentration dependent, is normally considered to be negligible under field conditions.

**COMMENT 115:** Page 5-11; Section 5.2.1.1; A range of published values should be used.

**RESPONSE:** The following is a range of published porosity values for the primary aquifer components (Sharp-Hansen 1990). The effective porosity typically used in a model is less than the total porosity.

Material	Bulk Density (g/cm <sup>3</sup> )	Total Porosity
Silt	1.01-1.79	0.34-0.61
Sand, fine	1.13-1.99	0.26-0.53
Sand, course	1.42-1.94	0.31-0.46
Gravel, fine	1.60-1.99	0.25-0.38
Gravel, course	1.69-2.08	0.24-0.36
Granite, weathered	1.21-1.78	0.34-0.57
Schist	1.42-2.69	0.04-0.49
Fractured crystalline rock		0.0-0.10 (a)

a) Freeze and Cherry, 1979

**COMMENT 116:** Page 5-12, section 5.2.1.4.; A range of values should be used.

**RESPONSE:** A range of published density values is included in the previous table for Response to Comment #115.

**COMMENT 117:** Page 5-13, pH and Eh and page 17, First Paragraph; A range of Kd values should be used based on the extremes of pH and Eh, redox potential, measured at the site. We suggest that a discussion be included specifying the reasoning for selection of sources of such values.

**RESPONSE:** As discussed in the text two sources of Kd's were used, Baes (1984) which does not include variation with pH, and EPA (1994) for which the value at a pH of 6.8 was used. To be conservative (maximize the partitioning to sediment in the screening analysis) the higher of the two values was used. In general, the pH at Site 07 is neutral such that it was not considered necessary to vary the Kd from the published value at 6.8. For example, at the 6 near shore shallow wells from which the maximum metal concentration was selected for first-step screening, the pH varied between 6.76 and 7.09 at 5 wells and was 7.3 at MW07-24S. At well -24S, two parameters, barium and thallium, had a maximum near shore value and had an available Kd/pH relationship. The Kd for thallium varies between 71 and 80 and for barium between 1.4 and 2.5 as pH varies from 6.8 to 7.3. However, for these two parameters a higher value from Baes of 1500 and 60 had been used.

**COMMENT 118:** **Chapter 5, Page 17.** The Navy should use either the higher of the results from the two phases of data as a worst case scenario or should use the average of a years worth of quarterly sampling data to find the best representation of the actual site contaminants. The Navy should not use the geometric mean for the fate and transport evaluation. Instead the Navy should use the arithmetic mean and the site maximum for a conservative worst case. This approach was agreed to during the March 12, 1996 conference call where this first step evaluation was discussed by the BCT.

**RESPONSE:** For VOC, Phase III RI data was used which was the higher of the two sampling rounds and is the only data set that covers the entire Site. The previous RI Phases include substantially smaller data sets. For consistency, the larger Phase III RI data set was also used for metals.

The use of arithmetic mean versus geometric mean makes no real difference in the out come of the analysis. The emphasis of the screening analysis was usually on maximum detected near shore values or on maximum site values. The use of the geometric mean did not play a central role in the screening analysis. It should also be made clear what data was included in the geometric mean. A site mean could include all data including the non-detects. The geometric means presented in

Chapter 5 were only for detected values. For many constituents there was only one detected value such that the arithmetic mean, geometric mean, and site maximum were all the same value.

Second step screening at shallow wells was performed only for the maximum near shore concentrations in order to examine plume attenuation over the remaining several hundred foot distance to the shore.

The data for first step screening of VOC in deep/rock wells had only 1 detect for 12 of 22 parameters (site mean = site max). Except for 1122-Tetra, the geometric mean and site max were both either above or below the screening criteria. The arithmetic mean would also have been either above or below. Similarly for metals, both the geometric mean and site max were jointly both above or below the screening criteria except for manganese.

Second step screening for deep/rock wells had 2 components: 1) application of AT123D from source area in the vicinity of MW07-4D/-5D to a near shoreline location, and 2) extension under Allen Harbor. For modeling the source area, only the maximum site value was used. The plume movement under Allen Harbor was only performed for TCE, a representative VOC, using maximum near shoreline deep/rock well concentrations.

**COMMENT 119:** Page 5-19; p. 2; EPA does not concur with the Navy's conclusion that the metals are "not of concern". The potential for metals to accumulate in sediment needs to be considered.

**RESPONSE:** The key metal risk driver identified by the Marine ERA for the intertidal sediment was arsenic for which revised Section 4.6.3.3 indicates that the Marine ERA sediment and Phase III RI ground-water results do not indicate that there is a completed pathway from Site 07.

Additionally, the maximum "accumulated" concentration of constituents in the sediment is provided by the equilibrium partitioning theory. The calculated sediment values were based upon maximum near-shore ground-water concentrations. If this ground water was to move toward pristine sediment, initially the pore water and sediment concentration would be less (retardation effect). However, after sufficient time the sediment concentration would reach the value indicated by the equilibrium partitioning calculation.

**COMMENT 120:** Chapter 5, Page 21, section 5.3.6. The applicability of utilizing AT123D on this site is questionable. The transport of contaminants in a

heterogeneous, tidally-influenced, variable-density aquifer is highly complex. It is not obvious what factors play a dominant role in determining the mass flux of contaminants to the harbor area. Additionally the following questions should be addressed in the revision of the text.

- What values of dispersivity were used in the model?
- What were the (elapsed) times of simulations for which the results were presented, or were they steady-state simulations?
- Table 5-3 does not present any values for volatilization flux for VOCs.

**RESPONSE:**

In Section 5.3.6 of the draft RI report, the AT123D model is being used to simulate the movement of shallow ground water for the 240-ft distance from MW07-19S/-21S to the shoreline. The presence of higher salinity tidal water in the shallow aquifer would most likely either impede the movement of the lower saline water towards the shoreline due to blockage, or provide increased dilution in a tidally influenced zone near the shoreline. In either case, not including tidal/density effects would be a conservative assumption by maximizing predicted shoreline concentrations. The use of AT123D is appropriate for the screening analysis and was purposely not intended to represent a detailed 3-D ground-water model of the site.

The dispersion used in the model was 20, 4, and 0.4 ft in the longitudinal, lateral, and vertical directions respectively. The presented model results were for steady state simulations which required model run times in excess 2 years to achieve a solution for the 240-ft distance from wells MW07-19S/-21S.

With regard for Table 5-3, there are no other VOC that were detected in soil samples from the vadose zone where volatilization to the atmosphere might occur.

**COMMENT 121:** Page 5-22; para 1; K values used appear to be very high.

**RESPONSE:** The hydraulic conductivities of 80 and 175 ft/day at MW07-19S and -21S were determined from slug tests and the geologic logs. The geologic logs indicated that the material in this area was coarser grained than in other locations.

**COMMENT 122:** Page 5-24, p. 2; Why would the metals plume be expected to have the same dimensions as the VOC plume?

- RESPONSE:** The metal plume would not (conservatively) be expected to be any narrower than the 200 ft VOC plume assumed at MW07-19S/-21S. Section 5.3.6.3 indicates that because VOC was attenuated to only 91 percent of initial value, no significant attenuation would occur for metals during step two screening. This conclusion would only be strengthened if the metal plume was wider.
- COMMENT 123:** **Chapter 5, Page 25, first paragraph.** The flux of 4,942 cubic feet per day through the shallow plume, as determined from estimated hydraulic conductivity and the measured hydraulic gradient, appears to be very high. For a 200-ft wide by 1400-ft long contributing area, as measured from the topographic divide, a recharge rate of 2 ft per year (an upper limit) would supply only about 1,500 cubic feet per day. Perhaps the hydraulic conductivity estimate is too high.
- RESPONSE:** The 4,942 ft<sup>3</sup>/day flux does appear to be high. In addition to the hydraulic conductivity, the assumed hydraulic gradient may also be overestimated. The intent of the screening analysis was to conservatively use the available site data. The flux was calculated to provide a mass loading to the surface water model. The magnitude of the tidal dilution available in the surface water model renders a refinement of the flux to be unimportant.
- COMMENT 124:** **Chapter 5, Page 25, Last Paragraph.** "The resulting surface water concentrations, for a similar mass loading, are smaller at Site 07 than at Site 07 because..." One of the referenced sites should be changed to Site 09.
- RESPONSE:** The sentence will be corrected to read: "... are smaller at Site 07 than at Site 09."
- COMMENT 125:** Page 5-27, p.2; typo. "additionally".
- RESPONSE:** The typo will be corrected to: "additionally."
- COMMENT 126:** Page 5-28; Table; Why were some of the half-lives used in the model outside of the published ranges ?
- RESPONSE:** To be conservative, a half-life of 1 year was used for 1122-PCA which had a reported value of 0.1 year.
- COMMENT 127:** **Chapter 5, Page 30, last paragraph.** A porosity of 0.1 is high for fractured bedrock. Porosities of 0.02 or less are commonly assumed. A discussion about uncertainties in porosity estimates on model results would be appropriate.

- RESPONSE:** Porosity in the fractured bedrock under Allen Harbor is an unknown parameter. The expected range of porosity in fractured bedrock is 0.01 to 0.1. The value of 0.1 was selected to be representative of the upper bedrock which is expected to have more fractures. The relatively high hydraulic conductivity of 15.5 ft/day measured at MW07-21R with a packer test supports the higher porosity at this location.
- COMMENT 128:** Page 5-36; Site-Wide Summary; EPA does not concur with the conclusions reached from the modeling. VOCs and metals appear to be problematic, and will need to be further examined in light of a revised conceptual model for the site.
- RESPONSE:** Refer to Sections 4.6.2.3 (comparison of VOC detected .....; last paragraph), 4.6.3.3, and 4.7 (Site conceptual model) of the draft final RI report.
- COMMENT 129:** **Chapter 6, Section 6.1.2.2, Page 4, Paragraph 3.** This paragraph states "Samples of surface water on or near Site 07 were not available." Information in sentence 2 of paragraph 5 and in paragraph 8 (page 5) indicates otherwise.
- RESPONSE:** Phase I and II RI Sampling sections on pages 4 and 5 summarize sampling activities undertaken at one or more of the NCBC Davisville sites. Thus, the discussion is not site-specific. There were no available samples of surface water on or near Site 07. As result, exposures to surface water could not be evaluated in the HHRA.
- COMMENT 130:** **Chapter 6. Section 6.1.2.2, Page 6, Sentence 5 and 6.** Sentences indicate that butyltin residues in the shellfish were considered in the ERA, but were excluded from the HHRA (page 10, paragraph 6). Organic forms of tin are easily biomagnified and, at relative low doses, they are both neurotoxic and immunotoxic to higher organisms. For these reasons organotins should not be removed from consideration just because they are not on the TCL or TAL list of compounds. The approach of using structurally similar chemical surrogates (QSAR data) described at the bottom of page 12 and the top of page 13 should be considered for butyltin.
- RESPONSE:** Although Site 07 is not a source of butyltin (it is a COC in offsite media), butyltin results have been incorporated into the HHRA. However, in the absence of toxicity values for butyltin compounds, the potential health effects on consumers of shellfish containing butyltin residues are qualitatively discussed in Section 6.5.2.6. The uncertainties associated with butyltin exposure via shellfish consumption are discussed in Section 6.5.3.3.

- COMMENT 131:** Chapter 6, Section 6.2.1.2, Page 10, Paragraphs 4 and 6. Six shellfish samples were taken, but ribbed mussels were discarded. How many samples of edible shellfish were retained?
- RESPONSE:** Six samples of shellfish were used in the analysis.
- COMMENT 132:** Chapter 6, Section 6.2.1.3, Page 14, Paragraph 1. Section should also address butyltin residues in shellfish.
- RESPONSE:** The results for butyltin residues in shellfish is incorporated into this paragraph per reviewer's comment.
- COMMENT 133:** Chapter 6, Section 6.2.1.5, Page 17, Paragraph 2, Sentences 2 and 3. It is unclear as to whether butyltin in shellfish was considered when the phrase "However, the screening was conducted so as not to eliminate chemicals which could prevent serious risks. Finally, where no RBC was available, the contaminant in question was retained for evaluation" was stated.
- RESPONSE:** Butyltin in shellfish is incorporated into the HHRA and treated as site-related COC in shellfish per reviewer's comment.
- COMMENT 134:** Chapter 6, Section 6.2.2, Pages 17 - 66. A paragraph on the toxicity of butyltin should be included in this section.
- RESPONSE:** Toxicity of butyltin compounds is summarized in this section per reviewer's comment.
- COMMENT 135:** Chapter 6, Section 6.4.1, Page 68, Paragraph 2. Based on the statement "In this HHRA....of concern at Site 07." and Section 6.4.2.5 - page 62, paragraph 1, it is not clear why adults excluded from future land-based recreational users?
- RESPONSE:** Future land-based recreational users of the site was assumed to be children between the ages of 2 and 18 in this HHRA. This scenario was assumed to conservatively represent human exposures to COCs at the site.
- COMMENT 136:** Chapter 6, Section 6.4.3.2, Page 75, Paragraph 1, Sentence 2; Section 6.4.3.5, Page 76, Paragraph 1, Sentence 1; Section 6.5.1.1, Page 79, Paragraph 1, Sentence 2. Substitute the word "fewer" for the word "less". Fewer implies unit measurement values, whereas less implies sub-unit (continuous) measurements.

- RESPONSE:** The word "fewer" is replaced for the word "less" at locations shown above per reviewer's comment.
- COMMENT 137:** **Chapter 6, Section 6.5.1.2, Page 79-80, Paragraph 1, Sentence 2.** In the statement "The numerical estimate of excess lifetime cancer risk was calculated by multiplying the lifetime average daily dose by.." the words "chronic daily intake (CDI)" should be substituted for "life time average daily dose" in this instance in all other instances where LADI is used.
- RESPONSE:** The words "chronic daily intake (CDI)" are substituted for "life time average daily dose (LADI)" in all instances where LADI is used throughout the chapter per reviewer's comment.
- COMMENT 138:** **Chapter 6, Section 6.5.1.2, Paragraph 2, Sentence 2, Page 80.** Remove the words, "and could even be zero" from the statement "The actual risk may be lower, and could even be zero." or add the NCP citation.
- RESPONSE:** The text is revised per reviewer's comment.
- COMMENT 139:** **Chapter 6, Section 6.5.2.3, Page 83, Paragraph 1, Last Sentence.** The COC target organ pair for Zn is the RBC, or blood (RBCs). Again, butyltin should be discussed in terms of neurotoxic effects. Cu may produce adverse effects on the nervous system of susceptible individuals who have Wilson's Disease.
- RESPONSE:** The text is revised per reviewer's comments. Butyltin effects are qualitatively discussed in Section 6.5.3.3.
- COMMENT 140:** **Chapter 6, Section 6.5.3.3, Page 87, Paragraphs 2 and 3.** Although specific data for benzotriazole and chlorinated benzotriazole may not be available, estimates of RfDs can be derived from QSAR data. QSAR estimates are better than deleting a COPC just because appropriate values have not been provided by the EPA.
- RESPONSE:** A literature search was performed regarding toxicity of benzotriazole, halogenated benzotriazoles, and structurally similar compounds. However, the review of toxicity information did not reveal any information which could be used to establish toxicity values for benzotriazoles. A few studies reported cases of allergic contact dermatitis from clothing containing spandex tape. The persons reacted to 2-(2-hydroxy-5-methylphenyl)benzotriazole (Tinuvin P) in spandex tape (Kanima, et al. 1991. Chemical approach to contact dermatitis caused by household products: VIII. UV absorber Tinuvin P in polyurethane elastomers for fabric products. Eisei Kagaku. 37(3): 218-

228; Arisu, et al. 1992. Tinuvin P in as spandex tape as cause of clothing dermatitis. Contact Dermatitis. 25(5):311-316.) Blakey et al. (1994) reported no mutagenic activity associated with 5-methyl-1H-benzotriazole in a battery of in vivo and in vitro tests (Blakey, D. H. Et al. 1995. Mutagenic Activity of 3 industrial chemicals in as battery of in vitro and in vivo tests. Mutation Research. 320(4): 273-283).

In the absence of quantitative toxicity information on this class of chemicals, EA evaluated uncertainties associated with toxicity assessment of benzotriazoles in Section 6.5.3.3.

**COMMENT 141:** Chapter 6, Section 6.5.3.3, Page 87, Paragraph 5. The third sentence "Even though there has been some..., and toxic response." should reflect the use of plurals for "observation" and "responses", since several occur.

**RESPONSE:** The text is revised per reviewer's comment.

**COMMENT 142:** In addition, several values in the body of the text appear to not agree with values calculated from data in the Tables. These discrepancies are summarized as follows:

**Section 6.5.2.2, Page 81, Paragraph 2, Line 6.** The estimated total HIs for recreational users under average and RME conditions are 10.2 and 215.4, but values calculated from data in Tables 6-42 and 6-43 are 10.072 and 214.92. This may be due to the spreadsheet's rounding error. In the text, all HIs should be rounded to whole numbers (in this case, 10 and 215, respectively).

**RESPONSE:** The discrepancies listed above and below by the reviewer have been corrected in the text and the tables, accordingly. In some cases, discrepancies are due to rounding effects.

**Section 6.5.2.3, Page 83, Paragraph 1, Line 3.** The estimated total HI for consumers of locally caught shellfish under RME conditions is 200, but the values calculated from data in Table 6-46 is 120.

**Section 6.5.2.3, Page 83, Paragraph 2, Line 3.** The estimated cancer risk for consumers of locally caught shellfish under average conditions is  $3 \times 10^{-5}$ , but the values calculated from data in Table 6-47 is  $2.4 \times 10^{-5}$ .

**Section 6.5.2.4, Page 84, Paragraph 1, Line 6.** The estimated total HI for residential consumers of bedrock groundwater under RME conditions is 133.7, but the values calculated from data in Table 6-47 is 134.8.

**Section 6.5.2.4, Page 83, Paragraph 2, Lines 4 and 7.** The estimated total cancer risks for residents consuming deep ground water under average and RME conditions were  $8.6 \times 10^{-3}$  and  $2.6 \times 10^{-1}$ , but the values calculated from data in Table 6-49 are  $8.7 \times 10^{-3}$  and  $2.7 \times 10^{-1}$ . The estimated total cancer risk for residents consuming bedrock ground water under RME conditions was  $3.8 \times 10^{-2}$ , but the value calculated from data in Table 6-49 is  $3.7 \times 10^{-2}$ .

**COMMENT 143: Chapter 7, Section 7.8, Page 5, Paragraph 1, Last Sentence.** The statement "The other pathways...risks less than one in a thousand ( $1 \times 10^{-4}$ ), indicating that the cancer risks fall in the acceptable range.." is not completely true in that, in some cases depending entirely on the site specific circumstances, cancer risks within a range of  $10^{-6}$  to  $10^{-4}$  may justify the cause for action. Rewrite the sentence to read, "The soil and sediment exposure pathways posed low risks ( $7 \times 10^{-7}$  and  $2 \times 10^{-6}$ , respectively)."

**RESPONSE:** The referenced sentence is correct as written in the draft RI report. The reviewer's comment is a generalized statement that is then trying to be applied to this site. However, it has not been related to any specific Site 07 conditions/circumstances to justify the use of the requested rewrite.

**COMMENT 144: Chapter 7, Section 7.9, Page 6.** The EPA cannot at this time agree with the Navy's recommendations for this site. The hydrological characterization has not yet determined the discharge points of the plume and therefore the ecological sampling may not have been done in the optimal locations to be representative of the actual risks from the site. Furthermore, the EPA disagrees with the Navy's conceptual model of contaminant discharge 100 or more feet away from the shore. EPA feels that the Navy should evaluate the salt/fresh water interface for potential contaminant discharge points. Additionally the modeling, even with its current limitations, suggests that VOCs and metals are problematic and will need to be further examined in light of a revised conceptual model for the site.

**RESPONSE:** Please refer to updated Sections 3.7.5.2 ("Interpreted Ground-Water Flow Direction, Evaluation of Impacts from Saline/Salt-Water Wedge), 4.6.1.4 (Salinity), 4.6.2.3 (Phase III RI, VOC in Ground Water), 4.6.3.3 (Phase III RI, Metals in Ground Water), and 4.7 (Site Conceptual Model).

**COMMENT 145: Figure 4-1.** Suggest that for consistency, PCE and 112TCA be removed from the analytical results summary box for MW07-31. Only those contaminants which were present in detectable amounts are shown in the summary boxes for the remaining wells.

**RESPONSE:** PCE and 112 TCA have been removed.

**COMMENT 146:** **Figure 4-2.** According to the analytical results summary in Table 4-2, benzene was detected in MW07-10 at a concentration of 5  $\mu\text{g}/\text{kg}$  (14-16 ft bgs). The analytical results summary box for MW07-10 should be modified accordingly.

**RESPONSE:** In the legend of the figure, "Total" is defined as the sum of the chlorinated compounds (annotated with an \* in the list) detected in the associated sample. Benzene is not a chlorinated VOC.

**COMMENT 147:** **Figure 4-3.** The analytical results summary box for MW07-19 (last column, 38-38.5 ft bgs) does not appear to present the correct total. The total line for this column should read 80  $\mu\text{g}/\text{kg}$  to account for the presence of methylene chloride.

**RESPONSE:** Methylene chloride was rarely detected in the soil and may have been introduced by the lab. Therefore, it is not included in the "Total".

**COMMENT 148:** Figures 4-14 through 4-16; Additional well control (Shallow, Deep, and Bedrock) is need in the area between the western site shoreline and the source area (e.g. area north of MW07-25D). In addition, depending on the results of a revised conceptual model for the site, additional shallow well control may be required in the northeastern quadrant of the site; additional bedrock control may be needed in the southern shoreline are between MW07-21R and -16R.

**RESPONSE:** Except for perhaps 15-20 ft, the area west of MW07-25D is a wetland, ie. very soft and wet, resulting in very poor access for drilling. For the remainder of this comment, refer to Section 4.7 (Conceptual Model).

**COMMENT 149:** **Figure 4-15.** According to the analytical results summary in Table 4-4, the value for 12DCE in MW07-25D should read 29  $\mu\text{g}/\text{L}$  rather than 47  $\mu\text{g}/\text{L}$ . In addition, none of the values for MW07-25D correspond to the values listed in Table 4-4. These discrepancies should be resolved.

**RESPONSE:** The 1,2-DCE value is shown on Figure 4-15 as 29  $\mu\text{g}/\text{l}$ . However, all four of the values shown on Figure 4-15 are incorrect. They will be corrected to match that shown on Table 4-4.

**COMMENT 150:** **Figure 4-19.** It would be appropriate to extend the 1,000 microgram per liter contour to or near the shoreline based on the observed concentration in well MW07-21R. Also, the concentration of 3,639 shown on the map for this well is not consistent with the concentration

of 8,390 shown on the section in figure 4-26. An explanation for the difference would be appropriate.

**RESPONSE:** Figure 4-19 has been corrected to 8,390 for MW07-21R.

**COMMENT 151:** **Table 2-4, Well Sampling Ground-Water Quality Field Data.** Footnote states "Turbidity reading was not representative of the sample. Visual inspection of the sample indicated that the turbidity should have been < 100 NTU". What was the basis for this reason? Did the instrument malfunction? If so, why wasn't the other turbidity meter used (footnote list two turbidity meter for the survey)?

**RESPONSE:** Yes, the instrument malfunctioned. However, there were two field teams working simultaneously, so the "other" turbidity meter was not available.

## VOLUME II

### Appendix C, Groundwater Data IR Program Sites 03 & 07

**COMMENT 152.** Page 1, Sample Collection: Clarify, how the duplicate samples were collected using a retractable screened water sampler.

**RESPONSE:** Refer to the response to Comment #59.

**COMMENT 153:** Page 3, Sample Analysis. (Gas chromatography) Explain why an acetone standard was used to "evaluate the presence of fuel products or petroleum based solvents" instead of the BETX standards.

**RESPONSE:** The referenced sentence was mistakenly included.

**COMMENT 154:** Page 3, Sample Analysis. The section states that a "3-point instrument-response curve" was used for calibration. Identify the calibration range for the gas chromatograph. If unknown analytes were detected by the instrument, explain how this data was handled.

**RESPONSE:** Calibrations were performed in the range of 1-10  $\mu\text{g/L}$ . Standards were available only for the CVOC that were representative of the CVOC detected in ground-water during the Phase I and II RIs.

**Responses to RIDEM'S Review Comments**  
**Draft Phase III Remedial Investigation IR Program Site 07, Calf Pasture Point**  
**Naval Construction Battalion Center**  
**Davisville, Rhode Island**

**COMMENT 1: List of Abbreviations and Acronyms.**

Please add the following acronyms: HSA (Hallow Stem Augur), FJ (Flush Joint), and WL1 Water Level Indicator).

**RESPONSE:** These three acronyms have been added to the list of abbreviations and acronyms.

**COMMENT 2: Page 1-11, Section 1.2.3.4, Study Area Screening Evaluation; Paragraph 2, Last Sentence.**

This sentence states that at the time of this investigation Rhode Island had no cleanup standards except for lead. Please note that at the time of the study area screening evaluation Rhode Island had a cleanup standard of 10 ppm for PCBs. The sentence should be revised to reflect this.

**RESPONSE:** PCB were not detected, nor are they listed on Tables 6-2 & 6-3 of Appendix A-5; therefore, they have nothing to do with the cleanup standards needed for the SASE and should not be included there.

**COMMENT 3: Page 2-5 & 6, Section 2.3.2.2, Stage 2 (Hydroprobe Survey); Last Sentence Page 1-5, First Sentence Page 2-6.**

*However, based upon the Phase geological units, i.e., not one common horizon within the silt unit as planned.*

Words seem to be missing between the words Phase and geological. Please complete sentence.

**RESPONSE:** The sentence on the draft RI was complete as follows: "However, based upon the Phase III RI boring logs, the intermediate depth hydroprobe samples were actually from a variety of geological units; i.e., not one common horizon within the silt unit as planned"

**COMMENT 4: Page 2-9 & 10, Section 2.4.1.2, Sample Analysis; Whole Section.**

Please state for the reader, in the text, what modifications were made to EPA Methods 3810, 8010, and 8020.

**RESPONSE:** These methods were modified as stated in the Work Plan addendum.

**COMMENT 5:** Page 2-14, Section 2.4.5, Well Development; Paragraph 2, Sentence 8:

This sentence states that development of the well continued until the turbidity was less than 100 NTU. 100 NTU is a very turbid water. Please explain why the development did not occur until the turbidity was much lower such as 5 or 1 NTU.

**RESPONSE:** Some wells seemed to reach a point at which further reduction in turbidity did not seem feasible. It was assumed that the low flow sampling method and field filtering would further aid in the reduction of the turbidity in the future collection of a sample for chemical analysis.

**COMMENT 6:** Page 2-16, Section 2.4.6.2, Purging and Sampling; Paragraph 4, Sentence 1.

(December 1996) should be (December 1995).

**RESPONSE:** 1996 will be changed to 1995.

**COMMENT 7:** Page 3-11, Section 3.7.5.5, Hydraulic Testing; Paragraph 3, Last Sentence.

Please note that with proper treatment GB groundwater can be suitable for human consumption.

**RESPONSE:** The referenced sentence was deleted because it was inadvertently included, but does not belong there.

**COMMENT 8:** Page 4-2, Section 4.4, Background Results; Paragraph 1, Sentence 1.

This sentence states that background groundwater have not been established at this time. Please note that background concentrations have been established as part of the basewide groundwater study.

**RESPONSE:** The sentence has been changed to state that "background concentrations of inorganic analytes in ground water at NCBC have been proposed (Table 4-1B)".

**COMMENT 9:** Page 4-15, Section 4.6.3.3, Phase III RI; Paragraph 1, Sentence 2.

This sentence states that there are no GB groundwater criteria in Rhode Island. Please revise this sentence to state that the Remediation

Regulations, as amended in August 1996, contained standards for GB, groundwater.

**RESPONSE:** The origin sentence states that " there are no established criteria for concentrations of metals in Class GB..." and is correct as stated.

**COMMENT 10:** **Page 5-13, Section 5.2.2.5, BOD/COD; Whole Section**

The Navy notes that for this phase of the investigation BOD/COD was not evaluated. Since the Navy is proposing no further action the evaluation of this parameter would seem prudent to determine if the contaminants are amenable to degradation.

**RESPONSE:** If natural attenuation is considered, BOD/COD will be considered for inclusion in potential sampling program.

**COMMENT 11:** **Page 5-14, Section 5.2.3.2, Site Topography and Atmospheric Mixing; Paragraph.**

This paragraph notes that the evaluation of the site and adjacent area ranges from MSL to 20 ft. The 55 ft high rock outcrop should also be noted.

**RESPONSE:** The reviewer has changed the wording in this paragraph. Actually the referenced paragraph is correct as stated and is meant to be related to the area where the DANC was released and areas down gradient.

**COMMENT 12:** **Page 5-22, Section 5.3.6.2, Estimated Shoreline Concentration - VOC; Paragraph 1, Sentence 3.**

Please provide a reference for the porosity value of 0.3. Typically a value of 0.2 has been used in the past for sites at NCBC. In addition, please explain why a TOC value of 0.75% is used when other analyses are based on either 1 or 5% TOC.

**RESPONSE:** A porosity value of 0.3 was selected to be representative of the more gravelly till material within which the detected VOC plume is present; evaluations at other sites; e.g., Site 09, were through more sandy material. The TOC value of 0.75% is representative of the subsurface soil while the 1-5% TOC values are representative of surface sediment in the intertidal zone.

**COMMENT 13:** **Page 5-30, Section 5.3.7.3. Plume Extension Under Allen Harbor - VOC; Paragraph 1.**

This paragraph states that the model was used to extend the VOC concentration 1000 feet beyond the shoreline. Please be advised that samples from the harbor will be needed to validate the model. This may be undertaken as part of the groundwater studies to be done for the Allen Harbor Landfill. Therefore, the State does not agree, at this time, that a no further action is prudent for this site.

**RESPONSE:**

Sediment samples were collected from Allen Harbor and the Entrance Channel during the Marine Ecological Risk Assessment in the areas adjacent to Site 07 where discharge may be expected when a saline water wedge is considered. No definitive connection/pathway from Site 07 was apparent.

**COMMENT 14:**

**Page 6-10, Section 6.2.1.2, Environmental Sampling Data Management and Evaluation (Shellfish Sampling); Paragraph 2.**

This paragraph states that the Navy has assumed, for the purposes of this risk assessment, that people deplete their shellfish prior to consumption and that nondepleted shellfish samples are not representative of actual human exposures to shellfish. Please be advised that many people both obtain and consume shellfish directly at the beach, hence depletion would not occur. Therefore, these sentences should be revised to reflect this. It is assumed that there would be greater risk to consuming nondepleted shellfish than there is to depleted shellfish. Since the risk analysis demonstrated unacceptable risk under average and reasonable maximum exposure scenarios to consuming depleted shellfish there, it is not necessary to perform an analysis for nondepleted shellfish, however, these issues should be so noted in the text.

**RESPONSE:**

The following has been added to the paragraph. "However, it should be noted that there would be greater risk to receptors consuming nondepleted shellfish than to receptors consuming depleted fish. Since the potential risks for consumption of depleted shellfish in this HHRA are estimated to be unacceptable under both average and reasonable maximum exposure conditions the analysis is not repeated for nondepleted shellfish consumption exposure scenario."

**COMMENT 15:**

**Page 6-10, Section 6.2.1.2, Environmental Sampling data Management and Evaluation (Shellfish Sampling); Paragraph 3, Sentence 1.**

This sentence notes that butylins are more relevant to an ecological risk assessment than they are to a human risk assessment and as such were not included in this HHRA. For the general public please explain in more detail why this is so.

**RESPONSE:** Butyltin results have been incorporated into the HHRA. However, in the absence of toxicity values for butyltin compounds, the potential health effects on consumers of shellfish containing butyltin residues are qualitatively discussed in Section 6.5.2.6. The uncertainties associated with butyltin exposure via shellfish consumption are discussed in Section 6.5.3.3.

**COMMENT 16:** **Page 6-12, Section 6.2.1.3, Risk-Based Concentration Screening; Paragraph 3, Sentence 1.**

*Finfish RBCs were applied to shellfish data.*

Please explain why finfish data can be used for shellfish. It seems inconsistent since most shellfish are scavengers whereas most finfish are not, hence a different diet.

**RESPONSE:** RBCs are developed using conservative exposure assumptions, and they correspond to a fixed risk level (i.e., cancer risk of one in one-million or hazard quotient of unity for health effects other than cancer). They provide a measure of concentration of a chemical in a given media that is protective of human receptors who may be exposed to that chemical via a potential media-specific exposure pathway. The reviewer assumes that RBCs are an analytical measurement of tissue concentration in shellfish, and thus it is important to differentiate between shellfish and finfish due to their different dietary habits. However, the development of RBCs are a mathematical exercise which relies on conservative exposure assumptions. This HHRA, thus, used RBC values for finfish due to the appropriateness of using conservative exposure assumptions such as consumption rate in deriving finfish RBCs for shellfish.

**COMMENT 17:** **Page 6-71, Section 6.4.2.5, Human Exposure Pathways (Future Recreational Users); Paragraph 1, Sentence 1.**

*Once remediation activities are completed, the landfill will have been capped and Site 07 will become a conservation area with a limited potential for recreational development.*

Please explain where the landfill is on Site 07 that requires capping.

**RESPONSE:** Site 07 does not contain any landfill. The mistake is corrected per reviewer's comment.

**COMMENT 18: Page 7-6, Section 7.8, Human Health Risk Assessment; Paragraph 1.**

Please be advised that prior to transfer of Calf Pasture Point to another owner restrictions preventing the use of groundwater will be required.

**RESPONSE:** The reviewer's comment is noted.

**COMMENT 19: Table 6-3, Selection of Chemicals of Concern from List of Detected Analytes in Sediments.**

Please be advised that many of the Risk-Based Concentrations noted in this Table are higher than the soil standards in the Site Remediation regulations which are also risk-based. This is particularly true of the metals. The values in this column should be changed to reflect the more conservative Rhode Island standard where it is applicable.

**RESPONSE:** Table 6-3 is revised to address reviewer's comments. Wherever necessary, RIDEM's direct exposure criteria is compared against the maximum concentration detected at the site in onsite media or in selected offsite media (sediment and shellfish in the intertidal zone adjacent to the site).