DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE, NORTHEAST
4911 SOUTH BROAD STREET
PHILADELPHIA, PA 19112-1303

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January 26, 2009

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NCBC DAVISVILLE
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Ms. Christine Williams
U.S. Environmental Protection Agency, Region I
1 Congress Street Suite 1100 (HBT)
Boston, MA 02114-2023

Mr. Richard Gottlieb
Office of Waste Management
Rhode Island Department of Environmental Management
235 Promenade Street
Providence, RI 02908-5767

Dear Ms. Williams/Mr. Gottlieb:

The Navy's responses to EPA and RIDEM comments on the Draft Phase III Remedial Investigation (RI) Report for Site 16, dated September 2008, are provided as Enclosures (1) and (2), respectively. The EPA comments were submitted to the Navy in correspondence dated November 17, 2008. The RIDEM comments were submitted to the Navy in correspondence dated December 12, 2008.

Per our discussions during the BRAC Clean-up Team (BCT) meeting of January 22, 2009, the EPA and the Navy agree that the Navy should proceed with preparation of the Feasibility Study (FS) for Site 16. The Navy acknowledges that discussions regarding the need to re-perform certain investigative work (re-sampling/re-development of select Site 16 wells) should continue in order to determine if such work is necessary to support the completion of the FS and/or Remedial Design for the Site. Per our discussions of January 22, 2009, the EPA will advise the Navy in the near future regarding available dates and times (in early February) convenient to EPA technical staff for the proposed discussions.

The Draft Final version of the Phase III RI document is being prepared based on the information contained in the attached enclosures as well as Navy correspondence dated January 16, 2009 which provided responses to hydrogeological-specific comments presented in EPA correspondence dated November 3, 2008 and December 23, 2008. Please call if you would like to discuss the information provided in Enclosures 1 and 2 or in Navy correspondence dated January 16, 2009. Per section 7.6 of the Federal Facilities Agreement, the Navy will be publishing the Draft Final version of the Phase III RI report in approximately 45 days.

If you have any questions, please do not hesitate to contact the Remedial Project Manager, Mr. Curt Frye, at 215-897-4914.

Sincerely,

David Barney
BRAC Environmental Coordinator
By direction of BRAC PMO

Enclosures:

1. Navy Responses to EPA Region I comments on the Site 16 Draft Phase III RI Report (EPA comments dated 17 NOV 2008).
2. Navy Responses to RIDEM comments on the Site 16 Draft Phase III RI Report (RIDEM comments dated 12 DEC 2008).

Copy to:
Mr. Curt Frye, NAVFAC Midlant (1 copy)
Mr. Richard Gottlieb, RIDEM (1 copy)
Ms. Kathleen Campbell, CDW (2 copies)
Mr. Steven King, Quonset Development Corporation (1 copy)
Mr. Jon Reiner, Town of North Kingstown (1 copy)
Ms. Ellen Iorio, U.S. Army Corps of Engineers (1 copy)
Mr. Joe Logan, TtNUS Pittsburgh (1 copy)
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ENCLOSURE 1

RESPONSE TO COMMENTS DATED NOVEMBER 17, 2008
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
DRAFT PHASE III REMEDIAL INVESTIGATION REPORT FOR SITE 16
NAVAL CONSTRUCTION BATTALION CENTER
DAVISVILLE, RHODE ISLAND

Enclosure 1
January 26, 2009

RESPONSE TO COMMENTS DATED NOVEMBER 17, 2008
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
DRAFT PHASE III REMEDIAL INVESTIGATION REPORT FOR SITE 16
NAVAL CONSTRUCTION BATTALION CENTER
DAVISVILLE, RHODE ISLAND

GENERAL COMMENTS

Comment No. 1: Hydrogeologic Summary *- Contaminants may or may not be migrating onto the Site 16 site from the up gradient boundary. However, the new up gradient ground water monitoring wells have not yielded useable data due to lack of adequate development and sampling breaks. As such, the conceptual site model cannot be completed.*

The presentation of ground water velocities and transport times from the up gradient Site 03 area to the area of Building 41 contained in the Phase III Remedial Investigation is unsupported for the deep overburden and non-existent for the shallow bedrock. Additional hydraulic conductivity testing is also needed for up gradient areas.

Based upon the available data there are clear indications that ground water can travel from the up gradient Site 03 area to Building 41 much faster than presented in the Phase III Remedial Investigation Report, potentially in 25 to 30 years in the deep overburden and in the shallow bedrock.

The existence of upward ground water gradients from the shallow bedrock to the deep overburden indicates that shallow bedrock ground water discharges to the deep overburden in the Site 16 area at the eastern end of Building 41.

The presence of 1,1,2,2 trichloroethane related compounds, including ethane in the shallow bedrock, also suggest that ground water may have traveled in deep overburden zones of preferential ground water flow or in shallow bedrock fracture zones from up gradient.

The presence of chloroform also indicates migration of ground water and CVOC from up gradient. The chloroform likely derived from the disposal of DANC at an up gradient location, most likely the Nike PR-58 site. The down gradient distribution of chloroform correlates with ethane related compounds, elevated TCE, and upward vertical gradients

There has been no convincing documentation that a major release occurred beneath the Building 41 area near the former TCE still. Contaminant distribution, stratigraphy, hydraulic gradients all indicate a relatively minor source area limited to the shallow and intermediate ground water zones. Review of the data does not indicate the presence of 1, 1, 2, 2 trichloroethane related compounds in MW16-30D, MW16-77I, or MW16-85"D" in the vicinity of the former TCE still area.

The North-Central Area has not been adequately nor appropriately characterized in terms of it importance to the conceptual site model as a major, if not the major, source area. The BTEX "hot spot" area as well as fate and transport analysis of past CVOC releases in that area including the BTEX "Hot Spot", Fire Fighting Training Area, and the Creosote Dip Tank Area has not been addressed. This area is a major source area for Site 16 CVOC contamination.

Response: Specific Navy responses to the comments listed in General Comment No. 1 are provided in responses to General Comments Nos.16 through 22 as well as in Navy correspondence dated January 16, 2009 (regarding EPA hydrogeological comments dated November 3, 2008 and December 23, 2008). Also, while the Navy does not concur with EPA that the North-Central Area has not been adequately or appropriately characterized for purposes of the RI, the comment provided is general in nature and does not specify "why" the EPA believes that the North-Central Area has not been adequately characterized. Please note that 53

additional borings were advanced in the North-Central Area during the Phase III Remedial Investigation. Several hundred soil samples were collected during the investigation (over 100 soil samples analyzed by the fixed-base lab for VOCs) and profiling of CVOC and residual PAH contamination, in particular, was very aggressive. Additionally, the Phase III Remedial Investigation successfully identified a BTEX "hot spot" (not previously identified) and excavated exploratory test pits (not originally scoped in the Phase III QAPP) to further delineate the extent of contamination. Finally, based on the results of the Phase III human health risk assessment, the collection of additional data has been proposed for the North-Central Area to support the Feasibility Study (FS) and potential remedial designs that may be necessary for this portion of Site 16. Please note that the Navy, RIDEM, and EPA met in May 2008 to discuss potential RI data gaps that might impact the preparation of the Phase III RI report. At that time, and again at the September 25, 2008 BCT meeting, the EPA indicated that the only significant data gap was the re-sampling/re-development of certain upgradient monitoring wells to assure that the samples from such wells were representative of upgradient water quality.

Comment No. 2: Human Health (General) *- Several EPA comments related to HHRA submitted on the Phase III Remedial Investigation Quality Assurance Project Plan have not been incorporated into this Phase III. These include the following:*

Comment No. 2a: *EPA recommended that risk to the future indoor worker and future resident include an evaluation of risk due to inhalation of VOCs that may have migrated from groundwater to indoor air. This pathway in the HHRA but the pathway is not recognized in Table 6-27 or 6-28 or discussed in Section 6.2.4.6. The report should address this pathway consistently.*

Response: Per the Phase III QAPP, this pathway was included in the HHRA. The methodology for evaluating the risk due to inhalation of VOCs that may have migrated from groundwater to indoor air is discussed in Section 6.2.4.8. The exposure factor assumptions used in the vapor intrusion analysis will be added to Tables 6-27 and 6-28.

Comment No. 2b: *Residential exposure to surface water and sediment was not evaluated as requested.*

Response: As stated in the Navy's Responses to EPA Comments on the Draft Phase III QAPP dated September 20, 2006, residential exposures to surface water and sediment would be evaluated only if Allen Harbor was determined to have been impacted by Site 16 source areas. However, the conclusion of the supplemental forensics evaluation (Appendix F) was that the sediments in Allen Harbor had not been impacted by the Site 16 source areas, therefore residential exposures to surface water and sediment were not formally evaluated. However, conservatively, risks to recreational receptors exposed to surface waters/sediments were evaluated. Given the conservative exposure factor assumptions used to evaluate the recreational receptor, it is anticipated that a residential receptor would be exposed in a similar manner (e.g., similar exposure frequencies, etc). The following text will be added to the discussion of potential exposure pathways for hypothetical residents on page 6-24. "Potential exposures to surface water and sediments are expected to be similar to those of recreational users."

Comment No. 2c: *Risk to the construction worker from incidental ingestion of groundwater was not evaluated as requested.*

Response: The reviewer is correct. This pathway will be added to the HHRA. However, please note that risk estimates for a construction worker exposed to COPCs as a result of incidental ingestion of groundwater while working tend to be insignificant unless the shallow groundwater unit is extremely contaminated. It is anticipated that the conclusions of the HHRA will not be changed as a result of the inclusion of this exposure pathway.

Comment No. 2d: *The EPA request to evaluate inhalation risk by comparing indoor air concentrations with inhalation reference concentrations and inhalation unit risk values rather than comparing calculated and reference doses has not been incorporated.*

Response: The Navy is aware that EPA is currently developing methodology for using inhalation reference

concentrations and inhalation unit risk values to evaluate air concentrations. This methodology, referred to as RAGS Part F, is still under development and is not currently available to the public. The Navy again requests that the EPA forward the referenced methodology so that it may be evaluated for inclusion in the HHRA for Site 16.

Comment No. 2e: *The EPA requested Fraction Ingested (FI) value of 1 for sediment exposure pathways has not been incorporated. Rather, as shown in Table 6-27 and 6-28, an FI of 0.5 was used.*

Response: Please note that the shoreline of Allen Harbor abutting Site 16 is covered with rocks and erosion control boulders making it difficult to come into contact with the sediments. Additionally, the sediments are covered with several feet of water. Consequently, in this particular case, a FI of 0.5 is very conservative exposure factor value for incidental ingestion of sediment pathway. Also, the HHRA has already identified the carcinogenic PAHs as chemicals of concern in Allen Harbor sediments. Increasing the FI from 0.5 to 1 will not change the conclusions of the HHRA. Finally, please note the environmental forensics analysis presented in Appendix F which indicates that the PAHs in the Allen Harbor sediments do not appear to be a consequence of Site 16-related activities.

Comment No. 3: *EPA does not agree with the elimination of chemicals as COCs based on background because EPA has not approved the selection of NCBC background samples for soil or groundwater. Navy has stated that all chemicals exceeding risk screening levels were identified as COPCs, regardless of background, and that all COPCs were carried through the risk assessment to the point of COC selection. However, Navy states that chemicals that did not exceed background were not selected as COCs. Therefore, the final cumulative risk is underestimated by an unquantified amount. Since the background sample selection was not approved by EPA, Navy should provide a table that quantitatively compares the cancer and noncancer risks of all COPCs (Table 9s) with the cancer and noncancer risks of all COCs (Table 10s). Navy should then identify those exposure scenarios and media for which the risk conclusions are significantly different. For instance, it is stated in Section 6.4.3.1 that the HI for a construction worker exposed to surface soil in the Northwest Undeveloped Area, the Southeast Undeveloped Area and the Developed Area was within acceptable levels on a target organ basis when only site-related chemicals are included in the calculation. This infers that adding the risk of background chemicals to the risk of COCs would render the total risk unacceptable. In addition, Navy should provide a map that identifies the location of all samples used as basewide NCBC background. This map should also identify features that might help to assure EPA that the locations are in areas without previous industrial development, such as aerial photos or maps that include the* locations of buildings, roads, and parking lots.

Response: Figures will be added showing the location of background samples. In addition, as requested, the attached table (comparing cancer risk and hazard index estimates for the all COPCs versus the risk estimates developed only for those COPCs believed to be present above background concentrations) will be added to the uncertainty section of the human health risk assessment. (Enclosure 1, Attachment 1).

With few exceptions, the risk estimates presented in the attached table indicate that the inclusion or exclusion of chemicals as COPCs on the basis of a background screen has very limited impact on the risk management decisions for Site 16 soils. It should be noted that the hazard indices for the construction worker on the attached table are primarily a function of a conservative inhalation reference dose for aluminum. However, as detailed in the qualitative background screening evaluation for soils in Appendix D.1, it is very unlikely that aluminum is present in the Site 16 soils at concentrations exceeding background. For example, the maximum detected aluminum concentration in the surface soils of the undeveloped area was 8,590 mg/kg. This concentration is less than all of the background benchmarks presented in Appendix D.1 and the plotting of the available data does not suggest any unusual data points or outliers that might be indicative of a subset of data points exceeding background conditions. In contrast, for example, a few of the arsenic concentrations in the surface soil of the undeveloped area may exceed background conditions based on the data plots and benchmark comparisons presented in Appendix D.1. (The reader should note that the inclusion of arsenic as a COPC for the surface soils is very conservative. The arsenic concentrations reported for the soils of the undeveloped area are well within the range of background arsenic concentrations reported in the literature.) In contrast to aluminum and arsenic, the evaluation presented for copper, lead, and zinc (for example) in the

surface soils of the undeveloped area suggest that these metals likely do exceed background conditions. (Please see that attached example Appendix D.1 graphs which support this response.)

It should be noted that qualitative background evaluation for soils presented in Appendix D.1 is based, in part, on methodology presented in the following Navy reference:

- NAVFAC Seminar: Environmental Background Analysis - Geochemical and Statistical Methods. Presented by the Naval Facilities Engineering Command and Battelle Memorial Institute, July 2000. (The reader is referred to Section 8, in particular: Onsite Background Analysis.)

The Navy acknowledges that this approach is more qualitative than quantitative, relies on the professional judgment, and was utilized because a Site 16-specific soil background data set is not currently available. As detailed in the Phase III QAPP for Site 16 and because the predominant contaminants at Site 16 are organics (i.e., CVOCs and PAHs), the Navy decided not to develop a site-specific background soil data set unless needed to support risk management decision-making. As noted above, the risk estimates presented on the attached indicate that this is not the case.

Regarding the background screening evaluation for groundwater, please note that a Basewide NCBC Davisville background groundwater dataset was presented in the Stone & Webster Environmental Technology Services (June 1996) Basewide Inorganics Groundwater Study Report, December 1996. As detailed in Appendix D.1, this background data set was used to conduct a background screen of metals detected in groundwater at Site 16. However, the risk assessment of chemicals detected in the Site 16 groundwater samples was based on concentrations detected in unfiltered groundwater samples. Very few metals were eliminated as COCs in the unfiltered samples on the basis of the background screen. As discussed in the Phase III RI, the metals concentrations detected in the groundwater appear to be a function, in part, of turbidity. Consequently, the use or non-use of the background screen to determine Site 16 COCs has limited impact on risk management decisions for groundwater at Site 16.

Comment No. 4: *It is noted that COPC screening was conducted using industrial soil screening levels for selection of COPCs that would be carried through the risk assessment for industrial receptors. Therefore, the results of these risk assessments for industrial receptors are useless for making conclusions concerning future residential risk. Therefore, institutional controls will be necessary to prevent residential use of these areas despite current zoning.*

Response: While chemical concentrations detected in soils were indeed compared to industrial soil screening levels, COPCs for the HHRA were selected using residential screening criteria. Table 6-23 presents the COPCs that were evaluated in the HHRA. The COPCs presented in Table 6-23 for direct contact with soil are those chemicals which exceed the residential screening criteria in Tables 6-1, 6-4, 6-7, and 6-10. The same set of COPCs was used to evaluate potential exposures by all receptors. The following text will be added to end of the second paragraph on page 6-5: "However, these Screening Levels will not be used for COPC selection; they are included for informational purposes only."

Comment No. 5: *It is noted that remedial goal options are identified for individual COCs for each receptor group that exceeded an ILCR greater than 1E-05 and HI = 1. The feasibility study should demonstrate that the remedial goals for all COCs for a receptor group and medium provide a cumulative risk that is within EPA's acceptable risk range. As an example, it is noted that the Remedial Goal Options for soil for hypothetical child residents at the 1E-04 risk level include concentrations for three chemicals (carcinogenic PAHs, dioxins/furans, arsenic). If all three chemicals occur at the Remedial Goal Option concentration in soil, the cumulative cancer risk would be 3E-04, which is higher than EPA's acceptable risk range.*

Response: Commented noted. This information is presented for informational purposes only. The issue will be addressed in the Feasibility Study for Site 16.

Comment No. 6: *It is noted at Section 6.4.3.1 that the high levels of PAHs in the vicinity of location SB16-A3-12 will require further investigation, and that they were not included in the risk assessment. In the uncertainty*

section, please identify whether any of the risk conclusions would be changed if the data were included in the soils database. Also please include this further evaluation in the feasibility study.

Response: A discussion regarding location SB16-A3-12 will be added to the uncertainty section as requested. Please note that the benzo(a)pyrene equivalent concentration in surface soil (58 mg/kg) at location SB16-A3-12 is approximately 4,000 times higher than the residential screening level of 0.015 mg/kg. Because the concentrations of PAHs at location SB16-A3-12 are so highly elevated when compared to the other locations in the Developed Area, it would not be appropriate to evaluate the Developed Area as a single exposure unit in the HHRA (including the data for location SB16-A-12). For example, evaluating the Developed Area as a single exposure unit could dilute the impact of the elevated PAH concentrations at location SB16-A3-12. Also, it is not advisable to characterize an exposure unit or even a "hot spot" area using the results for a single soil boring. Consequently, the HHRA recommended further investigation of location SB16-A3-12. The results of the additional investigation/evaluation will most likely be added to the final version of the FS report for Site 16.

Comment No. 7: *No unacceptable risk was identified from exposure to lead in soil, but the subsurface soil EPC needs to be explained. The average subsurface soil concentration used for the model was 161 p mg/kg, for the Northwest Undeveloped Area. Higher mean concentrations for the Undeveloped Area are presented for subsurface soil in Table 3.2.RME Exposure Point Concentration Summary Reasonable Maximum Exposure. This table presents an arithmetic mean of 185 mg/kg and an arithmetic mean of 1140 mg/kg in the EPC columns. Please clarify why 161 mg/kg was selected in lieu of these higher concentrations as the representative EPC for exposure to lead.*

Response: The referenced value of 1140 mg/kg is the upper 95 percent UCL concentration and not the arithmetic mean concentration. The exposure point concentration in Table 3.2.RME will be corrected to be 185 mg/kg and the adult lead modeling will also be revised accordingly. Note that this does not change the conclusions of the lead modeling.

Comment No. 8: *Risk to residents and industrial workers was determined based on soil vapor samples. Results are summarized for Building E-107, the Undeveloped Area, and Former Building 41 in Tables 6-42 and 6-43. While the risk results are supported, based on the concentrations detected in soil vapor samples, it is not clear that all appropriate areas were adequately covered. For example, the maximum concentrations of tetracholoroethylene and trichloroethylene in shallow groundwater were not detected within the area covered by Building E-107, the Undeveloped Area, and Former Building 41 but were detected in an area south of Former Building 41. Please confirm that areas with the highest groundwater concentrations of VOCs were represented by the soil vapor samples.*

Response: The soil gas samples were collected at the locations identified in the Phase III RI QAPP. Emphasis was placed on TCE (as a chemical of potential concern) and on selecting areas with relatively significant impacts identified in shallow and or intermediate depth wells, and also on historical operations/suspected source areas. The maximum TCE concentration in the shallow groundwater samples collected in 2007 was 180 ug/L reported for MW16-78S/TW16-108S located in the immediate vicinity of the former TCE still area. (Please see Figure 4-25.) (This area was targeted for soil gas sampling.) The maximum concentration had previously been reported for MW16-37S (2002 data = 840 ug/L); the 2004 and 2007 results for this well were 93 and 30 ug/L, respectively. (Please see Tables 4-41, 4-42, 4-43). Please note that soil gas samples were collected near Building E-107 to address community concerns relating to current and potential future occupancy of the building. The Feasibility Study for Site 16 will evaluate the potential need for institutional controls for elimination of exposures through vapor intrusion across the Site 16 area.

Comment No. 9: *Some chemicals eliminated as COPC because they lacked screening levels should not be eliminated. Some chemicals without screening levels were eliminated as COPC based on NTX (e.g., dioxins/furans in Table 6-2; phenanthrene and benzo(g,h,i)perylene in Table 6-3; phenanthrene and acenaphthylene in Table 6-9). These chemicals should be carried through as COPC, but the lack of toxicity values should be discussed in the risk characterization. Other chemicals were eliminated supposedly because maximum concentrations were below screening levels (BSL). In some cases, BSL was not an appropriate*

category for elimination because screening levels were not available (e.g., dibenzofuran in soil). Such chemical should be maintained as COPC.

Response: The COPC selection tables will be reviewed to assure that the "BSL" is applied properly in all cases. Chemicals without toxicity criteria will be retained as COPCs and discussed in the uncertainty section. Note that dioxins/furans were retained as COPCs and evaluated in the risk assessment.

Comment No. 10: *The last page of each of the screening/COPC selection tables (Tables 6-1 through 6-20) lists the samples addressed by the table. Please remove the column headings on these pages as they do not correspond with the sample lists and are confusing.*

Response: The column headings will be removed from the last page the COPC selection tables when the last page only contains the sample locations.

Comment No. 11: *The COPC selection tables, starting with Table 6-1, presented USEPA SSL soil to air and soil to groundwater screening values. The reviewer was not able to replicate the values listed in the tables. Please clarify the constants that were selected for the model input.*

Response: The soil to air and soil to groundwater values presented in Table 6-1 were downloaded from USEPA's Soil Screening Level calculator Internet site located at: http://rais.ornl.gov/epa/ssl1.shtml. The values were calculated using the default assumptions provided on the Internet site. Note that the values presented on the Internet site are not always the same as those published in the 1996 and 2002 Soil Screening Guidance documents because the values from the Internet site are calculated using the most current toxicity criteria.

Comment No. 12: *The ecological risk assessment (ERA) lacks a section describing the data used to assess ecological risk. The ERA should describe the surface soil data set, describe where samples were collected on the site (or refer the reader to sections of the RI where this description is made), and provide a list of samples used to evaluate ecological risk.*

Response: Agree. A sample list will also be added to Table 7-1 COPC Selection to identify the samples used in the ERA.

Comment No. 13: *The site description in the ERA should include the site acreage for the undeveloped area.*

Response: Agree. The acreage will be added to Section 7.2.1 Environmental Setting.

Comment No. 14: *The ecological risk assessment has not presented an evaluation of risk to plants or invertebrates. Section 7.4.1 states that Table 7-4 provides this evaluation. Table 7-4, however, presents a summary of less conservative HQs for wildlife, not an evaluation of risk to plants and invertebrates. Please add this evaluation to the risk assessment.*

Response: Table 7-4 COPC Refinement was inadvertently left out of the document. The Table will be added and the other tables will be renumbered accordingly.

Comment No. 15: *Cobalt was selected as an ecological COPC in Table 7-1 because the maximum site soil concentration (13.6 mg/kg) exceeded the screening value of 13 mg/kg. Cobalt was not carried through the food chain model, however. Please include cobalt in the food chain model calculations.*

Response: Disagree. Cobalt was not included in the food chain model because the maximum detected concentration was less than both the Avian and Mammalian Eco SSLs (120 mg/kg and 230 mg/kg, respectively). For clarification, the following text will be added to Section 7.3.4 under Terrestrial Wildlife; "Table 7-3 and 7-5 present the results of the conservative food chain models for soil receptors. The EPA Eco SSLs listed in Table 7-1 are the lower of the plant, invertebrate, or wildlife (mammal or bird) screening level to be conservative in the screening step."

In many cases, the wildlife screening level is the value presented in Table 7-1. Also, the maximum detected concentration for the chemical may be lower than the wildlife screening level, but may be greater than the screening level presented on Table 7-1. Chemicals that are detected at concentrations lower than the wildlife screening levels were not included in the conservative food chain model for terrestrial receptors exposed to chemicals in soil. Therefore, cobalt was excluded from the food chain model because the maximum detected concentration was less than both the Avian and Mammalian Eco SSLs (120 mg/kg and 230 mg/kg, respectively)."

Comment No. 16: *Key highpoints that are germane to the completion of the hydro geological portion of the remedial investigation are discussed in this review. Those major areas are as follows:*

1. *Ground water quality data from new up gradient monitoring wells is unacceptable.*
2. *The interpretation of up gradient ground water transport times is not supported.*
3. *There are strong chemical indicators of contaminant contribution from an up gradient Source.*
4. *There has not been documentation of a significant contaminant release at the former Building 41 Area so as to support the interpretation of it being the major source area.*
5. *Contaminant source areas within the North Central Area appears to be major rather than "minor to moderate" contributors to Site 16 contamination.*

Response: Specific Navy responses to each of the five key highpoints identified by EPA are provided in Navy response to General Comment's numbers 17 through 21.

Comment No. 17: Hydrogeological General Comment 1.0 Up Gradient Ground Water Quality Data - *The validity of the ground water quality data from the new wells in the up gradient boundary is for the most part not useable in its present form and constitutes a major data gap for this remedial investigation. This issue has been raised numerous times during the Triad process, well before completion of this remedial investigation. The concerns expressed were not addressed. Because of the inadequacy of the ground water quality data, resolution of whether there is potential contribution of chlorinated volatile organic compounds (CVOC) from an up gradient source area from Site 16 cannot be made at this time. This issue was detailed in a letter to the Navy dated November 3, 2008. As of the date of this comment letter, EPA has not heard back from the Navy concerning this issue. Additional comments will not be made at this time on this issue.*

Response: The Navy does not agree that the groundwater data for the new wells in the upgradient area is "for the most part unusable." Navy rationale concerning this issue was previously submitted to EPA in correspondence dated January 16, 2009 which provided the Navy response to the hydrogeological comments submitted by EPA in letters dated November 3 and December 23, 2008.

Comment No. 18: Hydrogeological General Comment 2.0 Up Gradient Ground Water Transport Times (Deep Overburden) - *The assessment of up gradient ground water travel times to the "Area between Building 39 and 41" is not supported. The calculation of travel times incorporated a geometric mean for hydraulic conductivity of the deep overburden that uses data from the entire site. This approach is inappropriate and unacceptable. First, it discounts heterogeneities in the deep overburden such as buried stream channels and/or highly weathered upper rock zones. This can be observed by evaluation of the soil boring logs that show deep overburden zones with descriptions of soils consisting primarily of gravel, while others consist primarily of sands with silt.*

Evaluation of the hydraulic conductivity data in Table 3-8 shows an extreme range of hydraulic conductivity values for the deep overburden. For instance, MW16-01D (2.77 ft/day) and MW16-08D (47.01 ft/day); MW16-09D (1.19 ft/day) and PGU-Z3-10D (53.81 ft/day); MW16-69D (1.05 ft/day); INJ16-01D (19.20 ft/day); MW16-17D (1.48 ft/day) and MW16-34D (43.49 ft/day), etc. have orders of magnitude differences in hydraulic

conductivity, yet, are separated by short distances. This suggests the presence of zones higher hydraulic conductivity within the deep overburden aquifer. Ground water and any associated contamination will preferentially migrate in the more permeable zones, as buried channels typical of alluvial deposits, etc. As such, lumping hydraulic conductivity values for the entire area mutes or obscures the actual potential for ground water velocity and contaminant transport.

The calculation also assigns hydraulic conductivity values from a distinctly different area, i.e. the east end of Building 41, to the area up gradient where there is little hydraulic conductivity data. The calculation of ground water seepage velocity for this up gradient area is extremely limited by few hydraulic conductivity values. In the area from EA-111D (Site 03) and the "Area between Building 39 and 41" there are few usable hydraulic conductivity values. As noted in the November 3rd letter, the hydraulic conductivity values for MW16-82D and 82R are not usable due to inadequate development of the well to reestablish preexisting hydraulic connections with the aquifer. Also, data from the former DPT wells converted to "permanent" wells are highly uncertain due to unknown aspects of their construction.

However, when using a geometric mean of the four available wells along Davisville Road, the location of the bedrock trough noted in seismic surveys and summarized on Figure 3-8, the hydraulic conductivity is much higher than the geometric mean noted for the deep overburden on Table 3-8 (4.08 ft/day). The geometric mean hydraulic conductivity for those wells: EA-111D (21.35 ft/day), EA-1110D (37.95 ft/day), MW16-55D (1.20 ft/day), and PGU-Z3-10D (53.81 ft/day), is 15.13 ft/day. This value would likely go up if an accurate hydraulic conductivity value for MW16-82D, which consists predominantly of angular rock fragments, were obtained. Nonetheless, this hydraulic conductivity value along with a gradient of 0.002 results in a ground water velocity of 44.2 feet per year or almost four times the average 11.9 feet per year provided on Table 3-9. The time to travel 2,100 feet would be closer to 48 years, rather than the approximately 178 years provided in the table.

Alternatively, following the deep overburden ground water contours (but not necessarily those provided in this Phase III Remedial Investigation but from the data and previous remedial investigations), the direction of ground water flow may be from EA-111D, past EA-1110D, to the vicinity of MW16-82D (no useable data for MW16-82D), then to the area of MW16-84D (3.89 ft/day), then toward MW16-34D (43.49 ft/day). The ground water gradient along this pathway is approximately 0.0025, somewhat steeper than 0.002. The geometric mean hydraulic conductivity of those four wells is approximately 19.24 ft/day. Using the geometric mean of the hydraulic conductivity for those wells, the 0.0025 feet/foot gradient, and an effective porosity of 0.25, the ground water velocity is approximately 70 feet per year or almost six times that presented in Table 3-9. The distance to this location would be traveled in approximately 37 years.

There are numerous variables that will determine actual ground water velocity. The effective porosity may be less than 0.25. Effective porosity values for gravelly glacial deposits are commonly range from 0.10 to 0.20 (Walton, 1988; Domenico and Schwartz, 1990) such that an effective porosity of 0.15 may be more appropriate than 0.25. This will increase the ground water velocity and shorten the travel time further. If a representative hydraulic conductivity value is obtained for MW16-82D it is likely to be fairly high given the descriptions of the screened interval soils (i.e. mostly rock fragments). Incorporation of this value would increase the geometric mean hydraulic conductivity. Nonetheless, given the available hydraulic conductivity data, the ground water travel time in the deep overburden would be far less than is presented in the Phase III Remedial Investigation Report.

Response: The Navy concurs with EPA's assessment that preferential migration can and does occur throughout Site 16, as detailed in Section 3.6.2 of the Draft Phase III RI Report. The presentation of groundwater velocities in Section 3.7.5.6 and Table 3-9 was intended to provide a general perspective on groundwater velocities across the site, not precisely evaluate preferential groundwater flowpaths. However, to provide a more robust understanding of potential groundwater velocities that may occur across the site, the Navy will update Section 3.7.5.6 and Table 3-9 to include ranges of velocities based on ranges in observed hydraulic conductivities and different effective porosities. Additionally, the Navy will also calculate groundwater velocities based on flowpath specific data, segmented as appropriate across Site 16. It should be noted that the Navy did not exclude the possibility of contaminant migration from the upgradient areas based on the high

travel time calculated in Table 3-9. In contrast, since low-level contamination has been observed in some of the upgradient wells, the Navy conceptual model is inclusive of contaminant migration from the upgradient areas. (Please see, for example, the text on the first page of the conceptual site model table [Table 5-3] presented in Section 5.) Therefore, while the proposed changes will provide a more robust understanding of groundwater velocities that may occur at the site, no changes to the conceptual model are necessary.

The Navy does not concur with EPA that hydraulic conductivity data at MW16-82 is unusable. Navy rationale was provided in correspondence to EPA dated January 16, 2009. The Navy also does not concur with the statement "Also, data from the former DPT wells converted to "permanent" wells are highly uncertain due to unknown aspects of their construction.", as their construction techniques were discussed in detail during the Triad teleconferences and outlined in Section 2.12.2.4 with well completion logs provided in Appendix B.7.2.

Shallow Bedrock

The Phase III Remedial Investigation Report essentially ignores ground water transport in the shallow bedrock. It is stated in Section 3.7.5.6, that an effective porosity of 0.005 was used along with the geometric mean of the shallow bedrock hydraulic conductivity values. This apparently resulted in an interpreted excessively fast ground water travel time that was deemed unacceptable, so further evaluation and scrutiny of the data was not performed. This is another major shortcoming of this remedial investigation.

An evaluation of potential ground water velocities and transport in the shallow bedrock is essential. Inspection of rock quality designation (RQD), seismic survey velocity differentials, and some slug tests demonstrate that the shallow bedrock is highly fractured, at least at a number of locations. In some cases there is little distinction between the deep overburden and the top of weathered bedrock. For instance, at MW16-19D the majority of the screen is actually in weathered bedrock. Further, for most of the monitoring wells, there is also a 3 foot gap between the bottom of the deep overburden well and the shallow bedrock well. Lack of evaluation of ground water velocities and travel time in the shallow bedrock ignores a major medium for ground water travel and potential contaminant transport.

As with the assessment of ground water velocity and travel time in the deep overburden from the up gradient Site 03 area to the Building 41 area, hydraulic conductivity values for the shallow bedrock cannot be lumped together to obtain a geometric mean value which is then applied to the shallow bedrock as a whole. More discrete assessment of hydraulic conductivity data locations is even more applicable when evaluating bedrock since ground water and contaminant transport in bedrock is likely to be along preferential fractures zones that might follow the strike of faults, etc.

Another limitation is that as with the deep overburden up gradient from Building 41 there are relatively few bedrock monitoring points, especially considering that slug test data is not available for EA-111R, EA-110R, and the result from MW16-82R is highly suspect. Nonetheless, an evaluation of the available data suggests that ground water transport velocities in shallow bedrock are not insignificant and may be a major contaminant migration pathway.

While there is not an accurate hydraulic conductivity value for MW16-82R, the low RQD values, very high number of fractures, and description of the shattered rock suggest that the hydraulic conductivity at that location will be at least equal to this geometric mean hydraulic conductivity of the wells discussed in the paragraph below. Also, while there is not slug test available, the shallow bedrock at EA-111D has been described as being very fractured with RQD values as low at 13% rendering this location also likely very permeable.

A number of shallow bedrock wells that are oriented along a west-northwest to east-southeast strike south of Davisville Road have relatively high hydraulic conductivity values. For instance: MW16-84R (7.68 ft/day), MW16-13R (5.51 ft/day), MW16-66R (23.67 ft/day), MW16-69R (5.08 ft/day), and MW16-60R (14.20 ft/day). The geometric mean hydraulic conductivity for these wells is 9.37 ft/day. It should be noted that the existing hydraulic conductivity value for MW16-82R is considered non usable due to excessive silt and likely smearing. Likewise, MW16-84R and MW16-13R may be on the low side also due to inadequate development as

indicated by high residual turbidity.

An alternative pathway may exist when viewing the seismic survey results (Figure 3-8) that show a shallower trough in the bedrock that leads into the east end of Building 41. This path is from EA-111R through MW16-82R can also be observed running through MW16-84R (7.68 ft/day), to MW16-13R (5.51 ft/day), to MW16-68R-upper (357.00 ft/day) then to MW16-25R (17.13 ft/day). The geometric mean of those values is approximately 22.56 ft/day. Again, if MW16-13R and MW16-84R are adequately developed, a higher hydraulic conductivity value may be obtained.

Nonetheless, using the available data, a conservative estimate of ground water velocity and travel time may be made using the geometric mean hydraulic conductivity values for the wells listed. Effective porosity values in fractured rock are difficult to ascertain. However, the effective porosity for coarse gravel, for instance, can vary from 0.10 to 0.25 (Walton, 1988; Domenico and Schwartz, 1990). If the shallow bedrock is shattered and/or weathered such that it resembles a gravel matrix, an effective porosity of 0.10 or 0.15 may be appropriate for the fractured/weathered rock. An effective porosity of 0.15 would still result in a ground water velocity that would be 30 times slower than the 0.005 value used and abandoned in the Phase III Remedial Investigation. Using the value of 0.15 for effective porosity and the geometric mean hydraulic conductivity values described, it would result in ground water velocities of 57 feet/year and 137 feet/year for the two shallow bedrock pathways discussed in the preceding paragraph. The travel time from EA-111R to the eastern end of Building 41 would be approximately 53 years and 22 years, respectively, for the two shallow bedrock pathways.

Response: Disagree. The Draft Phase III RI Report did not ignore groundwater transport in the shallow bedrock zone. As outlined on page 3-36 of Section 3.7.5.6, a primary porosity of 0.005 was used along with the geometric mean of hydraulic conductivity that resulted in an exceedingly fast groundwater velocity. It was later concluded that velocities should be similar to those of the deep overburden zones. The text will be updated (as well as Table 3-9) to include the shallow bedrock zone. However, consistent with the preceding deep overburden zone response, no updates to the site conceptual model are necessary since low-level contamination is already acknowledged to be entering the site from upgradient locations within this groundwater zone.

It should be pointed out that EPA's own calculations (presented in the comment) support that groundwater velocities will be similar to those in the deep overburden, since the travels times calculated are similar. As such, an extensive analysis is not warranted to complete the RI and proceed to the FS. Additionally, the Navy does not concur that the data at MW16-82 is unusable (see previous response for the deep overburden zones).

Contaminant Travel Times Considering Longitudinal Dispersion

The Phase III Remedial Investigation of travel time relates information only to ground water travel. In addition to the concerns relative to the calculated ground water velocity and travel times discussed above, it should also be noted that dissolved contaminants will travel faster than the average ground water velocity due to longitudinal dispersion. Reference: "Contaminant Hydrogeology", 2nd ed., C.W. Fetter, pages 53-55; Prentice Hall, 1999.

A hydraulic conductivity value is an average of values for a small area. Over distances, ground water and solute particles will move both slower and faster along specific micro pathways within the soil matrix. Therefore, the overall ground water velocity calculated with a given hydraulic conductivity will result in an average velocity and distance traveled that is representative of all micro pathways within the aquifer. In actual observation, dissolved solute will be observed ahead of this average ground water travel distance, albeit at a reduced concentration compared to those in the center of the plume.

A simple example of this is shown by the use of a simplified unsteady state Domenico ground water model and analytical calculations. An example aquifer would have the following characteristics:

Hydraulic gradient: 0.0025 feet/foot
Hydraulic conductivity: 10 feet/day
Effective porosity: 0.25
Time of travel: 10 years

The calculated ground water velocity using the above characteristics would be 36.5 feet per year for a distance traveled in 10 years of 365 feet. All contamination is assumed to flow as "plug flow" and the concentration of contaminant at the 10 year travel point will be the same as what was present at the starting point and 0 year. If the concentration was 10 milligrams per liter (mg/l) at the starting point up gradient, using the analytical approach would result in observation of 10 mg/l at 365 feet down gradient after 10 years, assuming that there is no degradation or retardation of the contaminant.

Using the unsteady state Domenico model for the same aquifer characteristics and with the starting concentration of 10 mg/l and assuming that the source area is only 100 feet wide and 10 feet thick, after 10 years the plume will have migrated 1,000 feet; however, with a concentration at that location of only 2 micrograms per liter (µg/l). At 750 feet, the concentration would be 39 µg/l; at 500 feet the concentration of the contaminant will be 354 µg/l; and at 250 feet the concentration would be 1,634 µg/l. It should be noted that if the plume source were wider, the starting concentrations higher, and/or thickness of the contaminated zone greater, the concentrations at the down gradient locations would be higher.

The preceding highlights the limitation of using the simple travel time analytical calculation used in the Phase III Remedial Investigation to assess potential impacts from up gradient sources.

Response: EPA is correct that the travel time calculations provided in the Draft Phase III RI Report are for advective groundwater migration. This is explicitly stated on page 3-36; qualifications regarding the analysis are also provided. In its comment, EPA focuses on longitudinal dispersion because it can lead to a faster migration of contaminants compared to the average groundwater velocity. In fact, there are numerous physical, chemical, and biological mechanisms that affect contaminant migration which can either increase or decrease contaminant travel time. Consequently, while the discussion presented by EPA concerning longitudinal dispersion is interesting, it is not comprehensive As pointed out in the two preceding Navy responses associated with General Comment 18, the Navy utilized more lines of evidence than just travel times to evaluate whether migration from upgradient locations is impacting Site 16. More importantly, further elaboration on this point is not fruitful since the Navy has already concluded that low-level contamination is entering Site 16 from the upgradient area. A more exhaustive analysis of contaminant transport from offsite areas into Site 16 will not alter the conceptual site model for Site 16 or impact the completion of the RI for the site.

Comment No. 19: Hydrogeological General Comment 3.0 Chemical Indicators of Contamination from Up Gradient Sources *- While the Phase III Remedial Investigation again appears to be dismissive of ground water discharging from the shallow bedrock to the deep overburden, several wells along the pathways noted above have consistently demonstrated upward vertical gradients. MW16-25D/R has consistently shown a very strong upward vertical gradient. MW16-15D/R located close to this zone has previously also shown strong upward vertical gradients although lately the gradient has been roughly neutral. MW16-70D/R also has shown consistent upward vertical gradients. MW16-68D/R which lies directly on the pathway to MW16-25D/R also has consistently shown a modest, but upward vertical gradient. In addition, MW16-59D/R and MW16-60D/R have consistently shown upward vertical gradients as well. This zone clearly is an area of discharge for ground water from the shallow and deep bedrock to the deep overburden.*

Response: This issue has been addressed many times by the Navy in previous responses to comments. The Draft Phase III RI Report is not dismissive of groundwater discharging from the shallow bedrock to the deep overburden. This fact is discussed at length in Section 3. As detailed in Section 3.7 and in multiple complementing figures (primarily Figures 3-10 to 3-32) groundwater does "discharge" from the shallow bedrock to deep overburden. Groundwater is also "discharging" from the shallow and intermediate overburden to the deep overburden. Thus, groundwater in the deep overburden zone is "receiving" water from

zones both above and below.

A complete understanding of the hydrogeological setting at Site 16 requires the review and analysis of all vertical gradient information as well as potentiometric maps for the various hydrostratigraphical zones and vertical flow nets across multiple time frames. The examination of the vertical flow nets (Figures 3-26 to 3-30) indicates that while some areas of the shallow bedrock system "discharge" to the deep overburden, this is a localized phenomena and not indicative of large scale transport. Based on the vertical flow nets, groundwater potentially "discharging" around MW16-68 and MW16-70 can originate from the overburden in the former Building 41 area. Additionally, groundwater around MW16-59 and ME16-60 appears to be near an inflection point in the overall transition from groundwater generally moving downward to the bedrock systems and discharging to Allen Harbor.

Presence of Ethane Compounds

Although the data presented in the Phase III Remedial Investigation Report includes data from 2004 and 2007 it should be noted that the 2007 data does not include low level analyses for certain wells for ethane compounds or for ethane for the deep overburden wells. The 2004 data, however, does provides ethane concentrations for deep wells. Nonetheless, inspection of the data shows that there are significant concentrations of ethane related compounds in Site 16 ground water.

The Phase III Remedial Investigation Report does not identify a Site 16 source area for origin of ethane compounds. Ethane related CVOC exists in the up gradient Nike PR-58 source area. That up gradient source area is also associated with elevated concentrations of trichloroethylene, which is a rapid abiotic degradation product of the ethane precursor 1,1,2,2 TCA. Associated with the degradation of 1,1,2,2 TCA are low concentrations of 1, 1, 2 TCA, 1, 1 DCA, and ethane.

Table 4 on the next page (tables 1-3 were sent to the Navy on November 3, 2008 for section 1 issues) lists concentrations of 1,1,2,2 TCA degradation compounds that have been detected in ground water in the Site 16 area. It should be noted that Site 16 injection (INJ16) wells were not sampled for any ethane compounds except for 1, 1 DCA and this compound generally had a detection limit of 25 µg/l.

It should be noted that the wells with ethane, the final degradation end point for 1,1,2,2 TCA occurs in highest concentrations in the shallow bedrock wells, most of which have upward vertical gradients. The presence of these compounds in the deep and shallow bedrock without a demonstrated Site 16 source suggests an up gradient source.

Response: The Navy does not agree with the EPA assessment that significant concentrations of ethane related compounds occur in Site 16 groundwater. According to Table 4 (provided by EPA with this general comment), the maximum concentration of any ethane compound is 6.6 ug/l (ethane at MW16-44R). Of the 51 positive detections reported in this table, 35 are below 1 ug/l. Consequently, the Navy cannot concur that significant concentrations of ethane related compounds have been detected in groundwater samples collected at Site 16.

The Draft Phase III RI Report does not identify a source for the origin of the ethane compounds as they were detected infrequently and when detected, reported at low concentrations. Additionally, even when ethane compounds were detected, compared to other volatile organic compounds (VOCs) detected, they account for a very low fraction of the total VOC concentrations (typically far less than 1%). While ethane related compounds occur in the upgradient Nike PR-58 source area, a more plausible explanation to their infrequent and exceedingly low concentrations observed at Site 16 is "contamination" from the production methods used to make trichloroethene, which was used in former Building 41 and forms the dominant CVOC present in both soils and groundwater. More recently, most trichloroethene was produced from ethylene; however, prior to 1970 (when trichloroethene was used at Site 16), most trichloroethene was produced in a two-step process from acetylene. In the first step, 1,1,2,2-tetrachloroethane is produced, which is then dehydrochlorinated to give trichloroethene. The low-level degradation products of 1,1,2,2-tetrachloroethane most likely originated from the production of trichloroethene and not long distance transport from the Nike PR-58 site. It is also plausible that low-level releases of ethane compounds occurred at various non-distinct locations and NCBC

just as observed at the Nike Site.

Presence of Chloroform in Deep Ground Water

In addition to the presence of ethane compounds in the Site 16 area, according to the Phase III Remedial Investigation Report as well as previous remedial investigation reports, chloroform has been detected in several wells for 2007. The 2007 Synoptic Ground Water Sampling Report for the PR-58 Nike Site also indicates that chloroform has been detected in the Nike PR-58 Site source area. The presence of chloroform may be serving direct evidence of contaminants migrating in ground water from up gradient.

The production of chloroform during chlorination of water and is common when swimming pools are shock chlorinated. Chloroform can also be formed by the disposal of decontaminating agent non-corrosive (DANC) to ground water. When the two individual chemicals that make up DANC (1, 3-dichloro-5, 5-dimethyl-hydantoin and acetyl tetrachloride (1, 1, 2, 2-tetrachloroethane) are combined and are then exposed to water, they readily break down to release chlorine. When chlorine contacts water it produces chloroform when there are traces of organics either in the water or from soil through which water percolates, i.e. humic and fulvic acids. Given the presence of extremely high concentrations of 1, 1, 2, 2-TCA in the Nike PR-58 site, it is likely that DANC was disposed of in this location along with subsequent generation of chlorine and ultimately chloroform. A listing of wells with chloroform and concentrations is provided on Table 5 following the table for ethanes.

Table 4: Phase III Remedial Investigation Report Ethane Data 2004-2007

Monitoring Well	1, 1, 2 TCA	1, 1 DCA	Ethane
MW16-02D	0.52 µg/l	BDL	BDL (at 6.2 µg/l)
MW16-05D	0.61 µg/l	0.16 µg/l	BDL
MW16-14D	1.60 µg/l	BDL	BDL
MW16-15D	0.25 µg/l	BDL	BDL
MW16-16D	BDL	0.25 µg/l	BDL
MW16-20D	0.19 µg/l	BDL	BDL
MW16-21D	0.02 µg/l	0.18 µg/l	BDL
MW16-23D	0.46 µg/l	BDL	BDL
MW16-25D	BDL	0.14 µg/l	BDL
MW16-32D	0.03 µg/l	BDL	1.30 µg/l
MW16-67D	BDL	4.90 µg/l	BDL
MW16-69D	BDL	BDL	3.50 µg/l
MW16-59D	1.90 µg/l	0.14 µg/l	0.85 µg/l
MW16-60D	1.28 µg/l	BDL	0.68 µg/l
MW16-62D	BDL	BDL	1.60 µg/l
MW16-72D	0.34 µg/l	0.18 µg/l	Not analyzed
MW16-02R	0.01 µg/l	BDL	4.75 µg/l
MW16-15R	0.19 µg/l	BDL	5.05 µg/l
MW15-25R	BDL	0.29 µg/l	BDL
MW16-44R	BDL	BDL	6.60 µg/l
MW16-58R	0.30 µg/l	BDL	BDL
MW16-59R	0.73 µg/l	0.23 µg/l	3.20 µg/l
MW16-60R	1.54 µg/l	BDL	3.10 µg/l
MW16-67R	Not analyzed	Not analyzed	0.80 µg/l
MW16-68R	Not analyzed	Not analyzed	BDL
MW16-69R	Not analyzed	Not analyzed	BDL
MW17-71R	BDL	Not analyzed	1.30 µg/l
MW16-02D(1)	0.50 µg/l	0.08 µg/l	Not analyzed
MW16-02R(1)	0.90 µ g/l	0.14 µg/l	Not analyzed
MW16-05D(1)	0.80 µg/l	0.20 µg/l	Not analyzed
MW16-05R(1)	0.50 µg/l	0.11 µg/l	Not analyzed

MW16-10D(1)	*2.00 µg/l*	*0.10 µg/l*	*Not analyzed*
MW16-14D(1)	*0.40 µg/l*	*BDL*	*Not analyzed*
MW16-15R(1)	*0.40 µg/l*	*BDL*	*Not analyzed*
MW16-21D(1)	*4.00 µg/l*	*BDL*	*Not analyzed*
MW16-22D(1)	*1.00 µg/l*	*BDL*	*Not analyzed*

(1) Concentrations were detected in November 2002.
BDL = below detection level

Table 5: Chloroform Detected in Deep Ground Water Monitoring Wells

Nike PR-58	Chloroform	Site 03	Chloroform	Site 16	Chloroform
MW03-14D	*46.0 µg/l*	*MW03-12D*	*0.9 µg/l*	*MW16-02D*	*20.0 µg/l*
MW03-14R	*52.0 µg/l*	*MW03-13D*	*0.8 µg/l*	*MW16-05D*	*15.0 µg/l*
MW03-14R2	*1.3 µg/l*	*MW03-09D*	*8.0 µg/l**	*MW16-17R*	*0.24 µg/l*
SES-01D	*0.3 µg/l*	*MW03-10D*	*4.0 µg/l**	*MW16-25D*	*10.0 µg/l*
SES-01R	*0.8 µg/l*	*EA-111R*	*1.0 µg/l**	*MW16-59D*	*41.0 µg/l*
SES-03D	*1.6 µg/l*	*MWZ4-02D*	*2.3 µg/l***	*MW16-60R*	*7.9 µg/l*
SES-03R	*1.7 µg/l*			*MW16-67D*	*9.1 µg/l*
SES-04R	*0.3 µg/l*			*MW16-68D*	*7.5 µg/l*
SES-07D	*38.0µg/l*			*MW16-68R*	*8.1 µg/l*
SES-07R	*9.6 µg/l*			*MW16-10D*	*0.3 µg/l****
SES-08D	*108.0 µg/l*				
SES-08R	*44.0 µg/l*				
SES-09D	*52.0 µg/l*				
SES-09R	*2.0 µg/l*				
SES-10R	*1.1 µg/l*				
EA-121R	*3.4 µg/l*				

** MW03-09D & MW03-10D for May 1995, EA-111R for March 1998.*
*** Concentration for MWZ4-02D is for chloromethane, a breakdown product*
**** MW16-10D is for November 2002*

Response: The Navy does not concur that the low-level chloroform concentrations at Site 16 are the result of a DANC release at the Nike PR-58 site. As with the ethane compounds, the most plausible explanation for the presence of low level chloroform in groundwater at Site 16 is that "contamination" of the trichloroethene used at former Building 41 is the source. It should also be noted that chloroform is a degradation product of trichloroethene (under the presence of light). Additionally, the data presented in the Site 3 column in the preceding Table 5 (prepared by EPA) appears to suggest that the chloroform is associated with the former Building 41 area because the levels of chloroform in the referenced Site 3 wells are lower than those observed at Site 16. The Site 3 referenced wells are located between the Nike PR-58 site and Site 16. This trend would not be anticipated if direct transport from the Nike PR-58 site were responsible for the presence of chloroform at Site 16.

Site 07 DANC-Chloroform Correlation

Support for this interpretation is provided by data from Site 07 where DANC was known to have been disposed. Ground water data for Site 07 shows the presence of chloroform in ground water at a number of monitoring wells. A table of historic data contained in the Monitoring Event 08 Report (Table 9) shows chloroform to be present in the source area in 1996 at MW07-05D (185 µg/l average of two samples), and MW07-05R (48 µg/l) with decline in 2007 to 8 µg/l and <30 µg/l (detection limit) in 2007. It has also been detected at the down gradient well MW07-27D with a high of 19 µg/l in 2000, declining to 3 µg/l in 2007. Further down gradient chloroform has been detected at MW07-39S at a high of 72 µg/l in 2006; MW07-39I at a high of 77 µg/l in 2005; and at 27 µg/l in MW07-39D in November 2006.

The trend in chloroform concentrations in MW07-39D is especially noteworthy since it was 2 µg/l in 2004,

15 µg/l in 2005, and declined to 10 µg/l in 2007 after the high noted for 2006. This suggests movement of the center of the CVOC plume mass at that location. Chloroform has also been detected down gradient in MW07-19S at up to 10 µg/l; MW07-21S/D at 2 µg/l (recent detection limits have been at 5.9 µg/l); MW07-23D at 1 µg/l; at MW07-21R as high as 8 µg/l (latest detection limit has been 12 and 15 µg/l); and at MW07-34D at 3 µg/l; as well as several other wells.

The overall distribution and trends suggest that chloroform may be an indicator of the migration of DANC contamination in ground water. This migrating contamination includes ethane compounds and the rapid abiotic degradation product trichloroethylene. Chloroform is not retarded in ground water and migrates with ambient ground water, or faster considering the effects of longitudinal dispersion. Therefore, it may travel at or faster than the velocities noted in the calculations provided in this review.

As shown on Table 5, elevated concentrations of chloroform exist at numerous wells in the Nike PR-58 source area including MW03-14D/R and at SES-08D/R as well as at down gradient locations. These include in the former Building 41 footprint at MW16-67D and MW16-68D/R as well as down gradient at MW16-59D/R, MW16-60D/R, MW16-02D/R, and MW16-05D/R. While the detections are limited for the Site 03, both due to lack of well coverage and possible issues related to sample point intake, there nonetheless appears to be a correlation between the Nike PR-58 source area and the area at the east end of Building 41.

Also at both of these locations, TCE has been detected, with the highest concentrations being in the former Nike PR-58 area. The 2007 Synoptic Sampling Round Report shows that TCE is present in ground water at MW03-14D and MW03-14R at 75,400 µg/l and 53,200 µg/l, respectively. 1,1,2,2 PCA was also simultaneously detected at 73,600 µg/l and 89,700 µg/l, respectively. Several other wells in that area with detection of chloroform also had elevated concentrations of TCE and 1,1,2,2 PCA including SES-08D with 50,300 µg/l and 113,000 µg/l, respectively; and SES08R with 99,400 µg/l and 50,600 µg/l, respectively.

Similar to up gradient Nike PR-58 Site and down gradient Site 16, Site 07 has elevated concentrations of 1,1,2,2 TCA and TCE in the up gradient source area, and at down-gradient locations elevated TCE with lower concentrations of TCA. Therefore, there appears to be a clear association of chloroform with the migration of ethane compounds and TCE. The presence of both ethane compounds and chloroform strongly suggests the potential for migration of TCE from an up gradient location. Taken together with the ground water flow pathways and likely higher ground water and contaminant transport velocities than is presented in the Phase III Remedial Investigation, there is clearly potential for the Site 16 Area to have been impacted. Therefore, it is necessary that up gradient monitoring wells be appropriately developed and sampled to rule out this possibility as was requested in our November 3, 2008 letter.

Response: While the Navy appreciates the effort expended by EPA to attempt to provide evidence for correlation of ethane, chloroform and trichloroethene co-migration, this analysis is not appropriate for Site 16 as the nature of the sources between Site 7 and Site 16 are entirely different. The sites are different from both a chemical and physical process perspective (e.g. DANC at Site 7 compared to trichloroethene at Site 16, release into open trench near bedrock outcrop compared to probable releases from piping, etc. in recovery still, for example). Additionally, any "chemical trail" type of evaluation of contamination between the Nike PR-58 site and Site 16 should focus on the primary contaminant detected in the Site 16 groundwater (trichloroethene) yet the EPA has not provided evidence either in a table or figure that demonstrates that significant trichloroethene is migrating from the Nike PR-58 site to Site 16. Rather, the evidence is always secondary; examining such generalized topics as groundwater velocities (General Comment 18) and upward vertical gradients or infrequently detected contaminants (ethane compounds and chloroform).

Comment No. 20: Hydrogeological General Comment 4.0 Building 41 as Primary TCE Source - *The Phase III Remedial Investigation Report interprets the former Building 41 TCE still to be a significant, if not major, source of TCE in the Site 16 area. This is indicated by the statement on Page 5-19, second paragraph, first sentence, that "the predominant plume of TCE emanates from the former Building 41 area..." and the text contained in Table 5-3, Page 2 of 9 of the Conceptual Site Model. This interpretation is also provided in the presentation of Figure 4-9 showing the lumped distribution of total CVOC in ground water. It is also shown by Figure 4-11. The impression provided is that the bulk of the TCE originated in or near the former TCE still.*

However, the data provided in this Phase III Remedial Investigation do not support this interpretation.

Extensive comment on this issue has been provided in a separate technical memorandum and is not provided here. The figures and interpretations presented in this Phase III Remedial Investigation Report remain essentially unchanged after comment was provided to the Navy in writing and discussed during a Triad conference call. While there are indications of CVOC having been released to the ground surface in the area of Building 41, the data does not support the TCE still as the primary source as is strongly implied in the Phase III Remedial Investigation Report.

The more likely source areas, are either from the North-Central area of Site 16, and/or from up gradient. At this point, the Phase III Remedial Investigation has not provided any usable data to rule out potential up gradient contributions, and has not thoroughly investigated the area north of Davisville Road. As noted in the following section, the Phase III Remedial Investigation clearly suggests that the North-Central Area is only a "minor to moderate" contributor to TCE contamination within the Site 16 Area. This is not supported by the data including Figures 4-1 through 4-9.

While detailed comments on all aspects of the Phase III Remedial Investigation Report are not provided given the major systemic concerns, some comment on several of the figures provided in the Phase III Remedial Investigation Report is made in the specific comment section. In general, they do not support the interpretation that the major source of CVOC in Site 16 ground water is from beneath Building 41.

Response: There are several significant inaccuracies presented in the comment, ranging from a misunderstanding of Navy positions/conclusions to an incomplete understanding of data presented on figures. While EPA accurately quotes from Section 5 on page 5-19, the Navy believes that the former solvent still is only one of several demonstrated or potential release points within the "former Building 41 area" that appear to be contributing to the overall distribution of contamination. For example, the text appearing only two paragraphs later states as follows "Overall, it appears that TCE was released at one or more points around the former Building 41 area...". Furthermore, EPA inaccurately states that Figures 4-9 and 4-11 present groundwater data when in fact, they present soil data.

The Navy acknowledges that EPA has provided extensive comments regarding the former Building 41 area as a source (in both written and during Triad discussions). However, since not all RI data had been compiled, processed, and analyzed prior to the preparation of the RI, the Navy reviewed the comments within the limited scope in which they were presented. Most notably, the RI considered the extensive Color-Tec® screening and fixed-base lab soil results as well as potentiometric maps for various groundwater zones, vertical gradient analyses and hydraulic connection data garnered from the constant rate tests. Therefore, while EPA may believe that "extensive comments" have been provided, an extensive evaluation of all available data has not been provided prior to the RI.

Finally, the Navy is concerned regarding the "concerns" presented in the final paragraph of the comment. The EPA has "systemic concerns" and references figures in the specific comments as evidence. However, as indicated below regarding the referenced figures, in most cases, the EPA is assigning the wrong media to the figure (see Navy response to Specific Comment No. 55. The Navy suggests that the EPA re-look at the data with a corrected understanding of the media and the context, and then ascertain whether the systemic concerns are still relevant.

TCE Residual and Driving Head

When viewing the figures provided, it should be noted that the Phase III Remedial Investigation provides no mechanism by which CVOC in significant mass was generated at the former TCE still area within Building 41. Soil gas data in the vicinity of the former still, soil boring data from a soil boring within the TCE still footprint, MW16-30D show no evidence of CVOC mass in the vadose zone. There is an unsaturated zone interval of approximately 15 or more feet below the building floor that, if significant CVOC mass were released at this location, would retain CVOC, especially if DNAPL were released as is stated in this report. Only after the capillary head was exceeded would DNAPL then enter the ground water table. Residual DNAPL would still be

retained in the soil matrix.

Even if there somehow had been significant CVOC mass in the unsaturated zone beneath the building that was somehow removed from the vadose zone, no mechanism for this removal has been provided. First, the building has always provided a relatively impermeable barrier above the inferred area of significant CVOC mass release. This barrier would significantly impede evaporation of the CVOC mass, as DNAPL or otherwise. Further, this relatively impermeable barrier would essentially eliminate infiltration of precipitation that would have provided a driving head that might have over time resulted in significant flushing of the inferred large CVOC mass that was released into the unsaturated zone.

Response: As outlined in Section 3.7, with particular emphasis on the vertical gradient analyses (Section 3.7.5.3) and vertical flow nets (Section 3.7.5.4), a driving force is present. In addition to the passive driving force of gravity, downward migration most likely occurred as a result of the limited infiltration of precipitation through cracks and fissures in the asphalt surface, leaks from the immediate storm water drainage system, and/or the general expression of groundwater recharge in adjacent areas (the area immediately north and, until recently, immediately south). Regardless of the physical mechanism(s), the observed data demonstrates that a driving force is present. The statement that there is no evidence of CVOC mass in the vadose zone is also directly contradicted by CVOC detections reported for 12 shallow soil samples (SB16-A3-08 at 1-2 and 5-6 feet bgs, SB16-A3-14 at 9-10 and 12-13 feet bgs, SB16-A3-22 at 15-16 feet bgs, SB16-A3-23 at 3-4 feet bgs – Color-Tec®, SB16-A3-26 at 2-3 feet bgs, SB16-A3-34 at 4-5 and 15-16 feet bgs, SB16-A3-37 at 5-6 and 15-16 feet bgs, SB16-A3-41 at 9-11 feet bgs). While three of the shallow soils samples were likely collected near the water table, the overall distribution demonstrates CVOCs have been detected in vadose zone at various locations in the former Building 41 area – not just the footprint of the former solvent still. Additionally, relatively significant soil gas results in the former solvent still area were observed and in fact, the results at this location are more significant for CVOCs than any other area, including the former firefighting training area.

It should also be noted that contaminant releases in the dissolved phase may have also occurred in the former Building 41 area. Under this scenario, significant residual TCE contamination in the vadose zone would not be anticipated given the passage of time. Essentially, less "trapping" of contamination within the soil matrix (since capillary pressures of water are different than those of TCE, allowing more effective draining due to gravity) would occur. This possibility will be incorporated into the conceptual site model, Section 5.7.

Examples of Source Area Soil Profiles

Two nearby locations exist where there is evidence of a significant past release, which even in the presence of prolonged flushing demonstrate residual CVOC in the soil column. These areas are near MW07-31I at Site 07 and near MW16-42D, MW16-44S, and MW16-45S at Site 16 in the North-Central Area. MW07-31I is located in the vicinity of the suspected area of the DANC source area on Site 07. MW16-44S and MW16-45S are located near the former Fire Fighting Training Area, while MW16-42D is located within the North-Central Area at a location that is down dip of silt layers underlying the North-Central Area. All of these areas had elevated photo-ionization detector (PID) or flame ionization detector (FID) readings in the soil column during drilling. The readings for those locations are summarized in Table 6 below. By way of comparison, no soil borings within the Building 41 area or surrounding area had PID readings anywhere close to these values. Even at the locations of the soil sample (SB A3-22) with the elevated TCE and the MW16-85"D" (SB A3-6)) with elevated TCE the PID results were at most in the range of two to three parts per million.

Additionally, the Phase III Remedial Investigation and Figure 4-11 implies significant migration into the deep, saturated overburden. There is no mechanical basis for this. While there is a downward vertical gradient when viewing relative ground water elevations, as noted above, this reflects the low permeability silt and/or silt with clay layer. This layer forms a perched water table condition. Without a significant additional driving head that might be achieved by infiltration and possible mounding, it is highly unlikely that significant CVOC, if released at this location, would migrate vertically downward along the pathway incorrectly presented on Figure 4-11.

Table 6: Soil Boring Head Space Readings

Depth (feet)	MW07-31I PID (PPM)	MW16-45S Result FID with Filter (PPM)	MW16-44S FID with Filter (PPM)	MW16-42D FID with Filter (PPM)	SB 16-A-22 PID (PPM)	SB 16-A-06 PID (PPM)
0-2	0	(No Reading)	0	0	0.4	0
2-4	0	(No Reading)	0	0	0.4	0
4-6	12.5	3089	0	0	0.4	0
6-8	49	(No Reading)	1086	0	0.4	0
8-10	40	(No Reading)	1086	0	0.4	0
10-12	35	067	828	295	0.4	0
12-14	108	1700	693	700	0.4	0
14-16	158	502	(No Reading)	2546	0.4	0
16-18	238	723	8956	1228	0.4	0
18-20	1028	3023	4485	1180	0.4	0
20-22	(No Reading)	End of Boring	End of Boring	1072	0.4	0
22-24	1667			731	0.4	0
24-26	2000+			686	0.9	0
26-28	End of Boring			325	1.4	0
28-30				114	End of Boring	0
30-32				Below = 0		Below = 0

Response: As stated in the Draft Phase III RI Report, the Navy agrees that the former firefighting training area in the North-Central area is a contributing source to the overall coalesced CVOC plume at Site 16. The Draft Phase III RI Report clearly reflects this determination.

The thrust of the comment appears to be that only areas with elevated FID and/or PID readings are worthy of consideration as significant source areas. This topic has been discussed and addressed on multiple occasions by the Navy and the data presented by the EPA reviewer in this comment does not change the Navy's position on this subject. During the Phase III Remedial Investigation, the Navy used PID readings, Color-Tec® screening levels, and physical evidence of contamination while investigating soil contamination at Site 16 in order to determine which soil samples were to be submitted to the fixed-base lab for analyses. The Navy relied on Color-Tec® screening as well as PID readings because use of FID/PID as the primary and only indicator of source areas can be problematic because of interferences (e.g., methane, water vapor). For example, the North-Central Area contains peat and "filled" materials and while a granular activated carbon filter may be added to the unit (to remove methane), it may or may not effectively filtered out all interferences because a tight seal of the field filter is required and typically, tiny gaps can occur. During the field screening the Navy also demonstrated that water vapor definitely interferes with the operation of the PID unit (i.e., results in false positives). The low-level only CVOC/BTEX concentrations reported for the fixed-base lab, vadose zone soil samples in the fire fighting training area suggest that the FID/PIDs readings (jar headspace method) may reflect interferences. Conversely, the lack of positive PID readings samples (real time measurements) for the Phase III SB16-A3-06 location (while both CVOC and fixed-base lab data demonstrated significant contamination) also suggests that the PID tool alone would not have been the most prudent approach for the Site 16 investigation (i.e., the tool may miss significant contamination). Also, please note that the readings presented in Table 6 are not directly comparable because the historical FID readings for the former fire training area were collected using the jar headspace method while the PID readings reported for the former Building 41 area were collected via real time measurements. Again, the Navy agrees that PID/FID meters can be a useful screening tool, but given the many limitations listed above, the Navy has does not believe it is appropriate to identify source areas based solely on PID or FID readings.

The Navy does not agree that perched groundwater conditions exist under the former Building 41 area. Please re-review Section 3, particularly Section 3.7.5.4 on vertical groundwater flow. There is no evidence from any well or DPT location that an unsaturated zone occurs above the EPA proposed silt and/or silt with clay layer, a necessary condition to meet the definition of a perched zone. There is also no significant "disturbance" in groundwater gradients in any of the overburden zones (or alternatively, mounding in the water table maps) in Figures 3-10 to 3-21 (as appropriate, not including bedrock maps) that would suggest the presence of a perched zone. The reviewer's statements are not supported by the RI data.

Building 41 Pathway

As described in a previous technical memorandum provided to the Navy and discussed during a Triad conference call there does not appear to be a pathway for significant contamination to migrated downward from the "hot spot" identified during this Phase III Remedial Investigation. In addition to the presence of the silt layer beneath Building 41 and even if CVOC penetrated this layer, significant flow to the east in the deep overburden would be blocked by the low permeability silt zone.

Response: Please see Navy response to comments within General Comment No. 20.

Comment No. 21: Hydrogeological General Comment 5.0 North-Central Area Source Contributions Not Defined - *Page 5-19, third paragraph, first sentence notes "a minor to moderate contributor to VOC contamination appears to be associated with the north-central portion of Site 16." This minimization of releases in this area is not concurred with.*

Response: The Navy is not minimizing the potential release in the North-Central Area; the use of the term "moderate" acknowledges that the potential releases in the North Central should not be viewed as inconsequential. However, it does appear that the Navy and EPA are using different definitions to qualitatively define the impact of the various source areas. Since the volume of any of the historical releases are not known (and, given the passage of time, will never be known), the Navy has chosen to qualitatively estimate the various contributing source areas throughout the Draft Phase III RI Report by interpreting the extent of impact of contamination and considering the available soils and groundwater data. For instance, the Navy considers the sources in the general, former Building 41 area to be significant as they appear to contribute to a large spatial area of contamination – both between the former Building 41 area and Allen Harbor and along the "eastern arm" toward Narragansett Bay. In contrast, the area impacted by releases at the former firefighting training area appears to be smaller and primarily confined within the North-Central area. It is plausible that the volume released at the former firefighting training area exceeds the volume released at the former Building 41 area. However, given the location of the releases in the former Building 41 area with respect to the overall physical system at Site 16 (just upgradient from a divergent groundwater flow system between two large surface water bodies), it is not surprising that releases that occurred there have impacted a large area of the site. It is important to note that the discussion of the relative magnitude of the releases is somewhat academic at this point. With few exceptions (e.g., the BTEX "hot spot"area), the majority of the residual contamination at Site 16 is currently found in the deeper saturated zones at the site. Any "active" treatment of residual CVOC groundwater contamination considered in the FS will focus (for the most part) on the current concentrations found in those zones.

Presence of Major Source Area(s)

Based upon review of the distribution pattern of CVOC in soil provided in Figures 4-1 through 4-12 as well as results from field head space screening of soil boring split spoon cores it is clear that a major source of CVOC at Site 16 is due to past releases in the North-Central Area. The concentrations of CVOC and the area impacted show a much larger extent of contamination in the North-Central Area compared to Building 41. The later appears to be the minor contributor rather than the major source area.

In addition to the distribution of CVOC in soils shown on Figures 4-1 through 4-12 showing that there was likely major release at this area, the concentration levels shown likely do not reflect actual concentrations. It should be noted that this area contains significant concentrations of BTEX compounds. BTEX compounds are

stated in the Color-Tec® literature to cause interferences and obscure detections of chlorinated compounds. According AQR Color-Tec® Method QA/QC Procedures Summary under the False Negatives Testing Procedure: "the presence of toluene and xylenes inhibits/diminishes the ability of colorimetric tubes to detect CVOH." Xylenes and toluene are present in soils north of Davisville Road in very high concentrations according to the laboratory analytical data.

An example of this problem is the result for SB16-58 at 8 feet below the ground surface where, according to Table 2-4 of the Phase III Remedial Investigation Report, the Color-Tec® responses were all non-detect, yet, the fixed laboratory analysis yielded a value of 1,300 µg/kg for total CVOC. Since Color-Tec® was used as a "fail safe" screening tool for selecting which samples would be sent to the fixed based laboratory many samples that may have resulted in potentially high concentrations of chlorinated compounds were never sent to a fixed based laboratory.

While some samples with Color-Tec® "non-detect" readings were sent to a fixed laboratory, with results that indicated no CVOC present it cannot be concluded that at all "non-detect" locations did not have elevated CVOC. Also where there were responses on the Color-Tec® tubes there apparently were decisions not to send certain samples to a fixed based laboratory for analysis. For instance, in the case of SB16-59 it appears that a Color-Tec® response of 3+ was observed for the 26 to 28 foot interval, yet there was no laboratory analysis. As such, the distribution of CVOC in soils in the North-Central Area is deemed to be a lower bound to what is actually in those soils.

Another limitation that likely underestimates CVOC impacts within the North-Central Area is the depth of the DPT borings. For instance, within the BTEX "Hot Spot Area" the depth of the DPT reached a maximum of 34 feet below ground surface at SB16-59. At SB16-56 and SB16-57 the depth was only 20 feet, while at SB16-58 the depth was only to 27 feet. Several other DPT locations were similarly shallow including SB16-71 through SB16-73 which went only to 30 or 31 feet. SB16-76 went to 24 feet while SB16-77 went to only 20 feet. Other DPT borings were similarly shallow or only to around 40 feet while the depth to bedrock beneath the site extends to approximately 50 to 60 feet or more, a depth which relatively few of the DPT reached.

Nevertheless, CVOC was detected in significant concentrations. In addition, this area, unlike beneath Building 41, and for that matter paved and/or highly compacted areas surrounding Building 41, was exposed to substantial leaching by precipitation. In addition, there is evidence of substantial biodegradation as indicated by the presence of vinyl chloride and cis-1, 2 DCE. Further, while the "BTEX Hot Spot Area" has been so designated, this area appears also to have been a disposal location for chlorinated hydrocarbons.

The sample results for SB16-58 at 8 feet below the ground surface show the presence of not only PCE at 450 µg/kg, TCE at 470 µg/kg, but 1, 1 DCE at 410 µg/kg. For this high a concentration of 1, 1 DCE to be present relative to the PCE and TCE concentrations suggests extensive biodegradation and likely subsequent transport, if not volatilization of CVOC. The retardation coefficient is much lower, the solubility and vapor pressure much higher for 1, 1 DCE than PCE and TCE. Therefore, for this concentration of 1, 1 DCE to remain suggests much higher concentrations of PCE and TCE previously existed at this location. Biodegradation is highly likely due to the documented high concentrations of a co-substrate in the form of BTEX.

Response: With reference to the North-Central area, the EPA's assertion that "It should be noted that this area contains significant concentrations of BTEX compounds." is both misleading (suggesting that the review of Section 4.2.1 was incomplete) and unsupported by available site data. While it is correct that five of the over 500 soil samples available for Site 16 (less than 1%) have elevated BTEX concentrations (over 100 ug/kg), three are located in close proximity to one another (SB16-058, SB16-059 and 16TP-ETP2) indicating that that the spatial extent of elevated BTEX concentrations is somewhat limited. Furthermore, at the five locations, elevated BTEX occurs within the vadose zone, with all sample depths less than 10 feet bgs further demonstrating the limited nature and extent of significant BTEX contamination. The EPA comment further implies that elevated BTEX is common all throughout the North-Central area and as such, is impacting validity of the Color-Tec® screening results. Presentation of the suppression of the CVOC result at SB16-058 where Color-Tec® screening did not identify a CVOC result of 1330 ug/kg is offered as evidence that "many samples

that may have resulted in potentially high concentrations of chlorinated compounds were never sent to a fixed based laboratory." However, this soil sample was the only location where BTEX concentrations exceeded 10,000 ug/kg; the concentration reported is approximately 4 orders of magnitude greater than the typical low level BTEX encountered at Site 16 (approximately 60 soil samples have positive detections with most being less than 10 ug/kg). Based on the Color-Tec® responses (Section 2 and 4, Tables 2-4 and 2-5 and Appendices B.5 and C.4), there is no evidence of suppression of CVOC responses for any soil location other than at SB16-058 (fixed-base lab sampling shows no CVOCs at 16TP-ETP2 and SB16-059, consistent with Color-Tec® screening results). It should be noted that benzene was detected infrequently and at low concentrations in the groundwater underlying Site 16 further evidence that significant BTEX contaminations is found in localized areas only and is not pervasive across the site.

EPA is correct that it cannot be assumed that all non-detects garnered through Color-Tec® screening would be confirmed as non-detect, but is not correct to suggest that elevated concentrations would be found in such samples. As outlined in Appendix B.5, 161 of the 187 Color-Tec® non-detect soil samples were confirmed as non-detect by the fixed base lab, a success rate of 86 percent. Twenty four of the 26 false negatives were less than 10 ug/kg for CVOC (maximum of 9.1 ug/kg), while one was 20.57 ug/kg and another was 46 ug/kg. Overall, it can be concluded that Color-Tec® screening was effective and attained impressively low detection limits. The EPA reviewer's focus on one false negative over emphasizes the uncertainty with the method and discards the significant site understanding that it provides (see Section 4.2.1).

EPA also appears to be over emphasizing the importance of shallow depths attained with DPT at a few locations within the North-Central area. In overview, a very comprehensive investigation of the North-Central area was conducted during the Phase III Remedial Investigation. In many cases where shallow DPT borings only were advanced, soil samples were not collected at deeper depths because existing pre-Phase III data provided environmental data for the deeper depths. Most deliberately shallow DPT borings occurred in the eastern portion of the North-Central area where the primary coalesced CVOC plume is observed to occur. Many well clusters exist in this area and pre-Phase III data provides significant information regarding the nature and extent of the deeper-zone contamination in this area. In some other locations, shallow refusal was encountered due to the presence of shallow, fractured rocks (generally in the northwest quadrant) or subsurface obstructions (around Building E-107).

The Navy agrees with EPA that CVOCs were released in the vicinity of the "BTEX Hot Spot Area"; the release may have been associated with fire fighting exercises in the North-Central Area. As noted above, the currently available data suggests that the areal extent of the "BTEX Hot Spot Area" is limited. However, it should also be noted that the Navy has already determined that additional sampling in support of the Site 16 FS will likely be needed to confirm the horizontal and vertical extent of contamination in this area.

Southward Migration of CVOC

Detailed discussion of the distribution of CVOC and potential migration pathways along downward dipping silt and clay layers beneath the North-Central Area that would support the presence of elevated CVOC along Davisville Road and even the east end of Building 41 have previously been provided to the Navy in a technical memorandum and discussed during a Triad conference call. Repetitive discussion is not provided in this review except to say that migration of CVOC cross gradient to ambient ground water flow direction can occur either as DNAPL moving down dip of lower permeability layers or dissolved phase assisted by temporarily altered ground water flow patterns. CVOC contamination could then migrate to the deep overburden when ground water reached gaps in the silt layer such as in the area east of Building 41.

Given the relatively low permeability of the underlying silt, clay, and/or silt and very fine sand layer beneath the more permeable upper soils and lower soils downward migrating water can result in temporary mounding of the water table if significant excess water is applied to the site. These intermittently changed ground water flow patterns would potentially result upon recharge of water used in fire fighting training activities or possibly other related activities including vehicle and equipment washing and dust suppression during operations. It should also be noted that during the time of active operations that the North Central Area was devoid of vegetation such that there would be no transpiration and less evaporation of infiltration as well.

The volume and duration of water that was intermittently applied at the North-Central Area is impossible to determine. However, it is clear that large volumes of water were applied periodically for fire fighting training. High pressure fire fighting equipment can easily dispense water at 2,000 gallons per minute to fight structure fires. Depending upon the actual usage could result in tens of thousands of gallons of water being applied during a training cycle even if this occurred only on one or two days. Training likely also included "dry runs" to familiarize and train crews with the handling of fire hoses discharging water under pressure. That is, simply training with using fire hoses without the actual burning of materials to extinguish.

The attached Figures 1 through 4 are not intended to be representative of actual conditions in the North-Central Area. They are provided to illustrate the mechanism by which ground water gradients may be changed, at least on an intermittent basis. The figures show steady state conditions for application of water at several thousand gallons per day over an area approximately 70 feet in diameter. The figures simulate an upper soil interval with a hydraulic conductivity similar to the North Central Area with an underlying silt layer with a sand layer beneath that. The hydraulic gradient across the sample model was similar to that for the North Central Area.

The first figure shows a simulated non-fire fighting condition. The second figure shows how ground water contours can be altered. The third and fourth figures illustrate the changes to ground water elevations and potential flow lines resulting from the introduction of fire fighting water and subsequent ground water mound development. It can be seen that under these conditions ground water flow and associated contaminant migration direction can move backward and laterally outward from the area where water is applied.

An exact determination of flows cannot realistically be assessed due to different gradients at the time of no vegetation, unknown water volumes applied, frequency of water application, etc. It should also be pointed out that the mound would not remain forever, but will dissipate over time. However, the effects of the mounding to push ground water and contaminants in direction other than ambient flow would still be observed, especially where DNAPL may exist as globules, etc. on top of the underlying silt layer.

Response: The Navy agrees that this topic has been discussed on multiple occasions; however, the reviewer's comment(s) do not provide any additional persuasive evidence to support this model. As demonstrated in previous responses and as observed in Figure 3-2A, there is no lithological evidence to support that even if a southward migration route were to occur that the contamination would reach the east end of former Building 41. At most, the maximum southern migration along this pathway would be approximately immediately south of Davisville Road (near MW16-59 and MW16-60). Based on the Sudan IV dye testing and available analytical data, DNAPL has not been detected at Site 16. Furthermore, based on the distribution of soil data presented in Figures 4-1 to 4-15, there is no evidence to suggest elevated CVOC concentrations occur atop of what is interpreted to be the silt layer facilitating transport.

The Navy generally agrees that past firefighting actions and/or other activities (vehicle washing, dust control, etc.) may have caused periodic mounding at the former firefighting training area and the area potentially south (between former firefighting training area and Davisville Road, near SB16-081). Such activities may have resulted in contaminant migration southward. While it is unlikely that contaminants were present in a DNAPL phase, it is likely they may have been present in the dissolved phase. Evidence for this phenomenon can be observed in Figures 4-1 to 4-4. On Figure 4-4, a large semi-radial outline is observed south of Davisville Road, somewhat centered around MW16-59. While there is certainly direct evidence to link this semi-radial feature (at least the eastern portion) with a small arm of contamination emanating from MW16-37 (elevated groundwater contamination occurs at MW16-38I at the same elevation range as Figure 4-4), the overall size and shape of the semi-radial feature suggests that it could originate from the North-Central area. One is cautioned when interpreting the data presented for the lower elevations, particularly Figure 4-5, as not to assume that contamination likely continues to migrate southwest to the eastern edge of former Building 41. It does not appear to be migrating in this direction because the width of the reference plume decreases toward the former Building 41. This pattern is exactly opposite of that anticipated for migration of dissolved phase contamination in porous media.

***Comment No. 22: Hydrogeological General Comment 6.0 Conceptual Site Model** - Page 1 of 9: Immediate Up-Gradient Area: **Not concurred with**. The ground water quality data from the new wells is unacceptable and ground water transport rates have not been supported. Further, there are chemical indicators of migration of contaminants from up gradient to the Site 16 area. As such, it has not been established that there is no contribution of CVOC from up gradient areas to the Site 16 area. See Sections 1.0, 2.0, and 3.0 above.*

Response: Please see response to EPA general comments numbers 1, 16, 17, 18 and 19. Also, the reviewer is misquoting the information presented on page 1-9 of the Conceptual Site Model which does not state that "there is no contribution of CVOC from upgradient areas to the Site 16 area." The text states... "The low-level CVOC concentrations detected in the referenced upgradient wells indicates possible, minor CVOC migration from upgradient sources (e.g., the Nike Site). In addition to/or alternatively, limited, localized releases (e.g., from septic systems previously associated with the buildings in the upgradient area) may be a source of the low-level CVOC concentrations in the upgradient wells."

*Page 2 of 9: Former Building 41 Area: **Not concurred with**. No significant contaminant pathway has been established between the shallow overburden and the deep overburden as described in this table and the Phase III Remedial Investigation Report. While there are differing hydraulic elevations beneath Building 41 when viewing those for shallow/intermediate/deep monitoring wells, these differing elevations are reflective of perched ground water conditions. Any release of CVOC within Building 41 likely migrates in the shallow to intermediate intervals. See Sections 1.0, 2.0, 3.0, 4.0, and 5.0 above.*

Response: Please see response to EPA General Comment Nos. 1 and 20.

*Page 3 of 9: Eastern Arm Area: **No major comments**. However, contributions from the North Central Area are also likely as well as potentially from up gradient contributions along preferential zones of ground water flow.*

Response: Comment noted. Also, please see Navy response to EPA General Comment No. 21.

*Pages 4 through 6 of 9: Creoste Dip Tank Area/Former Fire Fighting Training Area/BTEX Hot Spot Area: **Not concurred with**. These areas are all interlinked and are likely a major if not the major contributing source to ground water contamination at Site 16. In addition, the text in the tables is somewhat dismissive of contaminant transport and suggests that because peat underlies portions of the site migration, etc. is "complicated". Peat is not that extensive. Rather, an underlying discontinuous silt unit is present that likely has facilitated transport of CVOC to areas where the silt is discontinuous. This transport likely occurred under natural and anthropogenic causes including water application during fire fighting activities. Further, the use of Color-Tec® in an area of heavy BTEX disposal has obscured evaluation of the distribution of CVOC such that CVOC released in this area was not likely "minor". Also, the BTEX "hot spot" area was not adequately investigated in that DPT borings at that those locations were relatively shallow.*

Response: Please see response to EPA General Comment Nos. 1 and 21. The concept that "an underlying discontinuous silt unit is present that likely has facilitated transport of CVOC to areas where the silt is discontinuous" conflicts with EPA General Comments 1 and 21 where the assumption is that silt is continuous and facilitates large scale transport. As outlined in the response to EPA General Comment 21, EPA reviewer is over-emphasizing both the uncertainty of Color-Tec® screening technology and distribution of BTEX contamination at Site 16.

SPECIFIC COMMENTS:

***Comment No. 23:** ES-1, last paragraph. Change the location of Davol Ponds to south west rather than "west and south".*

Response: Agreed.

Comment No. 24: *- ES-5, first paragraph. Add a reference where the evaluation of the impacts of salinity and/or turbidity on metals is evaluated.*

Response: Agreed. As stated in the referenced text: "…the metals results reported for groundwater were often impacted by sample salinity and/or turbidity." In support of this statement, the text will be amended to reference the groundwater data summary tables presented in Section 4. Turbidity data is already presented for most samples included in the 2007 groundwater data tables (e.g., Table 4-36). The Navy will review all of the 2007 groundwater data tables and edit as necessary to present turbidity data and specific conductance data for all samples collected during the Phase III field investigation. Thus, the tables will clearly display the relationship between metals concentrations and turbidity/salinity.

Comment No. 25: *Table ES-7: Table ES-7 should include the risks from groundwater and sediment. Please correct or explain the following apparent discrepancies: Table ES-7 shows a 1E-05 cancer risk for the recreational child, however, Table ES-4 shows a cancer risk of 7E-04 for dermal contact with sediment. Table ES-7 shows a target organ HI < 1 for the construction worker; however, Table ES-4 shows that aluminum and manganese each have target organ HI > 1. Table ES-7 shows a 2E-05 cancer risk for the lifelong recreational user; however, the Table ES-4 shows a cancer risk of 8E-04 for dermal contact with sediment.*

Response: The risks for groundwater and sediment are included in Table ES-7. The risks for groundwater in the undeveloped area are presented on page 7, risks for groundwater in the developed area are presented on page 8, and risks for sediments are presented on page 11.

There are no discrepancies between Table ES-7 and ES-4. The cancer risks of 1E-5 for the child recreational users and 2E-05 for lifelong recreational users are for exposures to surface soil. The cancer risks for exposures to sediment are presented on page 11 of Table ES-7. Also, while Table ES-4 presents cancer risks and hazard indices for individual exposure pathways, Table ES-7 presents the cumulative cancer risks and hazard indices for all exposure pathways combined for each individual medium.

The final column in Table ES-4 does not show chemicals with hazard indices **greater than** one but rather chemicals that are **contributing** to a hazard index greater than 1. The risks presented in Table ES-4 are for both site and non-site related chemicals. In contrast, Table ES-7 presents the risks only for site-related chemicals. When evaluating individual target organs, the combined hazard indices for aluminum and manganese for exposures to surface soil at the northwest developed area exceeded the acceptable level of one. However, concentrations of aluminum in surface soil at the northwest undeveloped area were within background levels. When exposures to only site-related chemicals are evaluated the hazard indices for the individual targets are less than or equal to 1.

Comment No. 26: *Table ES-7, Table ES-7 should include the risks from groundwater and sediment. Please correct or explain the following apparent discrepancies: Table ES-7 shows a 1E-05 cancer risk for the recreational child, however, Table ES-4 shows a cancer risk of 7E-04 for dermal contact with sediment. Table ES-7 shows a target organ HI < 1 for the construction worker; however, Table ES-4 shows that aluminum and manganese each have target organ HI > 1. Table ES-7 shows a 2E-05 cancer risk for the lifelong recreational user; however, the Table ES-4 shows a cancer risk of 8E-04 for dermal contact with sediment.*

Response: Comment No. 26 is a duplicate of Comment No. 25. See the Response to Comment No. 25.

Comment No. 27: *P. 3-18, second paragraph. The 13 wells that exhibit variation in the depth of water over five ft seem to be clustered in the snakepit and western side of the undeveloped area of OU9. Please provide an explanation for this clustering.*

Response: The most plausible explanation is that these wells are in areas where more efficient recharge occurs compared to other locations across the site. The wells in the snake pit area and undeveloped area are in wooded areas that allow greater recharge to the subsurface compared to the developed portions of the site that is typically covered with asphalt.

Comment No. 28: *P.3-21, first paragraph. The exact geographic location of site 3 has not been determined. The FFA states that site 3 is west of building 224. The RI at site 3 found contamination from the east side to the west side of the property. Therefore to say, "west of site 3" is not quite correct as the high seems to be in the location of MWZ3-01 in the north western corner of site 3.*

Response: The text will be reviewed (Summary of Groundwater Flow, page 3-21 and 3-22) and confusing references to Site 3 will be appropriately amended. The references to Site 3 were for general guidance purposes only in presenting large scale understanding of groundwater flow.

Comment No. 29: *P. 3-25 second paragraph. Please clarify how there can be an upward gradient from deep overburden to shallow bedrock?*

Response: The zones being compared were inadvertently reversed. The text will be corrected to read, "The lowest consistently upward gradients occur from the shallow bedrock zone to the deep overburden, particularly around former Building 41 area wells MW16-59, MW16-67, MW16-68, MW16-70, and MW16-84."

Comment No. 30: *P. 3-38, last paragraph. Please be advised that if there is an unacceptable risk in the developed area of OU9 determined by ROD, an environmental restriction may need to be implemented in previously transferred property along with property currently under lease.*

Response: Comment noted.

Comment No. 31: Figure 3-2A Comments - *Two additional comments are warranted relative to the depictions on this figure.*

MW16-85D

A repeat comment on the designation of MW16-85"D" is also called for. The use of MW16-85"D" is a clear misrepresentation of data. This well is shown on various figures as a deep overburden well. This well is without question in the intermediate zone of the saturated overburden. The interval over which this well is screened is given as 38 to 48 feet below ground surface. The depth to bedrock in this vicinity is approximately 65 feet based upon coring at MW16-30D according to Table 3-1. There was no confirmation core taken at MW16-85"D" and as shown on Figure 3-2A, this boring terminates at 60 feet while MW16-30D and MW16-31D confirm rock at 65 and 64 feet, respectively. In fact, according to Table 3-1, the depth to competent bedrock is not provided.

Table 3-5 lists the depth to the water table as approximately 17 feet below ground surface. This results in a saturated zone thickness of approximately 48 feet. This is what determines whether a monitoring well is situated shallow, intermediate, or deep, not from the ground surface. The shallow, or upper interval, extends from 17 feet to 33 feet below ground surface. The intermediate zone is between 33 feet and 49 feet below the ground surface. The deep interval of this zone extends from approximately 49 feet to 65 feet. Monitoring well 16-85 "D"(screened from 38 to 48 feet below ground surface) is clearly within the intermediate zone of the aquifer not the deep zone.

The determination of how a monitoring well is designated relative to shallow, intermediate or deep is not a matter of subjective judgment. The designation of this well is misleading in that it implies that the concentrations observed in ground water from MW16-85"D" are actually in the deeper portion of the saturated zone. This is a major concern when viewing and discussing data for the site.

Response: Justification for the assignment of the well as a deep overburden well was previously provided to EPA during exchanges of information occurring in support of the Triad teleconferences held during the Phase III field investigation. However, because the EPA is still concerned about the designation of this well, further discussion is provided in the following narrative.

While the screen of MW16-85D may occur within the intermediate zone of the overall saturated overburden

thickness at this location, based on subsurface lithologies and interpretations of hydrostratigaphic zones, the screened zone is most accurately described as situated in the deep overburden zone. The Navy agrees with EPA that "The determination of how a monitoring well is designated relative to shallow, intermediate or deep is not a matter of subjective judgment." In fact, extensive discussion supporting the determination that the screened portions of this well occur in the deep overburden zone is provided on pages 3-8 and 3-9 of Section 3.6.2 (Site 16 Geology). Further, as outlined on page 3-17 in Section 3.7.5.1 (Hydrogeologic Zones), it is noted that the categorization of wells as "S", "I" and "D" in the overburden is not based on relative position within the overall thickness of saturated materials, but is based on the lithologies and interpreted depositional environment. This is particularly important at this site (and at the NCBC facility as a whole) where preferential flow (and/or impedance of flow) occurs due to the deposition type. Simply assigning well designations based on relative positions in the overall saturated thickness can lead to mis-interpretations of large scale groundwater transport.

Please note that, as outlined in Sections 4 and 5 of the Draft Phase III RI report, well designations are only used as a general guide to understanding the large scale transport and migration of contamination. For example, wells in the deep overburden in the general vicinity of former Building 41 generally equate to wells in the intermediate zone to the east toward Narragansett Bay. At first glance it might appear that another source is present along the eastern arm of the plume because the highest contamination (along the arm) is generally observed in the intermediate wells in this eastern portion of the site. However, the comprehensive 3-D analysis performed in Section 4 properly concludes that the source is the former Building 41 area because the elevations are nearly equivalent. Thus, even if the Navy were to agree with the rationale provided by EPA and change the well designation, no changes to the conceptual model would result as the nature and extent and transport of contamination evaluation was performed viewing the data in 3-D, not using a "zoned" approach.

MW16-31D

Comment is also warranted on how the soil log for this well is presented on Figure 3-2A, Cross Section 1-A". The interval from approximately 44 to 56 feet below ground surface is described as "gray, very fine silty gravelly sand and rock". This is not how this interval is described on the soil boring log. The soil boring log clearly describes this interval as "gray silt and gravel" and "gray, gravelly silt". The intervals above and below are described solely as "silt". The description provided and shown on Figure 3-2A does not honor the description that was provided by a previous Navy contractor.

This issue also was raised during Triad conference calls with the Navy. "Silt with gravel" has a much lower permeability than "silty, gravelly sand and rock". There is no indication of this type of soil description on the soil boring log for MW16-31D. It is not allowable to change a soil description obtained by another professional. The changing of this description is not a "best professional judgment" issue. During various Triad conference calls with the Navy it was requested that the soils at this location be confirmed by installation of another soil boring at the location of MW16-31D before the soil description for that location could be changed. This was refused by the Navy. As such the Nay's interpretation remains unsupported and is therefore rejected by EPA.

Response: While the lithology presented on Figure 3-2A between 44 to 56 does vary slightly from the soil descriptions presented on the soil boring log for MW16-31D, the variance is not profound enough to illicit significant changes in interpretation to the cross-section. Essentially, the lithologies described indicate a till since a wide range in grain sizes occur (silt and gravels with varying degrees of sand) which is consistent with the lower portions of the overburden material at adjacent locations, though is slightly different percentages.

It is somewhat unclear as to the intent of the EPA comment other than to suggest that the Navy is employing in unprofessional data analysis. The Navy agrees that "Silt with gravel" could have a much lower permeability than "silty, gravelly sand and rock"; however, since the boring log contains "silt and gravel", the EPA point is moot. It is not a subtle point that the words "with" and "and" are not interchangeable when considering lithological descriptions. Their use specifically refers to the percentage contribution within the overall distribution of lithologies observed. The word "and" implies an approximately equal percentage of the grain sizes being described while the word "with" implies that the second lithology is a lower percentage than the first. In other words, "silt and gravel" (as observed in the boring log) implies that an approximate equal percentage of both silt and gravel occur while "silt with gravel" implies that the silt component is larger and the

gravel is a smaller component of the overall grainsize distribution. As such, anticipated permeabilities could be quite different.

The Navy is not sure who this statement is directed at: "There is no indication of this type of soil description on the soil boring log for MW16-31D. It is not allowable to change a soil description obtained by another professional." Based on the boring log over the depth range specified in the comment, there is no "silt **with** gravel" as stated by EPA.

Taken on the whole, however, neither "silt with gravel" or "silt and gravel" are too restrictive (to the extent implied by EPA in the comment and many other comments) as to prevent effective migration of CVOC from upgradient locations (most notably MW16-77I and MW16-85D). The soil sample at MW16-31D from 56 to 58 feet bgs has a CVOC concentration of 881 ug/kg (830 ug/kg of TCE). Based on the distribution of soil contamination observed in Figure 4-11 (to be updated to more accurately reflect the 881 ug/kg at 56 to 58 feet bgs result), this appears to be originating from immediately below the former solvent still. While groundwater at MW16-31D is consistently fairly low level (low hundreds ug/l), based on the screened position of 54 to 64 feet bgs, it is likely that the screen is placed too low to accurately intercept the most contaminated portions of the subsurface (no soil data is available between 36 to 56 feet bgs where the highest areas of contamination would be anticipated based on Figure 4-11).

While EPA did request that grainsize analyses be performed on a continuous basis (multiple discrete samples until refusal) at one location in the former solvent still/central former Building 41 area, the intent was not to change lithological descriptions at MW16-031D as suggested by EPA in this comment. The intent was to gauge the geotechnical data against field calls by the site geologist to get an "unbiased" result. As outlined in section 2.12.2.13 (GeoTechnical Sampling of Soils), with results discussed on pages 3-10 and 3-11, it was found that the lithological descriptions recorded by the site geologists were very accurate.

Comment No. 32: Figure 3-26 - *The flow net depicted on this figure does not reflect actual potentiometric lines that likely exist at this location. The lines shown beneath the Building 41 are essentially straight, diagonal lines. This is not how those lines should be depicted when viewing both the ground water elevations and the stratigraphy. The lines should be nearly vertical above the low permeability silt layer, with a marked diagonal slant across the lower permeability silt layer, with a resumption of more nearly vertical lines in the lower interval where more permeable soils are present, except for near MW16-31D when the soils are again of low permeability.*

While there is a higher ground water elevation in the shallow overburden than the deeper, this is due to a perched ground water condition. The elevation differential will cause ground water to move downward through the low permeability silt layer. However, this movement will be much slower and result in the steeper gradient across that layer, similar to light being refracted in a prism as it passes through glass with much greater density than that of air. Therefore, the depiction of the flow net provided on this figure incorrectly gives the impression of a direct, smooth, downward migration of ground water from the shallow perched ground water to the deeper ground water interval at a constant, unimpeded velocity.

Response: The Navy does not agree with the EPA conclusion that perched groundwater conditions are present in the former Building 41 area (see Navy response to General Comment 20). The data provided by the Navy represents the best interpretation based upon multiple lines of evidence (distribution of soil and groundwater contamination, results of multiple constant rate tests, vertical gradient analyses, etc.). While the Navy believes that the flow net depicted on the referenced figure (and other flow nets not referenced) does accurately reflect the subsurface conditions, the Navy agrees that other valid interpretations are possible.

Comment No. 33: *P. 4-4, first paragraph, table 4-30. Methylene Chloride and Acetone have a "T" qualifier that is not described in the table. Please add a footnote to the table for clarification.*

Response: Agreed. The "T" qualifier is defined as: This parameter was also detected in a trip blank. Note that it is associated with somewhat older (pre-Phase III data) in the remedial investigation dataset for Site 16.

Comment No. 34: *P. 4-9 fourth line down. Please explain where the wooden burn structure is located on the map of the undeveloped area.*

Response: Agreed. The text should read "wooden bermed structure". The structure is located between the creosote dip tank area and the former fire fighting training area.

Comment No. 35: *P. 4-17, fig 4-10. The text states that these areas are not likely connected. Why wasn't the cross section developed using MW16-12, MW16-34, MW16-10 and MW16-86 instead?*

Response: The intent of the cross-section depicted on Figure 4-10 was to provide a large scale, site wide perspective along the primary flow line trending generally west to east across the site. Furthermore, the intent was to present data along the pathway frequently referenced by EPA as critical to understanding the nature and extent of contamination emanating from upgradient locations. Undoubtedly, numerous other variants to the cross-sections could be proposed; however, the overall conclusions outlined in the conceptual site model would remain unchanged.

Comment No. 36: *P. 4-17, fig 4-10. Please plot the monitoring well locations on a base of the 1939/1941 aerial photograph. It seems that some of the upwelling at the eastern shore may be due to the old shoreline influences.*

Response: The Navy will consider creation of such a figure, most likely for inclusion as an attachment or within an existing RI appendix.

Comment No. 37: *P. 4-35. Last bullet. EPA agrees that 2 rounds of data cannot be used to develop trends. Please remove all trend discussion from this document.*

Response: Please note that, as summarized on 4-56, there are three or four rounds of groundwater data for many of the Site 16 wells. While this is still a limited data set for purposes of making any formal conclusions regarding trends, preliminary patterns may be gleaned from the review of the data. The text throughout the document will be reviewed and edited, as necessary, to reflect the fact that any analyses/language regarding trends is preliminary only/subject to change given the limitations of the existing groundwater dataset.

Comment No. 38: *P. 4-37. Please provide the lines of evidence used to determine that the plume would only be 100 feet further out from TW16-AH-06.*

Response: Please note that the referenced text states: "However, given the general trend of CVOC and TCE concentrations observed between locations TW16-AH-06 and TW16-AH-05 (located south of TW-16-AH-06), the plume underlying Allen would not be expected to extend much further than approximately 100 feet north of location TW16-AH-06." Examining Figure 4-29, it is noted that the CVOC and TCE concentrations decrease by more than 50 percent between locations -05 and -06. These locations are less than 200 feet apart. The TCE concentration in the deep sample at the -06 location (the northern most location) is 460 ug/L. The referenced statement is based on the rate of decline in concentrations observed between the two locations and the lack of any CVOC contamination in samples from locations -03 and -09 (to the west and east of location -06). This is, obviously, a "professional judgment" statement and is not based on analytical modeling. Most importantly, please note the bulleted recommendation item on page ES-9:

a. Further sampling of the groundwater plume underlying Allen Harbor may be necessary to delineate the northern extent of the plume. [The sampling would support the FS (e.g., support the determination of the potential long-term monitoring plan locations)].

The referenced text will be amended to include this explanation.

Comment No. 39: *P.4-37 Section 4.2.3: The last paragraph seems to imply that TCE was detected in only one sediment sample. The cited Figure 4-31 shows four sediment samples with measured TCE between 6.5 and 11 ug/kg. Please revise.*

Response: The reviewer is correct. The text will be updated to state that TCE was detected in 4 sediment samples at a concentration range of 2 ug/kg to 11 ug/kg. This information is correctly summarized in Table 4-65.

Comment No. 40: *P. 4-38, last paragraph and 4-40 third paragraph. There was no discussion of the QA/QC of the data nor the usability of the data in this document. If chemicals were below screening levels please only state that fact rather than noting lab contamination without the backup data evaluation.*

Response: Agreed. The reviewer is correct. The fact that acetone and 2-butanone are reported as positive detections in the analytical data base indicates that the reported concentrations did not exceed the action limits (for common lab contaminants) established for that particular data package during the data validation review. However, please note that acetone and 2-butanone are indeed common laboratory contaminants. Because data validation is conducted on a data-package specific basis it is constrained by the lab and field blanks available for that particular package; the review will not always flag all concentrations potentially attributable to lab contamination. Also, please note that all data validation memorandum are included in Appendix C of the RI report. Additionally, a "Data Quality Review" summary is provided in Appendix C-3. The text in Section 1 will be amended to alert the reader to the availability of Appendix C-3.

Comment No. 41: *P. 4-43, third full paragraph. The author seems to be confusing contamination and risk. Please reword. Contamination limitations should be based on detections not risk numbers. In addition, the ecological screening criteria is not used in the tables as frequently as the human health criteria and the RIDEM direct soil exposure criteria is a human health based criteria as is the ORNL criteria.*

Response: Contamination is not the same as risk. However, please note that, as indicated on page 4-2, the referenced screening levels have been use throughout Section 4 to provide perspective on the chemical concentrations detected in the environmental media. Are the concentrations detected potentially a risk concern? Has significant environmental contamination (in terms of risk) been bounded vertically/horizontally? The theme is that concentrations that do not exceed screening levels would typically not present an unacceptable risk. (However, the comparison does not, in any way, replace the risk assessments presented in Sections 6 and 7.) The referenced text does need to be corrected to state: The extent of contamination in the surface and subsurface soils of this particular area is somewhat limited. There is one exceedance of the RIDEM direct soil exposure residential criterion and several exceedances of the more conservative ORNL residential screening levels in the immediate area. There is also one exceedance of the RIDEM direct soil exposure industrial criterion at a location immediately north of the circled area presented on Figures 4-16 and 4-17.

Comment No. 42: *P. 4-49, last sentence. Typo? "..shallow bedrock overburden groundwater..." ?*

Response: Agree. The word "overburden" will be deleted.

Comment No. 43: *P. 4-51, last sentence. Please explain what is meant by the statement, " When concentration variability is taken into account, there is no real difference in concentrations...."*

Response: The referenced wording will be modified as follows: Multiple sources contribute to the PAH contamination in the Allen Harbor sediments. Consequently, a significant amount of variability in PAH concentrations was expected and was noted in the sediment samples collected from the Harbor (i.e., a wide-range of concentrations was detected). However, no particular concentration pattern or gradient was observed whereby samples along the shoreline demonstrated high concentrations versus samples collected distal from the shoreline. This analysis is consistent with the assessment presented in the Appendix F, the Supplemental Forensics Report.

Comment No. 44: *P. 4-57, first paragraph. The lower chlorinated congeners of PCBs are soluble in water. In addition, PCBs are found in groundwater samples at the Allen Harbor Landfill. Please clarify the statements.*

Response: The reviewer is correct that the lower chlorinated congeners of PCBs are more soluble in water that the higher chlorinated congeners. Additionally, while PCBs (as a group) are considerably less soluble in groundwater than the primary site contaminants (i.e., the CVOCs), PCBs have been detected in groundwater samples collected during environmental sampling at other sites investigated by the Navy. Sometimes the migration of PCBs (from soils to groundwater and within the groundwater aquifer) is even promoted by the presence of solvent contamination in soils/groundwater. However, PCBs were not detected in groundwater samples collected during the Phase II RI for Site 16. The text will be amended to include this information.

Comment No. 45: *P. 4-57, section 4.4.5. The AWQC should be used for comparison of the sheen pesticide contamination. Endrin is 0.0185 ppb, Lindane is 0.08 ppb, and Total BHC is 0.34 ppb. All of the seen detects seem to be above standards.*

Response: An in-text table and discussion comparing sheen sample results to AWQC and other relevant ecological screening criteria will be added to the referenced text. However, it should be noted that the AWQC assume that an organism is exposed to contaminants in surface water, not necessarily in a sheen floating atop of surface water. As noted in the text on page 4-57, "the concentrations noted may reflect an affinity/concentration of these organics with organic materials (anthropogenic or naturally occurring)". It should also be noted that an ecological risk evaluation of chemicals of potential concern in the sediments of Allen Harbor (the sink for contaminants entering the Harbor) was presented in the Phase II Screening Level Ecological Risk Assessment for IR Program Site 16.

Comment No. 46: *P. 4-59, Section 4.5.1: It is stated in the last paragraph that dioxin/furans exceeded direct contact human health screening criteria in five surface soil samples and six shallow subsurface soil samples, but that dioxins and furans are not discussed further because they are below the EPA goal of 1 ug/kg. The risks of dioxins/furans should be quantified because they exceed screening levels and will contribute to the total site cancer risk. It is possible that the addition of this as yet unquantified risk to the risks already quantified may result in different conclusions concerning whether risk exceeds the risk range of 1E-04 to 1E-06. Please revise this paragraph and quantify risk.*

Response: Please see Section 6 of the RI. The referenced text will be amended to acknowledge that, although the EPA goal of 1 ug/kg was not exceeded, dioxins/furans were selected as COPCs and evaluated in the human health risk assessment. Risk estimates for the dioxin/furans were already included in the risk summary tables presented in Section 6 and in the detailed risk analysis tables presented in Appendix D.

Comment No. 47: *P. 4-59, Section 4.6.1: It is stated in the second bullet that there is no Site 16-specific background soil dataset, and that the Navy may develop such a data set if it is determined that accurate Site 16-specific background values are necessary for risk-management decisions for Site 16. Please demonstrate that a site 16-specific background dataset is unnecessary for risk management decisions by quantifying and documenting the risks of all COPCs (regardless of background) compared with risks of only those COPCs that are greater than background.*

Response: Please see response to General Comment No. 3. The RAGS Part D Table 9s present risk assessment results for all chemicals selected as COPCs based on toxicity screening only. The RAGS Part D Table 10s present risk assessment results for chemicals/risk drivers selected as COPCs based on a toxicity and background screen.

Comment No. 48: *P. 4-73, section 4.7.1.2. EPA agrees with the Navy's recommendation to further investigate the hits around SB16-A3-12.*

Response: Agree.

Comment No. 49: ***Figure 4-1 (30 to 15 feet MSL)*** *- While there are several small areas of low CVOC concentrations in soil beneath Building 41 and none observed elsewhere it should be noted that this interval is in the unsaturated zone. Building 41 asphalt/concrete floors and associated pavement has not allowed*

significant infiltration into this area while other areas (north of Davisville Rd in the Central Area) have been subjected to prolonged leaching due to exposure to precipitation. In some areas such as the Former Fire Fighting Training Area and possibly the BTEX Hot Spot area, there has been additional water applied during fire fighting. Also, given the extensive presence of BTEX, there has more than likely been extensive biodegradation of chlorinated compounds in the Central areas.

Response: The observation by the EPA reviewer that several small areas of low CVOC concentrations within the unsaturated zone is precisely the important point to conclude from this figure. However, this observation appears to be contrary to the EPA position stated in General Comment Number 20 in the section "TCE Residual and Driving Head". While the Navy agrees that prolonged leaching and biodegradation has reduced the present day concentrations observed in the vadose zone and upper saturated portions in the former firefighting training area, the conceptual model accurately accounts for these phenomena. Please see section 4.2.1 (Volatile Organic Compounds in Soils) and section 5.7 (Conceptual Site Model) of the Draft Phase III RI Report for detailed discussions and conclusions drawn from this figure.

Comment No. 50: Figure 4-1 (15 to 5 feet MSL) - *The distribution of total CVOC in this interval argues against the Phase III Remedial Report interpretation that the major source area is at Building 41 while the area north of Davisville Road is minor to moderate (Page 5-19, third paragraph, first sentence notes "a minor to moderate contributor to VOC contamination appears to be associated with the north-central portion of Site 16.") The area of CVOC is much more extensive with the highest concentration of CVOC in this interval being at the BTEX Hot Spot area. The distribution of CVOC from this elevated area actually appears to show migration to the south, likely along silt layers.*

Response: Comment noted. Please see Section 4.2.1 (Volatile Organic Compounds in Soils) and Section 5.7 (Conceptual Site Model) of the Draft Phase III RI Report for detailed discussions and conclusions drawn from this figure.

Comment No. 51: Figure 4-3 (5 to -5 feet MSL) - *As with Figure 4-2, this figure also supports an interpretation that the area north of Davisville Road is a much greater source area than is Building 41. The area of highest mass (highest concentrations of CVOC) clearly is to the east of the BTEX Hot Spot Area and south of the Former Fire Fighting Training Area. Coupled with Figure 4-2 shows that there has been downward migration of CVOC in this area far in excess of that beneath Building 41. It should also be noted that the depth of the DPT borings within the BTEX Hot Spot did not penetrate to this interval. Thus, while there is no CVOC noted within that area for this interval, this may be due to lack of data, not absence of CVOC at this interval for the location within the BTEX Hot Spot Area.*

Response: Comment noted. The EPA reviewer is correct that for this specific shallow-zone interval, the highest concentration of CVOC is just south of the fire fighting training area (and east of the BTEX hot spot). This observation does not invalidate Navy's discussion/analysis of the nature and extent of contamination in the former Building 41 area nor demonstrate that this area is more important for consideration as a primary source. The EPA reviewer is incorrect when noting "the depth of the DPT borings within the BTEX Hot Spot did not penetrate to this interval." While it is correct that the 16TP-ETP2 did not penetrate this interval (an exploratory test pit), SB16-058 did penetrate this interval (and the interval below as well – Please see Figure 4-4). As observed in Appendix C.4, seven soil samples were collected and analyzed via Color Tec field screening (one sample was sent to the fixed-base lab) between 0 and 27 feet bgs, with a estimated ground elevation of 19.5 ft MSL. Four samples were collected below the elevated results observed at 8 feet bgs (11.5 feet MSL), with one occurring at the lower interval outlined in Figure 4-4.

Please see Section 4.2.1 (Volatile Organic Compounds in Soils) and Section 5.7 (Conceptual Site Model) of the Draft Phase III RI Report for detailed discussions and conclusions drawn from this figure.

Comment No. 52: Figure 4-4 (-5 to -15 feet MSL) - *The distribution of CVOC on this figure does not support significant migration from the Building 41 area. Instead, it suggests migration to the south from the North-Central Area, likely along dipping silt layers. It may also represent upwelling of CVOC from the shallow bedrock. It is also noted that the "red" zone shown beneath Building 41 is not appropriate. Only one location*

had CVOC concentrations that exceeded 6,000 µg/l, which is the minimum concentration for that color designation. Therefore, the area of "red" should be smaller than depicted.

Response: Comment noted. The EPA interpretation that this figure "may also represent upwelling of CVOC from the shallow bedrock" is not supported as subsequent figures (4-5 to 4-8) and Figure 4-11 do not demonstrate a continuous pathway of elevated CVOC concentrations upwelling from the shallow bedrock zone to the elevation range displayed in this figure. The EPA comments regarding the "red" coloration are inaccurate because the figure presents soil concentrations and their interpreted isopleths, not groundwater concentrations.

Please see Section 4.2.1 (Volatile Organic Compounds in Soils) and Section 5.7 (Conceptual Site Model) of the Draft Phase III RI Report for detailed discussions and conclusions drawn from this figure.

Comment No. 53: Figure 4-5 (-15 to -25 feet MSL) - *The distribution of CVOC shown on this figure also does not support the Building 41 TCE still area as the major point of origin. When viewed in context with the preceding figures it is clear that mass has migrated from north of Davisville Road (North-Central Area) and/or is upwelling from shallow bedrock or is being carried into the site from a preferential flow pathway in the deep overburden from up gradient. The distribution pattern shown on this figure closely follows a distribution pattern from the North-Central Area as CVOC migrated down dip of silt layers to an area where silt is non-existent. Migration cross gradient would have been facilitated by application of water during fire fighting and other training activities in the North-Central Area that would have resulted in intermittent ground water mounding and thus, radial flow. This information was previously supplied as a technical memorandum prior to the onset of this Phase III Remedial Investigation during the work plan development.*

Response: Comment noted. Please see Navy response to EPA Specific Comments Numbers 51 and 52. Please see Section 4.2.1 (Volatile Organic Compounds in Soils) and Section 5.7 (Conceptual Site Model) of the Draft Phase III RI Report for detailed discussions and conclusions drawn from this figure.

Comment No. 54: Figures 4-6 (-25 to -35 feet MSL) and 4-7 (-35 to -45 feet MSL) - *See previous comments above. The distribution shown suggests either residual from flow from the North-Central Area and/or continuing contribution from shallow bedrock. This figure does not support Building 41 as the major source area.*

Response: Comment noted. Please see Navy response to EPA Specific Comments Numbers 51, 52 and 53. Please see Section 4.2.1 (Volatile Organic Compounds in Soils) and Section 5.7 (Conceptual Site Model) of the Draft Phase III RI Report for detailed discussions and conclusions drawn from this figure.

Comment No. 55: Figure 4-11 - *This cross section merits special comment. The interpretations and distributions shown do not reflect the very low concentrations of CVOC down gradient from the "hot spot" beneath Building 41. The interpretation provided on Figure 4-11 is highly subjective and does not convey an accurate representation of the distribution of CVOC data collected to date.*

There is no data in the Phase III Remedial Investigation to suggest concentrations of CVOC approach 20,000 µg/l as is depicted on this figure by use of the red color shading. The highest concentration observed is just over the 6,000 µg/l minimum for the red color. The concentrations on this cross section do not begin to approach 10,000 µg/l. MW16-85"D"(I) which is depicted in the red zone does not even reach the 6,000 µg/l minimum. The data provided on Page 21 of 27, Table 4-36 in Volume 4 of the Phase III Remedial Investigation Report shows a total CVOC value of 4,807 µg/l for MW16-85"D"; Page 11 of 13, Table 4-34 provides a value of 7,700 µg/l for MW16-77I; while SBA3-23 has only a total CVOC of 88 µg/kg in soil, as shown on Page 3 of 7 on Table 4-18. No data is provided in this report for MW16-78S.

The data available for SB A3-22 and SB A3-23 are for soil, not ground water. While there is a concentration of CVOC at 17,000 µg/kg in at SB A3-22 this does justify depiction of a ground water concentration of up to 3,000 µg/l by using the shading pattern with a range from 300 µg/l to 3,000 µg/l. The highest PID reading was 2.5 PPM in the soil column. The concentration of dissolved phase at this location would be significantly less

than, 17,000 µg/l. There is also no data to support any concentration at MW16-30D/SB16-A3-23 that would justify a blue (3,000 to 6,000 µg/l) or green color, let alone a red color. Down gradient, the concentration at SB A3-33 which has a soil maximum of 42 µg/kg does not support the continuum of colors depicted on this figure to that location.

Response: The reviewer has incorrectly assumed that the isoconcentration contours presented on Figure 4-11 are based on groundwater data when they are actually based on soil data (screening level and fixed based lab data). Please note the soil units in the text box at the lower left hand corner of the figure and the discussion of the various cross section figures throughout Section 4.2.1 (Volatile Organic Compounds in Soils). As such, no further discussions are warranted.

Comment No. 56: *P. 5-11, last paragraph. MW16-25 seems to be down gradient according to Figure 3-18 rather than MW16-23, please clarify.*

Response: A review of Figure 3-18 indicates that both MW16-23S and MW16-25S are downgradient of MW16-37S. MW16-23S is discussed, in particular, because of the moderate TCE concentration detected during the Phase III monitoring event.

Comment No. 57: *P. 5-12, second full sentence. Please explain how the dissolved TCE has migrated downward if there is no infiltration of rain water, no driving force, since the area was under a building for 50 years and the area outside of the building was paved for 50 years.*

Response: Please see Navy response to EPA General Comment Number 20.

Comment No. 58: *P. 5-13, last sentence of the third paragraph. This phenomena described is similar to EPAs CSM for the migration of the plume at Calf Pasture Point (OU8).*

Response: Comment noted. However, comments/discussions regarding the Conceptual Site Model for Calf Pasture Point (Site 07) are best addressed in documents/response-to-comments discussions particular to Site 07.

Comment No. 59: *P. 6-5, middle of page. Please quote the RIDEM GB definition rather than paraphrasing it.*

Response: The second sentence in the section titled "Screening Levels for Groundwater and Groundwater Seeps" will be revised as follows: "The COPC selection tables for groundwater also include the RIDEM GB groundwater objectives because the groundwater underlying Site 16 is currently classified as a GB area (i.e., those groundwater sources designated by the Director which may not be suitable for public or private drinking water use without treatment due to known or presumed degradation)."

Comment No. 60: *P. 6-8, Section 6.1.2.2: It is stated that in the last bullet that all chemicals that exceeded risk screening criteria, including those that did not exceed background, were selected as COPCs and carried through the risk assessment. However, per Navy policy, chemicals present at naturally occurring levels were not retained as COCs. It is also Navy policy that such eliminated chemicals be identified and evaluated qualitatively or semi-quantitatively for their risk. Please revise this section to identify what was done with these chemicals.*

Response: The Navy's policy is to calculate risks for site related COPCs. Non-site related COPCs (not COCs) should be compared to risk based screening benchmarks and discussed in the uncertainty evaluation of the risk characterization section. For Site 16, risks were calculated for both site related and non-site related COPCs. Those risks estimates were presented in the RAGS Part D Table 9s. Subsequently, RAGS Part D Table 10s were prepared; but, only present risk estimates for those chemicals determined to be clearly site-related (suspected to be present above background concentrations). Since risks were calculated for both site-related and non-site related COPCs (i.e., the RAGS Part D Table 9s) there was no need to present a separate evaluation for non-site related COPCs in the risk characterization section. No changes are proposed for the text in this section.

Comment No. 61: *Page 6-9, Section 6.1.3.1, The COPC list for inorganics in surface soil should include beryllium.*

Response: Beryllium will be added to the list of COPCs for inorganics. Note that beryllium in surface soil was evaluated in the HHRA.

Comment No. 62: *P. 6-25, last bullet. The EPC for groundwater should not be an arithmetic average for the RME. In accordance with guidance use the maximum since we only have 2 rounds of data.*

Response: There were 36 COPCs identified for groundwater in the undeveloped area. The maximum detected concentrations for these 36 COPCs occurred in 19 different samples collected from 14 different locations. There were 29 COPCs identified for groundwater in the developed area. The maximum detected concentrations for these 29 COPCs occurred in 20 different samples collected from 12 different locations. A receptor could not be exposed the maximum concentration of different COPCs collected from different wells simultaneously. Consequently, the average COPC concentration across the highly contaminated area of the plume was considered a more representative exposure point concentration versus the maximum detected concentration. Most importantly, the results of the risk assessment indicate there are unacceptable risks from exposures to groundwater. Use of the maximum concentration as opposed to the average plume concentration does not change the conclusions of the risk assessment. While some additional VOCs may be retained if the maximum detected concentration is evaluated in the risk assessment, all major VOCs have already been selected as COCs. Also, some additional metals would be retained as COCs, most notably in groundwater in the developed area. However, as discussed in the RI report, the metals concentrations in the unfiltered/high turbidity samples appear to be primarily a consequence of suspended particulate matter in the groundwater samples. Also, the pattern of metals concentrations across Site 16 suggests that the metals concentrations reported in the Site 16 groundwater are, for the most part, not site-related.

Comment No. 63: *P. 6-40, section 6.2.410. EPA cannot agree with the use of an average for the EPC of groundwater nor the use of less than 250 days for exposure time for residential exposure.*

Response: See response 62 regarding the calculation of the EPC for groundwater. An exposure frequency of 350 days a year was used to evaluate exposures to groundwater. Per the Phase III QAPP, an exposure frequency of 150 days a year was used to evaluate exposures to soil because this value was the value historically recommended by USEPA Region I for residential soil exposures. The Navy is aware that USEPA Region I is currently revising their exposure assumption recommendations, but, has not yet published revised recommendations. The Navy will address this issue in the uncertainty section of the HHRA and will include tables in the HHRA appendix that provide the risk estimates assuming a 250 day per year exposure frequency for residential exposure to soils.

Comment No. 64: *P. 6-53, section 6.4.3.3. Is this section for the surface water media noted in the RAGS part D tables? EPA had requested residential exposure evaluation to both sediments and surface water at Allen Harbor for completeness. Why has the Navy ignored that request?*

Response: See Response to General Comment No. 2b. As noted in that response, the Navy has not ignored the EPA request to evaluate the surface waters and sediments of Allen Harbor.

Comment No. 65: P. 6-55 & 56, Section 6.4.3.5: *Please identify the location in the report of the modeled indoor air concentrations, risk equations, and risk calculations for the vapor intrusion risk evaluation in this section. It is stated that the uncertainty about vapor intrusion is included in the uncertainty section however; EPA did not find such a discussion. EPA does not approve the indoor air risk estimates because of the high uncertainty surrounding the soil characteristics used in the Johnson and Ettinger modeling and soil gas monitoring. EPA believes that this uncertainty is several orders of magnitude, leading to a conclusion that risks may be higher than EPA risk criteria in a future building. Therefore, EPA believes that a feasibility study would recommend, at a minimum, institutional controls to require sub-slab ventilation in any future building, especially since the vapor intrusion screening levels are exceeded considerably.*

Response: The locations of the soil gas samples are shown on Figures 4-70 and 4-71. Print outs of USEPA's Johnson and Ettinger vapor intrusion model, which include the model indoor air concentrations, are included in Appendix D.6. Since the vapor intrusion evaluation was performed using software published by the USEPA, the equations used in evaluation are not included in the text. The equations are too numerous to reproduce in the HHRA and can be found in the referenced USEPA user guide. Please note that the soil gas sampling and the subsequent risk evaluation were conducted in accord with the Phase III QAPP for Site 16.

The text does not state that uncertainty with the vapor intrusion modeling would be discussed in the uncertainty section.

It is not clear if the USEPA is not approving the vapor intrusion modeling because they disagree with the site-specific values that were used as inputs to the modeling or if USEPA Region I does not approve the use of USEPA's Johnson and Ettinger Vapor Intrusion model. Regardless, the Navy does agree that there is a relatively high amount of uncertainty associated with the referenced model and will take this fact into account during the preparation of the Feasibility Study and when making risk management decisions for Site 16.

Comment No. 66: *P. 6-59, section 6-5. Include the uncertainty of using background data sets that are not comprehensive nor site specific to screen out COPC that are "not site related".*

Response: Agreed. A discussion on the uncertainty associated with the background database will be added to the uncertainty section.

Comment No. 67: *P. 6-63, EPCs. Include the uncertainty of not using the maximum for groundwater concentrations in accordance with guidance for the RME.*

Response: Agreed. A discussion on the uncertainty associated with the exposure point concentration for groundwater will be added to the uncertainty section. Note that there is also uncertainty associated with using the maximum concentration as the exposure point concentration since, as discussed in the response to comment 62, the maximum concentration for the individual COPCs occur at different locations across the site and it is extremely unlikely a receptor would be exposed to groundwater from all locations simultaneously. Perhaps most importantly, the groundwater underlying site Site 16 is clearly contaminated with significant levels of CVOCs. The use of maximum versus average concentrations as the EPC does not alter the conclusions of the risk assessment.

Comment No. 68: *P. 6-67, Section 6.5.3: In the subsection entitled "Uncertainty in the Toxicity of Arsenic" please eliminate the first sentence because it is debatable and irrelevant whether carcinogenic effects are the primary health effects of arsenic. Also, please eliminate the fourth sentence because evaluating arsenic as a non-carcinogen would not be more appropriate than evaluating it as a carcinogen. Rather, it is appropriate that arsenic should be evaluated for both carcinogenic and non-carcinogenic effects because EPA has provided an oral Slope Factor and oral RfD for the respective effects.*

Response: The text will be revised as requested.

Comment No. 69: *P. 6-71, Seeps and Sediment Risks, include residential exposure to Allen Harbor surface water and sediments not just recreational exposures.*

Response: Please see Response to Comment No. 64.

Comment No. 70: *Table 6-1 and 6-2, The screening levels for dioxins and furans reflect the Regional Screening levels but are consistently a little lower than the Regional values. Please explain why this apparent adjustment was made.*

Response: As noted in the text on page 6-4 and in the footnotes to the COPC selection tables, the July 2008 version of the Oak Ridge Screening Levels were available at the time the risk assessment was prepared and

were used in the COPC selection tables. The values for dioxins/furans presented in the July 2008 table differ from those presented in the current table because of differences in the toxicity criteria used to develop the screening criteria.

Comment No. 71: *Table 6-1 and 6-2, While the screening levels for some of the dioxins and furans reflect the Regional Screening levels, except as discussed n the preceding comment, the table should clarify which surrogates were used for the compounds for which no Regional value is available.*

Response: Regional Screening Levels were available for all the dioxin/furans congeners detected at Site 16, therefore no values were developed using surrogates.

Comment No. 72: *Table 6-1, The table (and other tables with residential screening values for soil) does not list an ORNL Regional Screening Level for cobalt. A screening value is available, however. Please add the screening value 2.3 mg/kg to the table and screen the site data accordingly.*

Response: The July 2008 version of the Oak Ridge Regional Screening Level table, the version available at the time the risk assessment was prepared, did not contain criteria for cobalt. The most current version of the referenced ORNL tables will be reviewed by the Navy at the time the next revision of the report is prepared. If changes in toxicity criteria impact either risk-management decisions or the selection of COCs, the HHRA will be updated to include revised toxicity criteria.

Comment No. 73: *Table 6.1, The listed ORNL residential soil screening value for vanadium is 55 mg/kg, for metallic vanadium. Please explain why the more conservative benchmark of 39 mg/kg for vanadium and compounds was not used. This comment also applies to other tables with residential screening values for soil.*

Response: Agree. The tables will be revised to use the screening level of 39 mg/kg for residential exposures. Note that this change does not impact the conclusions of the HHRA since all detected concentrations of vanadium are still less than the screening criteria.

Comment No. 74: *Table 6-2, Dibenzofuran was not selected as a COPC, and the given rationale for elimination is below screening level (BSL). No screening level is provided for dibenzofuran, however. This chemical should not be eliminated as a COPC.*

Response: Agree. The rationale for dibenzofuran will be changed to NTX and dibenzofuran will be retained as a COPC and discussed in the uncertainty section.

Comment No. 75: *Table 6-2, The table does not list an ORNL Regional Screening Level for cobalt. A screening value is available, however. Please add the screening value 30 mg/kg to the table and screen the site data accordingly. This comment also applies to other tables with industrial screening values for soil.*

Response: The July 2008 version of the Oak Ridge Regional Screening Level table, the version available at the time the risk assessment was prepared, did not contain criteria for cobalt. The most current version of the referenced ORNL tables will be reviewed by the Navy at the time the next revision of the report is prepared. If changes in toxicity criteria impact either risk-management decisions or the selection of COCs, the HHRA will be updated to include revised toxicity criteria.

Comment No. 76: *Table 6.2, The listed ORNL industrial soil screening value for vanadium is 720mg/kg, for metallic vanadium. Please explain why the more conservative benchmark of 520 mg/kg for vanadium and compounds was not used. This comment also applies to other tables with industrial screening values for soil.*

Response: Agree. The tables will be revised to use the screening level of 520 mg/kg for industrial exposures. Note that this change does not impact the conclusions of the HHRA since all detected concentrations of vanadium are still less than the screening criteria.

Comment No. 77: *Table 6-5, The ORNL industrial regional screening level for chloromethane is listed as 840 ug/kg. The lowest screening level in the ORNL tables (8400 ug/kg) is actually a cancer-based value and does not need to be divided by 10. The appropriate entry for the screening level column is "8400 C."*

Response: Agree. The ORNL industrial screening criteria for chloromethane will be revised to 8,400 C in all tables.

Comment No. 78: *Table 6-27 and 6-28, The units for SA and AF for dermal contact with soil and sediment need to be altered to more accurately reflect the rate of exposure. The SA is listed as cm^2/day and the AF is listed as mg/cm^2. The SA should just be cm^2, as it is a time-independent skin surface area. The AF should be mg/cm^2-event and the associated exposure equations should include an EV (1 event/day) factor, to incorporate a time component for the adherence factor.*

Response: Agree. The units will be revised as suggested.

Comment No. 79: *Table 6-27 and 6-28, The surface area parameter A for dermal contact with groundwater and surface water is presented in units of cm^2/day. The A should just be cm^2, as it is a time-independent skin surface area.*

Response: Agree. The units will be revised as suggested.

Comment No. 80: *Table 6-35, No cancer unit risk for inhalation is provided for cobalt. The ORNL regional screening table lists a PPRTV value of 9E-3 $(ug/m^3)^{-1}$. Please use this value for cobalt.*

Response: The July 2008 version of the Oak Ridge Regional Screening Level table, the version available at the time the risk assessment was prepared, did not contain criteria for cobalt. The most current version of the referenced ORNL tables will be reviewed by the Navy at the time the next revision of the report is prepared. If changes in toxicity criteria impact either risk-management decisions or the selection of COCs, the HHRA will be updated to include revised toxicity criteria.

Comment No. 81: *Table 6-39, The title only refers to the "Undeveloped Area." This should state "Southeast Undeveloped Area."*

Response: Agree. The title will be revised to state "Southeast Undeveloped Area".

Comment No. 82: *Table 6-46, Please explain why there are no soil gas COCs for building E-107 when Figure 4-33 indicates that benzene exceeds target soil gas levels in two samples along the south wall of the building. Please explain why there are no soil gas COCs for the undeveloped area when Figure 4-33 indicates that target soil gas levels are exceeded by TCE, vinyl chloride, and benzene in the area south of building E-107 and north of Davisville Road. Please revise the analysis or explain why not.*

Response: Please note that Figure 4-33 highlights VOCs detected at concentrations greater than referenced screening criteria; the figure does not identify chemicals actually selected as chemicals of concern (COCs). As discussed in Section 6.1.3.12, several VOCs were detected at concentrations in soil gas samples exceeding the screening criteria and were retained as COPCs for soil gas. Subsequently, as discussed in Section 6.4.3.5, exposures to COPCs in soil gas were evaluated with USEPA's Johnson and Ettinger vapor intrusion model. In contrast to the risk results for the former Building 41 area, the results of the vapor intrusion modeling indicated that risks from exposures to soil gas at Building E-107 and the undeveloped area do not exceed risk benchmarks referenced in the risk assessment. Therefore, no COCs for soil gas were identified for these areas.

Comment No. 83: *Page 7-3, Section 7.2.3, The first paragraph states: "While the north central area at Site 16 is currently heavily vegetated, erosion (and overland run-off of soil particulates) was possible when the site was less vegetated and actively used by the Navy." The sense of this sentence is clear but it would be more appropriate to state that "erosion was more likely" rather than "erosion was possible." As currently worded, the*

suggestion is that erosion is no longer possible. This statement should be moderated.

Response: Agree. The wording on Page 7-3, Section 7.2.3, first paragraph will be changed to "While the north central area at Site 16 is currently heavily vegetated, erosion (and overland run-off of soil particulates) was more likely when the site was less vegetated and actively used by the Navy."

Comment No. 84: *Page 7-4, Section 7.2.4, Please correct the text of the last sentence (starting with: "Based on the habitat description at the Site...") of the first paragraph. The sentence structure is confusing.*

Response: Agree. The wording on Page 7-4, Section 7.2.4, last sentence will be changed to "Based on the habitat description at the Site, the following are the assessment and measurement endpoints that were selected for this SLERA."

Comment No. 85: *Page 7-6, Section 7.2.4, In the paragraph on Insectivorous Birds and Mammals, the text states: "Insectivorous birds and mammals that consume primarily invertebrates and other vermin are considered first-level carnivores." To help support the assertion for this level of carnivory attributed to predators, please define "vermin."*

Response: The wording "and other vermin" will be deleted from the sentence above to clear up any ambiguity.

Comment No. 86: *Page 7-13, Section 7.3.4, The paragraph under Terrestrial Wildlife discusses COPC selection for this class of receptors. It should be noted that COPC for all ecological receptors were selected as presented in the Table 7-1. The discussion of wildlife HQs should be treated separately from COPC selection. The conservative HQs from Table 7-3, discussed in this paragraph, do not denote COPC selection but were calculated for all COPC identified in Table 7-1. The discussion of these HQs should be presented in a section separate from the COPC selection.*

Response: In accordance with the USEPA Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (USEPA, 1997), conservative food chain modeling was conducted in Step 2 to help select the list of COPCs based on risks to wildlife. This approach was followed because only a portion of the chemicals have screening values based on risks to wildlife. The only exceptions were for essential nutrients (calcium, magnesium, potassium, and sodium) and chemicals that had maximum detected concentrations lower than their wildlife Eco-SSLs. For example, several PAHs (2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, dibenzo(a,h)anthracene, fluoranthene, fluorene, naphthalene, and phenanthrene) had maximum detected concentrations below the wildlife Eco-SSLs; therefore, these chemicals were not evaluated in the food chain model.

Comment No. 87: *Page 7-19, Section 7.4.2, The treatment of COPC eliminated based on background or pH is not clear or consistently applied for the various wildlife receptors. It should be noted that aluminum, mercury, iron, and vanadium are included in Table 7-4, as they should be. The appropriate, clear approach is to include them in the less conservative HQ calculation and then if they are eliminated based on other factors, this can be discussed in the risk characterization.*

Response: Disagree. It is Navy policy to eliminate COPCs that are within background concentrations early in Step 3a, and not to include them in the less conservative food chain model. Aluminum, iron, mercury, and vanadium were inadvertently included in the less conservative food chain model. They will be deleted from Table 7-4 in the next version of the SLERA. Note that the reference to Table 7-5 in the text is incorrect. The text will be changed to reference Table 7-4.

Comment No. 88: *Page 7-19, Section 7.4.2, The presentation of less conservative HQs is not very well organized. The HQs for each receptor should be summarized separately. There is no discussion of the mercury HQ for the robin. The rationale for elimination of each COPC is not clear. Please reorganize the text.*

Response: Agree. The text will be modified and reorganized to discuss each receptor instead of the receptor

class. Note that based on the Navy's response to USEPA comment No. 87, a discussion of the mercury for the robin is not needed and will not be included in the SLERA.

Comment No. 89: *Page 7-19, Section 7.4.2, The top of the page notes: "For avian receptors, the NOAEL HQ was greater than 1.0 for lead." Please add iron and mercury to this sentence.*

Response: Disagree. Please see the Navy's response to USEPA comment No. 87.

Comment No. 90: *Page 7-19, Section 7.4.2, The second paragraph refers to the woodcock. Please change this to the robin.*

Response: Disagree. The word "woodcock" will be deleted as it is not applicable to this paragraph.

Comment No. 91: *Table 7-2, The home range listed for the robin is 0.61 acres, based, according to the text in Appendix E, on "data from Tennessee and a New York dense conifer forest" with values that ranged from 0.27 to 1.04 acres. It appears that this average was calculated without first averaging the New York values (0.11 ha and 0.21 ha). As equal weight should be given to the two studies, please use an average of the mean Tennessee home range and the average of the New York home ranges. This results in a value of 0.285 ha, or 0.70 acres, slightly more conservative that the selected home range.*

Response: Disagree. Although both of the New York studies were conducted in New York, the forest types and density of the robin population were very different. Therefore, these should be considered separate studies. Note that the resultant acreage of 0.70 is <u>less</u> conservative than the value of 0.61 on Table 7-2. Furthermore, the area use factors were not used in this SLERA so changing the value from 0.61 to 0.70 would not change the risks.

Comment No. 92: *Table 7-2, Please complete the footnote: "The exposure factors were derived as presented in Appendix _."*

Response: Agree. The footnote will be changed to "The exposure factors were derived as presented in Appendix E."

Comment No. 93: *Table 7-2, The selected conservative food ingestion rate for the robin is 1.25E-02 kg/d. This is based on a Nagy et al. (1999) metabolic scaling: $FI = (9.7 \times BW(g)^{0.705})/18kJ/g/1000$. This value is significantly lower than the mean of the laboratory derived values for the robin 1.205 g/g-day or 9.3E-02 kg/d. Given that this value is an empirical measurement specific to the robin, and given that it is a much more conservative value for food chain modeling, this value should be considered a top choice for risk assessment. Please provide further explanation for why the assumption that the robin diet consists entirely of worms for the food chain models means that the field metabolism scaling (Nagy et al., 1999) is more appropriate than using the values presented in EPA (1993). Further, please review Nagy et al. (1999); is the food ingestion rate on a wet weight or dry weight basis?*

Response: As presented in Appendix E of the SLERA (Dry Weight Derivation of Body Weight, Food and Water Intake Factors for Terrestrial Food Chain Models), the model from Nagy et al. (1999) used for the robin was based on insectivorous birds. Also in Nagy et al., (1999), the robin is considered an insectivorous bird. As presented in USACHPPM (2004): "During seasons when fruits dominate the diet, robins may need to consume quantities in excess of their body weight to meet their metabolic needs each day. Robins as well as other fruit-eating birds exhibit a low digestive efficiency for fruits; Karasov and Levey (1990) estimated the metabolizable energy coefficient (MEC) (i. e., the proportion of food energy that actually is assimilated) for robins eating a mixed fruit diet to be only 55 percent, perhaps because of the low retention time of the digested matter in the gut (Levey and Karasov, 1992). The short retention time might actually be an adaptation to eating fruit because large quantities of fruit must be processed to obtain an adequate protein intake. In contrast, when eating insects, robins (as well as other bird species) exhibit a higher digestive efficiency of approximately 70 percent (Levey and Karasov, 1989). Moreover, the energy content of insects tends to be higher than that of most fruits, particularly on a wet-weight basis. Thus, during the spring when robins are

consuming insects, they should consume a smaller amount relative to their body weight than when eating fruits." This is the reason for the lower ingestion rates when evaluating the robin as an insectivore. Page 262 in Nagy et al. (1999) clearly indicates that the dry matter is used in the calculation of ingestion rates.

USACHPPM (U.S. Army Center for Health Promotion and Preventive Medicine), 2004. Development of Terrestrial Exposure and Bioaccumulation Information for the Army Risk Assessment Modeling System (ARAMS), Aberdeen Proving Ground, Maryland, April.

Comment No. 94: *Table 7-2, The soil ingestion rate for the robin is unclear. The conservative value presented 3.742E-04 kg/d is higher than the value actually used in the food chain model 2.046E-03 kg/day. It appears that the value used in the food chain model calculations was converted from the Nagy et al. (1999) food ingestion rate, while the value presented in the table was converted from a revised food ingestion rate. Please clarify.*

Response: Agree: The value in Table 7-2 was incorrect. The value should be 2.046E-03 kg/day, which was used in the conservative food chain model calculation for the robin. Also, for the less conservative food chain model, the correct soil ingestion rate is 7.601E-04, not the value listed in Table 7-2, which was used in the less conservative food chain model.

Comment No. 95: *Table 7-2, EPA Specific Comment 98 on the March 2007 QAPP noted an apparent error in the selected food ingestion rate for the northern bobwhite. The comment noted that the literature value should not have been converted to a dry weight basis. This comment has not been incorporated into the ecological risk assessment; the food ingestion rate is still too low. Please use the food ingestion rate directly from the Koerth and Guthery (1990) study without performing the wet weight to dry weight conversion.*

Response: Agree. The food chain model for the northern bobwhite quail will be recalculated using the food ingestion rate directly from the Koerth and Guthery (1990) study without performing the wet weight to dry weight conversion.

Comment No. 96: *Table 7-4, The HQ based on conservative inputs for pyrene for the vole exceeded one. Please add pyrene to Table 7-4.*

Response: Agree. Pyrene will be added to Table 7-4.

Comment No. 97: *P. 8-3, Pesticides/PCBs. According to the risk tables, (table 7s) in Appendix D. there was no unacceptable risks due to exposures to neither pesticides nor PCBs. Please delete the sentence concerning anthropengic background and just state the fact that the Pesticide/PCB detections were infrequent and generally below screening levels.*

Response: Agree.

Comment No. 98: *P. 8-7, add redevelopment & sampling of MW16-82 D&R and the resampling of MW16-10I, MW16-13R, MW16-83 R&D, MW16-84 R&D, MW 85 "D"I, and MW16-86 D&R.*

Response: Please see response to EPA Comments presented in correspondences dated November 3, 2008 and December 23, 2008, sent January 16, 2009.

Comment No. 99: ***Appendix E,*** *Table Dry Weight PAH BAFs for Plants and Earthworms. Please remove PAHs from the title. The table present BAFs for other groups of chemicals as well as PAHs.*

Response: Agree. "PAH" will be deleted from the title.

Comment No. 100: ***Appendix E,*** *Table Dry Weight PAH BAFs for Plants and Earthworms. Each Conservative and Average column heading is tagged with an (8). Please change this to (6) to reflect the actual footnotes.*

Response: Agree. The numbering in the cells with Conservative and Average will be changed to (6) to reflect the footnote.

Comment No. 101: Appendix E, *Table Dry Weight PAH BAFs for Plants and Earthworms. Many of the bioaccumulation factors are listed as "Regression equation from Eco SSL" with no numerical value listed. While the regressions from the Eco SSLs are appropriate sources for bioaccumulation factors and while the bioaccumulation values used in the food chain models were appropriately derived, it would be helpful to see the actual numerical bioaccumulation factors presented in the tables. Because they are based on finite soil concentrations, a maximum, an average, or a 95% UCL, there is no reason the actual values could not be presented.*

Response: Agree. A numerical value will be listed in the Appendix E Table Dry Weight BAFs for Plants and Earthworms where "Regression equation from Eco SSL" is listed.

Comment No. 102: *Appendix E, Table Dry Weight PAH BAFs for Plants and Earthworms. Please provide a reference for the plant and earthworm BAFs for dioxins.*

Response: The references for the dioxin BAFs will be more clearly noted in the Appendix E Table Dry Weight BAFs for Plants and Earthworms and BAF text document in Appendix E will be updated with text describing the dioxin BAFs. The plant BAFs for dioxin were taken from ORNL's Chemical Specific Factors Database at http://rais.ornl.gov/cgi-bin/tox/TOX_select?select=chem and the earthworm BAFs were taken from Table 3 (90 percentile for conservative) and Table 4 (regression equation for average) of Sample et al. (1998) Development and Validation of Bioaccumulation Models for Earthworms.

Comment No. 103: *Appendix E, Table entitled Toxicity Reference Values or Terrestrial Food Chain Models Phase III Surface Soil - Undeveloped Area. There is no support for the mammal and bird TRVs for dioxins and furans. Please provide references for these values and any necessary explanation of the derivation* of these TRVs.

Response: A footnote will be added to the Appendix E, Table entitled Toxicity Reference Values or Terrestrial Food Chain Models Phase III Surface Soil - Undeveloped Area and appropriate TRV sources and endpoints will be added to the table titled TRV Source and Endpoints and full references will be provided in the TRV Source and Endpoint References document in Appendix E.

Comment No. 104: *Appendix E, For the vole, shrew, and robin, HQs based on conservative inputs exceeded one for aluminum, iron, and mercury (as well as several other COPC). The tables showing less conservative HQ calculations do not include these COPC, however. Please include these COPC in the follow-up less conservative HQ calculation tables.*

Response: Disagree. Please see the Navy's response to USEPA comment No. 87.

Original Comment No. 105: General Comments on Appendix F - *Navy has done a credible job of addressing previous review comments regarding presentation of the forensic evaluation process in a manner that outlines the necessary steps more clearly. The flow chart shown on Figure 6 is very helpful in this regard. According to this chart, characterization of petrogenic and pyrogenic PAH patterns, and saturate and biomarker patterns, is performed in Tier 3. Following this step, differences between source and reference samples are identified before reaching conclusions regarding matches. It would be especially helpful to have some additional guidance in understanding how these differences are identified. Perhaps two annotated examples – one, demonstrating how source-reference samples match, and another showing how another pair does not match – would help to illustrate the key points for the non-specialist. Because this is a complex process, it remains difficult for the reader to connect the data, as presented in this Appendix, to the conclusion that the hydrocarbon fingerprint found in Site 16 soils does not match the Allen Harbor sediments.*

To address specific data gaps identified by EPA in previous reviews, additional soil samples from the southern

portion of Site 16 have been analyzed for PAHs; additional samples have been collected in the source areas; samples from marina pilings have been analyzed; and the database for potential source materials has been expanded. However, despite the completion of these tasks, it is not clear how the data presented here entirely support the conclusion that the PAHs in Allen Harbor sediments are not attributable to historic activities at Site 16. The grain size measurements, although sparse, do not appear to correlate with PAH concentrations. Both marina pilings and roadway runoff apparently contributed PAHs to harbor sediment, but the concentration gradients from the shoreline are ambiguous and require further explanation. It is unlikely that groundwater is a significant pathway for transport of pyrogenic 4- to 6-ring PAHs to harbor sediments. Finally the mismatch between the hydrocarbon fingerprint (PAHs plus biomarkers) of the soils and the sediments is not easily discerned from the data by a non-specialist.

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 105:

Comment No. 105a: Explain the forensic matching process with examples. *EPA requested an example of 1) a match between a source sample and a field sample and 2) a non-match between a source sample and a field sample.*

Response: Match and non-match examples provided. One of the better matches was sample PIL16-01 (abbreviated PIL01) and SD16-AH-15-SD-0001 (abbreviated SD15) (Table 1). Pursuant to the tiered forensics approach (Figure 6), this conclusion is based on the concentration gradient, high resolution hydrocarbon fingerprint, PAH, and biomarker patterns. The concentration of PAHs was high in PIL01 (366,000 mg/kg EPAPAHs) and lower in SD15 (54.9 mg/kg EPAPAHs) due to dilution with native sediment (Table 7 and Figure 8b). The moderately weathered creosote pattern in PIL01 became heavily weathered in SD15 due to environmental weathering (Figure 10). The ratio of fluoranthene relative to pyrene (FL0/PY0) was 1.8 for both samples indicating good source signature fidelity (Figure 12a). The ratio of anthracene relative to phenanthrene (A0/P0) was 0.2 in PIL01 and 0.4 in SD15 (Figure 12a). This increase was likely due to mixing with native sediments (Figure 12b - the reference area sediments ranged between 0.3 and 0.6). The saturated hydrocarbon pattern of PIL01 resembled a middle distillate product while SD15 exhibited plant waxes mixed with lesser amounts of weathered distillate range hydrocarbons (Figure 13). These signatures demonstrated the strong influence of ambient hydrocarbons. The creosote sample PIL01 contained no detectable triterpanes while SD15 exhibited a BIO/GHI ratio of 0.3 (Figure 12d) with Pattern F (Figure 14) as evident elsewhere in Allen Harbor. The presence of triterpane Pattern F in SD15 was attributed to localized storm water runoff or petroleum products from docked vessels.

A poor match existed between samples 16TP-TP1-0509-Wood (TP1Wood) and the sheen sample AP16-AH-01-082807 (SH01) (Table 1). TP1Wood sample contained 32,300 mg/kg EPAPAHs and SH01 contained 2,960 mg/kg EPAPAHs (Table 7). The declining concentration gradient was consistent with a hydrocarbon release into a water body, so additional hydrocarbon analysis was pursued. Importantly, no other upland sample contained more PAHs than the sheen sample, so TP1Wood was the most significant candidate upland sample for this investigation based on PAH concentration and proximity to Allen Harbor sediments (Figure 8b). TP1Wood and SH01 exhibited weathered 4- to 6-ring pyrogenic PAHs (Figure 11); however, several important differences existed. In comparison to TP1Wood, SH01 contained lower proportions of retene and anthracene relative to phenanthrene (Figure 11). The double ratio plot demonstrated the different PAH source signatures between the TP1Wood (upper center) and SH01 (mislabeled SP01 – lower right) as evidenced by the pronounced lack of overlap between these samples in Figure 12a. These PAH source signature differences led to a non-match conclusion. The saturated hydrocarbon signature of the TP1Wood sample exhibited a late eluting UCM while the SH01 exhibited late eluting normal alkanes (Figure 13). TP1 Wood and SH01 samples both exhibited triterpane Pattern G (Figure 14). In summary, the systematic hydrocarbon fingerprinting method demonstrated that the PAHs in the sheen sample originated from a source that was distinct from the TP1Wood sample.

Other upland source samples were systematically compared to the sheen and Allen Harbor sediment samples. No matches were observed.

Comment No. 105b: Historical activities not represented in the forensic investigation. *EPA is not clear how the forensic data support the conclusion that historical activities at Site 16 are not attributable to PAHs in Allen Harbor.*

Response: The forensic analysis is complete. The technical approach (Figure 6) for this investigation followed the Navy User's Guide for Determining the Sources of Contaminants in Sediment (Stout et al., 2003). This process has been peer reviewed, published in numerous textbooks, and employed on behalf of numerous entities, including U.S. EPA. The forensics investigation demonstrated that the concentration of PAHs in Allen Harbor were low and consistent with urban sediment. It must be remembered that background PAHs typically adsorb onto particles that settle out of the ambient water column, especially in quiet tidal environments. The central question for Allen Harbor is the degree to which historical activities at Site 16 caused significant and recognizable impacts above and beyond the concentrations of PAHs associated with the ambient background condition.

The initial forensic investigation conclusively determined that the PAHs in Allen Harbor existed at low concentrations and exhibited source signatures that did not match the hydrocarbon materials extracted from soil samples collected in Source Areas 1, 2, and 3. The supplemental forensic investigation demonstrated the representative nature of Source Areas 1, 2, and 3. It also demonstrated the absence of source material in the southern portion of Site 16 and the presence of blackened debris in several test pit areas in the central and northern portions of Site 16. The PAHs in several of these blackened areas were elevated; however, there was not evidence that the PAHs migrated into Allen Harbor using the systematic forensic approach described previously. Rather, the forensic results demonstrated the active and ongoing migration of PAHs from marina pilings and roadway runoff into Allen Harbor sediments. This conclusion is consistent with the hydrodynamics of the study area, the depositional nature of the harbor, and the presence of contemporary PAH source signatures in the surficial sediments. The initial investigation indicated higher PAH concentrations in the surface sediment verses subsurface sediments (Core 1, Top = 10.4 mg/kg EPAPAHs and Bottom = 2.80 mg/kg EPAPAHs). This finding demonstrated the absence of historical Site 16 impacts associated with Navy activities.

Comment No. 105c: Grain size - *The grain size measurements do not correlate with PAH concentrations. Both marina pilings and roadway runoff apparently contributed PAHs to harbor sediment, but the concentration gradients from the shoreline are ambiguous and require further explanation.*

Response: PAH concentration should not correlate strictly with grain size in all areas. Grain size data were collected to quantitatively evaluate the degree to which fine particles increased from the Narragansett Bay inlet to the sections of Allen Harbor with low energy water. This trend was observed by comparison of the grain size samples from the Narragansett Bay inlet and the sediment sample from the middle of Allen Harbor. The correlation broke down from the middle of Allen Harbor towards the marina and storm sewer, because commingling occurred with 1) leachate from the marina pilings and 2) abraded pavement from roadway runoff. The PAHs from these latter two sources were not correlated with particle size, because the piling leachate is not necessarily particle bound and the abraded pavement is highly variable in both particle size and PAH concentration.

Comment No. 105d: Groundwater constituents. *It is unlikely that groundwater is a significant pathway for transport of pyrogenic 4- to 6-ring PAHs to harbor sediments.*

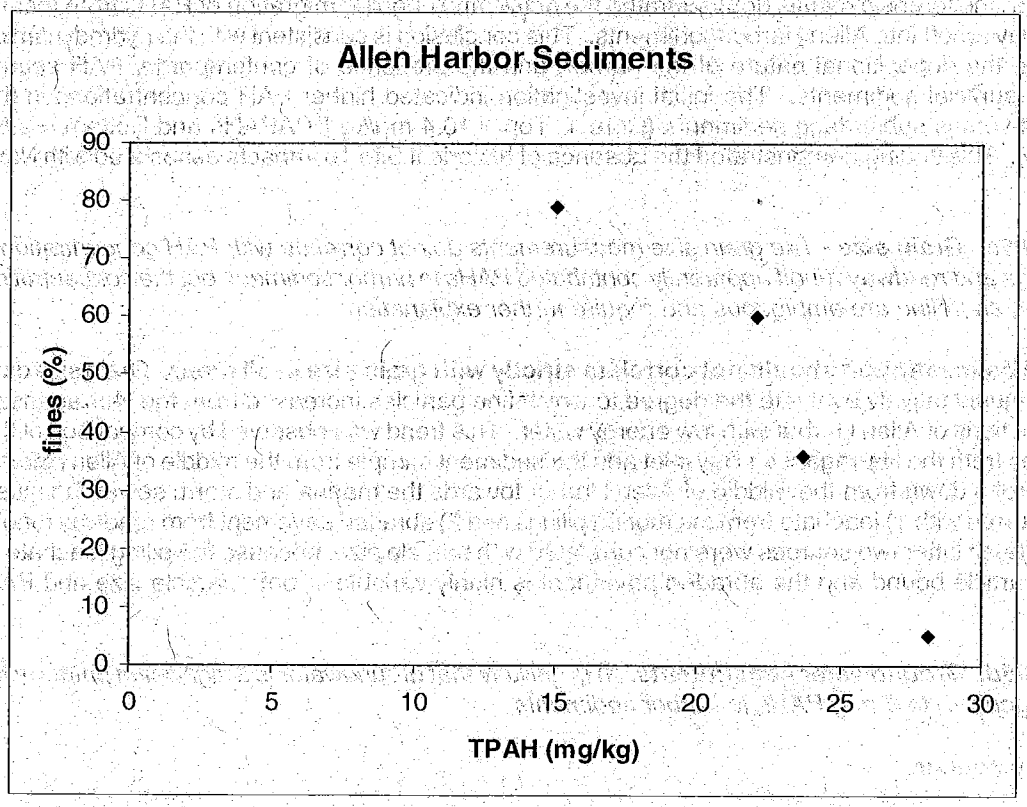
Response: Navy concurs.

Comment No. 105e: Hydrocarbon fingerprinting for the non-specialist. *The mismatch between the hydrocarbon fingerprint (PAHs plus biomarkers) of the soils and the sediments is not easily discerned from the data by a non-specialist.*

Response: Fingerprinting references provided. The Navy has produced numerous references and a flow chart that EPA can use to verify the conclusions of the forensic investigation. In addition, Navy will offer at least one additional opportunity to have NewFields explain in person any remaining specific EPA questions.

Original Comment No. 106: Appendix F Specific Comments: *Page 10, Section 5.3, Particle Size. The text states on page 2, Section 2.0, that one of the objectives of this work is to address a number of data gaps. One of these is to provide "...grain size data supporting the relationship [between] increasing PAH concentration and the abundance of fine particles." The data (Table 5) support the conclusion that fines settle out in low-energy environments such as the central portion of Allen Harbor. As stated on page 11, this is hydrodynamically unsurprising. What is not clear from the grain-size work is an association of PAH concentrations with grain size fractions. Figure 7 shows a total of seven grain size samples, four of which are located in the southeastern corner of Allen Harbor, near the stormwater outfall. The remaining three are located in the inlet at the north end of the harbor, in the central harbor, and near the southern shoreline. As displayed on this figure, it appears that the Conceptual Site Model (CSM) considers only two sources for particulate influx to the harbor: from Narragansett Bay through the inlet, and from the stormwater outfall. This seems to be an oversimplification of the hydrodynamics of Allen Harbor, which are likely much more complex. Please provide the rationale for ruling out other contributions from the perimeter of the harbor.*

Also, the distribution of grain sizes alone, with the central harbor sediments containing the largest proportion of fines, does not confirm the relationship between increasing PAH concentrations and abundance of fines as stated. Please provide support for the assumption that finer particulate sizes correlate with increasing PAH concentration. The data in Tables 5 (grain size) and 7 (hydrocarbon chemistry results) are sparse but appear to show an inverse relationship between TPAH concentration and percentage of fines in the sediment, as shown on the plot below:



Mr. Mattingly's Rephrased Comments and Responses to Comment No. 106:

Comment No. 106a: PAHs by grain size fraction. *What is not clear from the grain-size work is an association of PAH concentrations with grain size fractions.*

Response: Grain size data was collected to demonstrate the distribution of fines. The grain size data were collected to quantitatively evaluate the degree to which fine particles increased from the Narragansett Bay inlet to the sections of Allen Harbor with low energy water. This trend was clearly evident in the data collected. High energy areas exhibited high sand content (inlet and storm sewer) while low energy areas exhibited high fine content (middle harbor). The relationship between PAHs and percent fines is otherwise supported by the historical PAH concentration data (< 1 mg/kg EPAPAHs in Reference Areas 1 and 2, < 2.5 mg/kg EPAPAHs in Reference Area 3, and < 5 mg/kg EPAPAHs Middle Allen Harbor).

Comment No. 106b: The conceptual site model (CSM) is oversimplified. *The forensic investigation only considers two sources of particulate influx to the harbor – Narragansett Bay and storm water outfall. This study oversimplified the complex hydrodynamics of Allen Harbor.*

Response: The investigation focused on the significant PAH inputs. The initial forensic investigation established that Allen Harbor sediments contained pyrogenic 4- to 6-ring PAHs. The list of candidate sources of this material included numerous sources on Site 16 (creosote, fire fighter training, pavement) and around the perimeter of Allen Harbor (inlet, marina pilings, grit pile, pavement/roadway runoff). Other pyrogenic PAH sources in Allen Harbor (boat motor exhaust, building material runoff, etc...) were too diffuse to chase and potentially captured in the roadway runoff samples collected as part of the supplemental forensics investigation. As complex as the hydrodynamics of Allen Harbor may be, the sources evaluated in the study adequately represent the most significant PAH inputs to Inner Allen Harbor.

It should be noted for the record that Navy collected all of the additional forensic samples suggested by EPA during discussions about the supplemental forensics investigation work plan. EPA had ample opportunity to identify and suggest other PAH sources. Prior to this comment, EPA did not express any reservations about the PAH sources under consideration.

Comment No. 106c: TPAH increases with finer grain size. *The distribution of grain size alone, with the central harbor sediments containing the largest proportion of fines, does not confirm the relationship between increasing PAH concentrations and abundance of fines as stated. Please provide support for the assumption that finer particulate sizes correlate with increasing PAH concentration. The data in Tables 5 (grain size) and 7 (hydrocarbon chemistry results) appear to show an inverse relationship between TPAH concentration and percentage of fines in the sediment.*

Response: The investigation focused on the significant PAH inputs. As stated in the report, these samples contained storm sewer outfall material. This was demonstrated by the hydrocarbon concentrations and chemical fingerprints. Sediments impacted by roadway runoff were expected to exhibit variable trends; that is, variably sized, PAH enriched particles fall out of the storm water in a radial pattern around the point of discharge. The limited relationship discussed above (fines vs. TPAH) is inconsistent with the relationship between fines and more diagnostic hydrocarbon parameters, like TPH and EPAPAH concentrations, which vary independently of fine content among the sediment transect samples. In summary, these data strongly supported a CSM with localized influences from the marinas and storm water sewers in the Inner Allen Harbor.

Original Comment No. 107: *<u>Page 14, Section 5.5, Dominant Hydrocarbon Signatures</u>. From the discussion in the eighth paragraph in this section, it is not entirely obvious that the paired samples (marina piling and composited proximal sediment samples) "clearly" demonstrate leaching as indicated. Other than for the PIL-01 and SD16-AH-15-SD-0001, there is no indication that the sediment samples show the expected loss of 2- to 3-ring PAHs during weathering. Please indicate specifically which data support this statement.*

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 107:

Comment No. 107: Dominant Hydrocarbon Signatures. *It is not obvious that the paired samples (marina piling and composited proximal sediment samples) demonstrate leaching. Other than for the PIL-01 and SD16-AH-15-SD-0001, there is no indication that the sediment samples show the expected loss of 2- to 3-ring PAHs during weathering. Please indicate specifically which data support this statement.*

Response 107: Hydrocarbon impacts by marina pilings are irrefutable. The marina pilings exhibited six irrefutable features. These include: 1) the creosote treated pilings contained the highest concentrations of pyrogenic PAHs (EPAPAH > 300,000 mg/kg), 2) they were physically located closer to Allen Harbor sediment than any other PAH source, 3) there was no impediment to the migration of PAHs from the pilings into the sediments, 4) the hydrocarbon fingerprints of pilings and sediments matched, 5) the PAH concentrations in sediment samples collected next to the creosote pilings were among the highest observed in Allen Harbor, and 6) pilings treated with preservatives other than creosote also leached into proximal sediments.

EPA requested more information about the evidence supporting the match between the piling and sediment. The reader is directed to RTC 105a for a systematic analysis. The critical features of this systematic analysis for the paired piling and sediment samples are evident in Figures 10, 11, and 13. PIL01 (EPAPAH = 366,000 mg/kg) contained lightly weathered tar (creosote preservative with N0 > P0) while SD15 (EPAPAH = 54.9 mg/kg) contained moderately weathered tar (N0 < P0 > PY0). PIL02 (EPAPAH = 366,000 mg/kg) contained lightly weathered tar (creosote preservative with N0 > P0) while SD16 (EPAPAH = 2,580 mg/kg) contained heavily weathered tar (weathered creosote preservative with P0 < PY0) from the piling mixed with heavy petroleum (late eluting UCM) and plant waxes (likely leaf detritus) from background. PIL03 (EPAPAH = 3,660 mg/kg) contained lightly weathered diesel range petroleum (non-creosote preservative with normal alkanes > isoprenoid hydrocarbons) while SD17 (EPAPAH = 7.39 mg/kg) contained heavily weathered diesel range petroleum (normal alkanes < isoprenoid hydrocarbons) from the piling mixed with heavy petroleum (late eluting UCM) and plant waxes (likely leaf detritus) from background. PIL04 (EPAPAH = 1,600 mg/kg) contained moderately weathered diesel range petroleum (non-creosote preservative with normal alkanes ~ isoprenoid hydrocarbons) while SD18 (EPAPAH = 3.90 mg/kg) contained moderately weathered diesel range petroleum (normal alkanes ~ isoprenoid hydrocarbons) from piling mixed with heavy petroleum (late eluting UCM) and plant waxes (likely leaf detritus) from background. PIL05 (EPAPAH = 646,000 mg/kg) contained lightly weathered tar (creosote preservative with N0 > P0) while SD19 (EPAPAH = 1,500 mg/kg) contained moderately weathered tar (weathered creosote preservative with N0 < P0 > PY0) from the piling mixed with heavy petroleum (late eluting UCM) and plant waxes (likely leaf detritus) from background. In summary, the pilings contained a variety of preservatives and in each case the preservative signature is clearly evident in the proximal sediments. The migration of PAH containing hydrocarbons from the pilings into the sediments was irrefutably proven in the supplemental forensic investigation.

Original Comment No. 108: *Page 15, Section 5.5, Dominant Hydrocarbon Signatures. The last paragraph in this section discusses PAHs found in Site 16 groundwater from the temporary wells. The third sentence in this paragraph states that "[T]he dissolved phase consistently exhibited higher concentrations than the particulate phase indicating good separation of dissolved and particulate fractions..." The data are reported in Table 7 but it is not clear which units are associated with the filter/particulate fraction (is it mg/kg?). If the dissolved and particulate fractions are reported in different units, it is not clear how they are to be compared. Please clarify the wording here.*

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 108:

Comment No. 108: Dissolved and particulate concentration units need clarification. *EPA would like to clarify the units for the filter/particulate fraction reported in Table 7.*

Response: Dissolved and particulate groundwater data were reported in ug/L. The supporting information can be found in the laboratory report attachments.

Original Comment No. 109: *Page 16, Section 5.6, Petrogenic and Pyrogenic PAH Patterns. The fifth paragraph in this section indicates that all of the Marina Transect sediment samples exhibit similar patterns of 4- to 6-ring pyrogenic PAHs, dominated by fluoranthene and pyrene. The relative uniformity of their distribution is attributed to homogenization of marina sediments by propeller wash from boat traffic. Please reconcile this statement with previous discussion (Section 5.3) of the grain size distribution in Allen Harbor, in particular the concentration of fines from Narragansett Bay and the presumed association of PAHs with fines.*

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 109:

Comment No. 109: Homogeneity of Marina Transect samples. *EPA would like to reconcile the discussion of relatively homogeneous PAH signatures discussed in Section 5.6 (5th paragraph) with the discussion of grain size in Section 5.3.*

Response: Inner Allen Harbor contains PAH mixtures from multiple inputs. As stated in RTC 106c, the Inner Allen Harbor sediments are influenced by the mixture of regional (Narragansett Bay) particulates, marina piling leachate, and storm sewer effluent. Prop wash likely helped mix these three inputs, especially around the marina structures.

Original Comment No. 110: *Page 16, Section 5.6, Petrogenic and Pyrogenic PAH Patterns. The last paragraph in this section reiterates the observation that dissolved concentrations in groundwater samples "greatly exceeded" particulate concentrations. Examples given are for TW16-110S-NWG-081207 (16.2 ug/L and 0.19 ug/L, respectively), and TW16-111S-NWG-081207 (0.05 and 0.01 ug/L). Please note that the first pair of data differs by two orders of magnitude, but the second pair is related by a factor of 5, which is not a substantial difference.*

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 110:

Comment No. 110: Differences between dissolved and particulate groundwater vary. *The difference between the dissolved and particulate concentrations in TW16-110S-NWG-081207 (16.2 ug/L and 0.19 ug/L, respectively) and TW16-111S-NWG-081207 (0.05 and 0.01 ug/L) vary. EPA believes the 100x difference in TW16-110S-NWG-081207 is substantial, but the 5x difference in TW16-111S-NWG-081207 may not be substantial.*

Response: The dissolved fraction contains more PAHs than the particulate fraction. The data addressed the purpose of the work plan and demonstrated the difference between the dissolved and particulate groundwater concentrations. See EPA 105d above. The groundwater is not a source of pyrogenic 4- to 6-ring PAHs or particulates from Site 16 uplands.

Original Comment No. 111: *Page 17, Section 5.7, Hydrocarbon Ratio Plots. This discussion of hydrocarbon ratios helps the reader to understand how these ratios are used to distinguish different hydrocarbon sources. The text explains that the ratio of A0/P0 is high in anthracene oil and may increase during environmental weathering; the text asserts that this ratio does not decrease as a result of weathering. Does this mean that only phenanthrene weathers relative to anthracene? Since phenanthrene and anthracene are both 3-ring compounds, why does the former weather and the latter does not? Please provide a reference for this statement.*

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 111:

Comment No. 111: Reference request. *EPA requests a reference for the weathering of A0 and P0.*

Response: References provided in the forensics report. Both A0 and P0 weather in the environment. See references in the forensics report. The use of the A0 and P0 ratios can also be found in: Yunker et al (2002) PAHs in the Fraser River Basin: a critical appraisal of PAH ratios as indicators of PAH source and composition. Org. Geochem. 33: 489-515 and references therein.

Original Comment No. 112: *Page 19, Section 5.10, Horizontal and Vertical Hydrocarbon Distribution. The data show that the difference in EPAPAH concentrations and compositional features link the creosote-treated marina pilings to the adjacent sediments. However, the relationship between Allen Harbor sediments and contributions from the storm sewer is not as well-defined. According to the text in this section, the biomarker pattern for selected reference pavement samples matched the biomarker pattern found in harbor sediment at the storm sewer outfall, but the PAH pattern did not. Please reconcile this finding with the statement suggesting that the migration pathway "...for hydrocarbons and PAHs from the road to sediments..." is possible. If the PAH patterns in the pavement samples did not match those of the harbor sediment, what PAH*

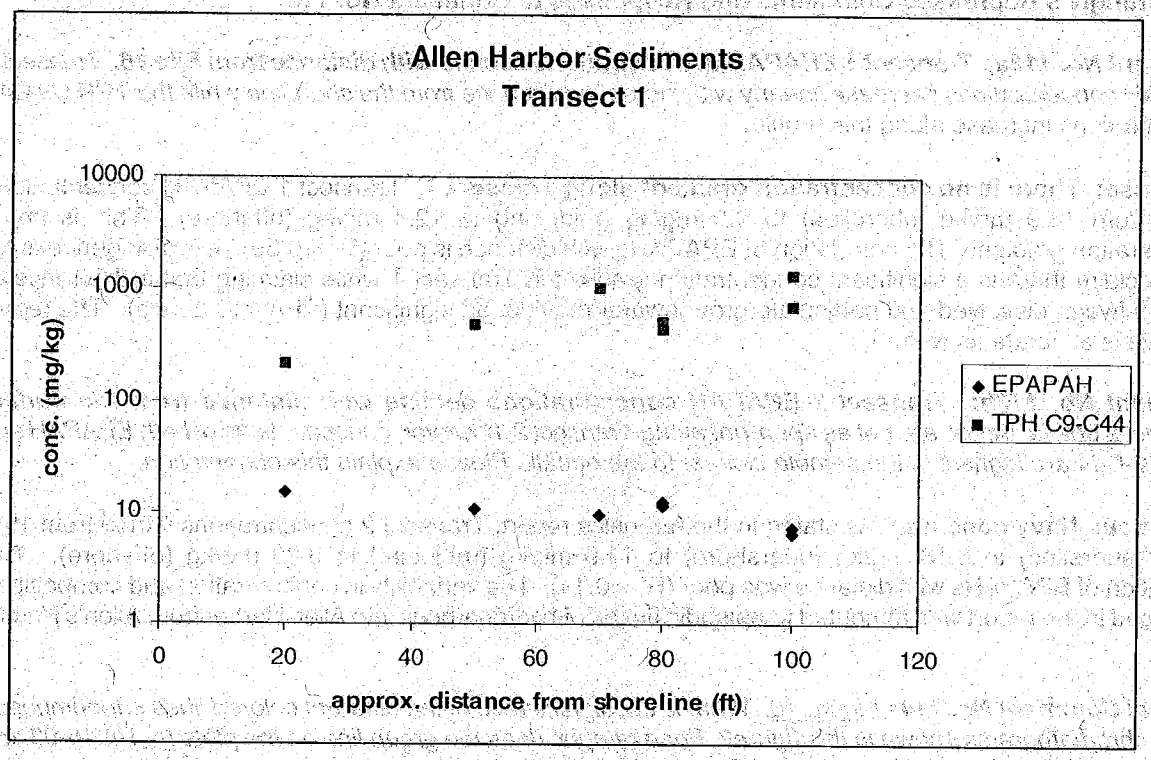
evidence supports this claim?

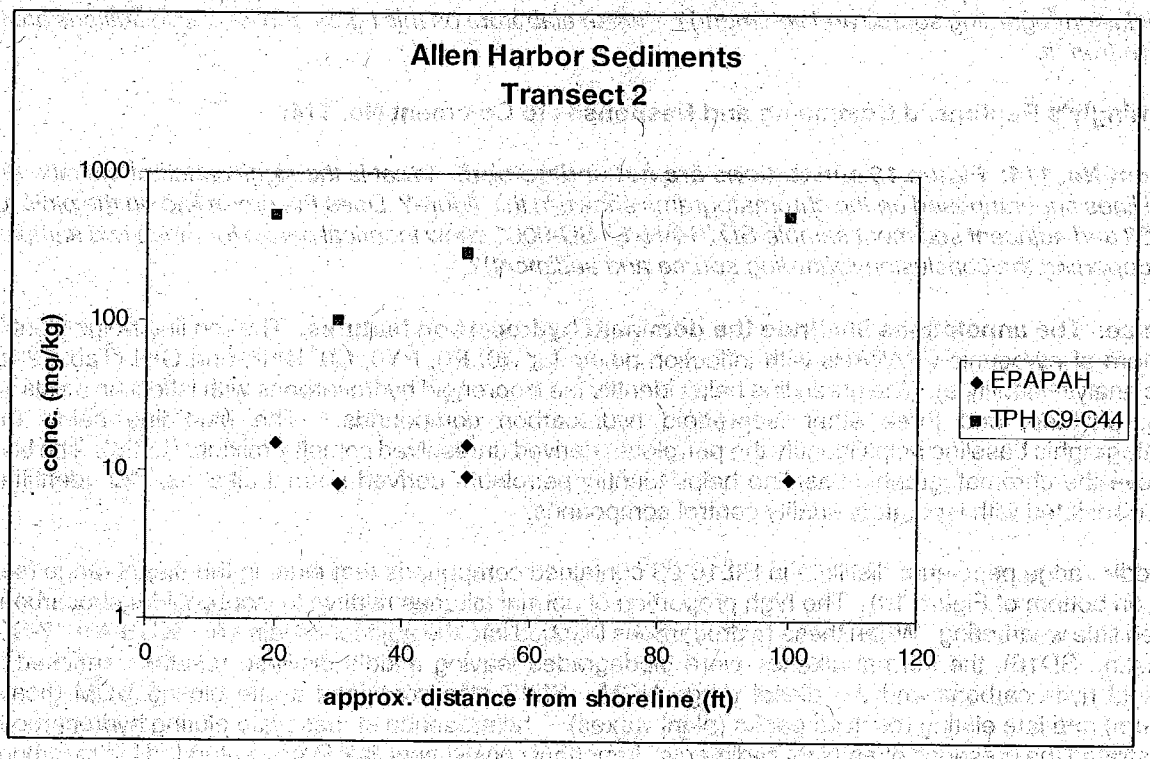
Mr. Mattingly's Rephrased Comments and Responses to Comment No. 112:

Comment No. 112: PAH and biomarker matches between pavement and sediments conflict. *The biomarker pattern for selected reference pavement samples matched the biomarker pattern found in harbor sediment at the storm sewer outfall, but the PAH pattern did not. Please reconcile this finding with the statement suggesting that the migration pathway for hydrocarbons and PAHs from the road to sediments is possible.*

Response: Roadway runoff contained heavy petroleum and pyrogenic PAHs. Most of the pavement samples were collected as abraded fragments from existing roadway courses (layers). Several samples (PAV13, PAV18, PAV19, and PAV20) were collected from piles or accumulations of roadway particulates. In this way, the forensic investigation captured discrete and composite samples. One of these composite samples, PAV19, contained roadway material with tar and petroleum components (EPAPAHs = 3,660 mg/kg). This sample demonstrated the use of tar binders on the Allen's Harbor Road. Importantly, the 2004 sediment sample collected at the storm sewer outfall (AH49 = 28 mg/kg EPAPAHs) exhibited PAH ratios that plotted within the insert box (FL0/PY0 = 1.1 and A0/P0 = 1.18) (Figure 12b). The PAHs in AH49 were likely impacted by tar pavement binder from a different storm water runoff event. In short, PAV19 and AH49 collectively demonstrated a range of compositional variability with a high potential for matching Allen Harbor sediments.

Original Comment No. 113: *<u>Page 21, Section 6. Summary</u>. The third bullet concludes that "...EPAPAH concentrations did not decline with distance from the Site 16 shoreline..." thus indicating "...that Site 16 was not a source of PAHs to Allen Harbor." In order to support this conclusion, data from Table 7 were plotted against estimated distances of sample locations from the nearest shoreline points. (Please note that Figures 2 through 5 have no scale, so distances on the accompanying plots are approximate.) For Transect 1, EPAPAH concentrations decrease linearly with increased distance from the shoreline to the dock containing PIL16-03, while the TPH C9-C44 concentrations increase along this profile (note: concentrations are plotted on a logarithmic axis, as the concentrations vary over 3 orders of magnitude). These spatial trends are not as apparent along Transect 2, extending from the stormwater outfall into the inner harbor; however, concentrations of both EPAPAH and TPH C9-C44 are highest in the sample closest to the outfall. Please explain these observations.*


Allen Harbor Sediments
Transect 1
10000
1000
100
10
1
conc. (mg/kg)
0
20
40
60
80
100
120
approx. distance from shoreline (ft)
EPAPAH
TPH C9-C44


Allen Harbor Sediments
Transect 2
1000
100
10
1
conc. (mg/kg)
0
20
40
60
80
100
120
approx. distance from shoreline (ft)
EPAPAH
TPH C9-C44

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 113:

Comment No. 113a; Transect 1 EPAPAH concentrations decline with distance from Site 16. *Transect 1 EPAPAH concentrations decrease linearly with increased distance from the shoreline while the TPH C9-C44* concentrations increase along this profile.

Response: There is no concentration gradient along Transect 1. Transect 1 EPAPAH concentrations varied from 14.9 mg/kg (shoreline) to 9.5 mg/kg (midpoint) to 12.4 mg/kg (offshore). This is not a concentration gradient. The correlation of EPAPAHs with distance is poor ($R^2 = 0.36$). It is disingenuous for EPA to claim there is a significant concentration gradient in Transect 1 while claiming that a difference of 500% between dissolved and particulate groundwater may not be significant (EPA 110 above). The report narrative is accurate as written.

Comment No. 113b: Transect 2 EPAPAH concentrations decline with distance from the outfall. *Transect 2 spatial trends are not as apparent along Transect 2; however, concentrations of both EPAPAH and TPH C9-C44 are highest in the sample closest to the outfall. Please explain this observation.*

Response: Navy concurs. As stated in the forensics report, Transect 2 concentrations varied from 15.1 mg/kg (shoreline) to 8.18 mg/kg (nearshore) to 14.8 mg/kg (midpoint) to 8.89 mg/kg (offshore). The correlation of EPAPAHs with distance was poor ($R^2 = 0.14$). The variability in concentration and composition discussed in the report was attributed to episodic fluxes of hydrocarbons into Allen Harbor from Allen's Harbor Road.

Original Comment No. 114: *Figure 10. What is the significance of the different colored lines superimposed on the chromatograms shown in this figure? For example, does the green line on the plots for PIL16-03 and adjacent sediment sample SD16-AH-17-SD-0001 show identical peaks for these two samples (thus supporting the conclusion regarding source and sediment)? Please elaborate on this figure and what conclusions are to be drawn from it.*

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 114:

Comment No. 114: Figure 10 annotations are not understood. *What is the significance of the different colored lines superimposed on the chromatograms shown in this figure? Does the green line on the plots for PIL16-03 and adjacent sediment sample SD16-AH-17-SD-0001 show identical peaks for these two samples (thus supporting the conclusion regarding source and sediment)?*

Response: The annotations illustrate the dominant hydrocarbon features. The red line helps identify the pattern of pyrogenic EPAPAHs with inflection points for N0, P0, PY0, C0, BAP, and GHI (Table 2 for specific analyte identities). The green line helps identify the isoprenoid hydrocarbons with inflection points for pristine, phytane, and three other isoprenoid hydrocarbon compounds. The blue line below the chromatographic baseline helps identify the petroleum derived unresolved complex mixture (UCM). The blue line above the chromatographic baseline helps identify petroleum derived normal alkanes. "Q" identified peaks associated with laboratory quality control compounds.

The middle range petroleum distillate in PIL16-03 contained compounds that elute in the diesel range (see ranges on bottom of Figure 10). The high proportion of normal alkanes relative to isoprenoid hydrocarbons indicated little weathering. When these hydrocarbons leached into the adjacent sediment (SD16-AH-17-SD-0001 a.k.a., SD16), the normal alkanes were biodegraded leaving middle distillate residues enriched in isoprenoid hydrocarbons and the diesel range UCM. SD17 also contained a late eluting UCM (heavy petroleum) and late eluting resolved peaks (plant waxes). The presence of these late eluting hydrocarbons demonstrated the presence of ambient sediments. Important constituents, like PAHs, saturated hydrocarbons and triterpane biomarkers were present, but the patterns of these compounds required mass spectrometry for accurate resolution (Figures 11, 13, and 14, respectively).

Original Comment No. 115: *Figure 11. If Figure 10 shows similarities in the chromatograms for PIL16-03 and adjacent sediment sample SD16-AH-17-SD-0001, why are the histograms so different? The PAH histogram for PIL16-03 appears to show a petrogenic signature while that for SD16-AH-17-SD-0001 is characterized as "mixed." Please explain.*

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 115:

Comment No. 115: Why do PIL16-03 and SD17 PAH histograms differ (Figure 11)? *The PAH histogram for PIL16-03 appears to show a petrogenic signature while that for SD16-AH-17-SD-0001 is characterized as "mixed." Please explain.*

Response: The difference demonstrates mixing of piling leachate and ambient sediment. PIL03-03 contains a diesel range petroleum distillate (see RTC114). The unweathered PAH signature of this middle distillate petroleum is presented in Figure 11. It primarily contains alkylated 2- and 3-ring PAHs. Once released into the sediments, environmental weathering reduces the proportion of 2-ring alkylated PAHs, which results in the enrichment of alkylated 3-ring PAHs (phenanthrene/anthracenes and dibenzothiophenens). Notice how the alkylated 3-ring PAHs dominate the PAH histogram of the adjacent sediment sample SD16-AH-17-SD-0001 (SD17). The additional pyrogenic 4- to 6-ring PAHs in SD17 came from the ambient sediments.

Original Comment No. 116: *This plot shows the ratio of FL0/PY0 to A0/P0 for harbor sediment, reference areas, source area samples, and standards. It is interesting to note that all but two of the harbor sediment samples plot within the blue box, along with the Uplands Source Soil samples. Also, the TP-1 soil and wood samples fall within the same FL0/PY0 ratio range as the harbor sediment samples, as do the S1-1 and S2-2 Uplands Source samples, although the A0/P0 ratios are higher. Is it possible that the latter have elevated A0/P0 ratios due to terrestrial weathering? Of what significance is the similarity between the harbor sediment samples and the Uplands Source Soils samples? What is the magnitude of uncertainty (i.e., error bars) that should be associated with these points, in both the x- and y-directions on this plot?*

Mr. Mattingly's Rephrased Comments and Responses to Comment No. 116:

Comment No. 116: Figure 12 shows similarities among samples in the magnified box. *It is interesting to note that all but two of the harbor sediment samples plot within the blue box, along with the Uplands Source Soil samples. What is the magnitude of uncertainty (i.e., error bars) that should be associated with these points, in both the x- and y-directions on this plot? Could these samples share a common origin?*

Response: The PAH source signatures are one of many lines of evidence. The insert box in Figure 12b was used to portray all of the samples clearly, not to cluster samples by common origin. The precision was approximately +/-5% on this plot as evidenced by the laboratory duplicates ("D" suffix). Samples outside of this range contained varying mixtures of particles with distinct PAH origins. See RTC 111 for comments on the use of A0/P0.

This plot demonstrated that the upland samples with the highest concentrations of pyrogenic PAHs (the most significant candidate sources) were very distinct from the sediment samples. EPA observed that the PAH signatures of several uplands samples plotted within the insert box along with many sediment samples. Most of these upland soils contained lower concentrations of EPAPAHs than the Allen Harbor sediments. The one upland sample with elevated PAHs (SO5506 = 139 mg/kg EPAPAHs) contained other hydrocarbons (saturates and biomarkers) that were not observed in the sediments. The tiered forensic approach requires agreement among multiple lines of evidence to determine a match, not just a passing similarity to a single double ratio plot. The tiered forensic evaluation of the available data demonstrated no matches between Site 16 upland soils and Allen Harbor sediments.

Importantly, the insert box also contains all of the background sediment samples in the study; specifically, the NIST standard reference material (SRM) from the New York City area plus Narragansett Bay Reference Area Samples 1-4, 2-1, and 3-2. None of these background samples were affected by Site 16. Not surprisingly, the

Allen Harbor sediments exhibited pyrogenic PAH signatures, heavily weathered petroleum residues, and plant waxes found in regional background samples.

ENCLOSURE 1, ATTACHMENT 1

- **RISK ASSESSMENT COMPARISON TABLE:**
  COPCs EXCEEDING/NOT EXCEEDING BACKGROUND

- **EXAMPLE PLOTS FROM APPENDIX D.1**

TABLE FOR ENCLOSURE 1, ATTACHMENT 1
COMPARISON OF CANCER RISKS AND HAZARD INDICES -
REASONABLE MAXIMUM EXPOSURES
PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Receptor	Media	Cancer Risks		Hazard Indices[1]	
		Including All Chemicals	Excluding Chemicals Present at Background Levels[2]	Including All Chemicals	Excluding Chemicals Present at Background Levels[2]
Construction Workers	**Northwest Undeveloped Area**				
	Surface Soil	2E-06	2E-06	2.2	1.7[3]
	Subsurface Soil	5E-06	5E-06	3.8	3.2[3]
	Southeast Undeveloped Area				
	Surface Soil	1E-06	1E-06	2.2	1.8[3]
	Subsurface Soil	8E-07	6E-07	2.2	1.5[3]
	Developed Area				
	Surface Soil	7E-07	6E-07	2.0	0.1
	Subsurface Soil	1E-07	8E-09	2.3	0.05
	Undeveloped Area				
	Groundwater	6E-07	6E-07	0.3	0.3
	Developed Area				
	Groundwater	1E-07	1E-07	0.6	0.5
Industrial Workers	**Northwest Undeveloped Area**				
	Surface Soil	1E-05	1E-05	0.2	0.2
	Subsurface Soil	6E-05	5E-05	0.9	0.8
	Southeast Undeveloped Area				
	Surface Soil	6E-06	6E-06	0.1	0.1
	Subsurface Soil	4E-06	2E-06	0.07	0.05
	Developed Area				
	Surface Soil	2E-06	2E-07	0.06	0.05
	Subsurface Soil	1E-06	1E-07	0.06	0.02
Adolescent Trespassers	**Northwest Undeveloped Area**				
	Surface Soil	2E-06	2E-06	0.03	0.03
	Subsurface Soil	8E-06	8E-06	0.2	0.2
	Southeast Undeveloped Area				
	Surface Soil	6E-07	6E-07	0.02	0.02
	Subsurface Soil	6E-07	5E-07	0.01	0.008
	Developed Area				
	Surface Soil	2E-07	6E-08	0.01	0.008
	Subsurface Soil	1E-07	3E-08	0.01	0.004
Child Recreational Users	**Northwest Undeveloped Area**				
	Surface Soil	1E-05	1E-05	0.3	0.3
	Subsurface Soil	6E-05	6E-05	1.6[3]	1.5[3]
	Southeast Undeveloped Area				
	Surface Soil	4E-06	4E-06	0.2	0.2
	Subsurface Soil	5E-06	4E-06	0.1	0.09
	Developed Area				
	Surface Soil	1E-06	5E-07	0.1	0.09
	Subsurface Soil	8E-07	3E-07	0.1	0.04

TABLE FOR ENCLOSURE 1, ATTACHMENT 1
COMPARISON OF CANCER RISKS AND HAZARD INDICES -
REASONABLE MAXIMUM EXPOSURES
PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Receptor	Media	Cancer Risks		Hazard Indices[1]	
		Including All Chemicals	Excluding Chemicals Present at Background Levels[2]	Including All Chemicals	Excluding Chemicals Present at Background Levels[2]
Adult Recreational Users	**Northwest Undeveloped Area**				
	Surface Soil	3E-06	3E-06	0.04	0.03
	Subsurface Soil	2E-05	1E-05	0.2	0.2
	Southeast Undeveloped Area				
	Surface Soil	1E-06	1E-06	0.02	0.02
	Subsurface Soil	1E-06	7E-07	0.01	0.01
	Developed Area				
	Surface Soil	4E-07	1E-07	0.01	0.009
	Subsurface Soil	8E-07	1E-07	0.04	0.01
Lifelong Recreational Users	**Northwest Undeveloped Area**				
	Surface Soil	2E-05	2E-05	NA	NA
	Subsurface Soil	8E-05	7E-05	NA	NA
	Southeast Undeveloped Area				
	Surface Soil	5E-06	5E-06	NA	NA
	Subsurface Soil	6E-06	5E-06	NA	NA
	Developed Area				
	Surface Soil	2E-06	6E-07	NA	NA
	Subsurface Soil	2E-06	4E-07	NA	NA
Child Residents[4]	**Northwest Undeveloped Area**				
	Surface Soil	3E-05	3E-05	0.9	0.9
	Subsurface Soil	1E-04	1E-04	4.5	4.4
	Southeast Undeveloped Area				
	Surface Soil	1E-05	1E-05	0.7	0.6
	Subsurface Soil	1E-05	9E-06	0.4	0.3
	Developed Area				
	Surface Soil	3E-06	1E-06	0.4	0.3
	Subsurface Soil	2E-06	7E-07	0.3	0.1
	Undeveloped Area				
	Groundwater	8E-04	8E-04	14	14
	Developed Area				
	Groundwater	9E-04	9E-04	134	116

TABLE FOR ENCLOSURE 1, ATTACHMENT 1
COMPARISON OF CANCER RISKS AND HAZARD INDICES -
REASONABLE MAXIMUM EXPOSURES
PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Receptor	Media	Cancer Risks		Hazard Indices[1]	
		Including All Chemicals	Excluding Chemicals Present at Background Levels[2]	Including All Chemicals	Excluding Chemicals Present at Background Levels[2]
Adult Residents [4]	**Northwest Undeveloped Area**				
	Surface Soil	8E-06	8E-06	0.1	0.1
	Subsurface Soil	4E-05	4E-05	0.5	0.5
	Southeast Undeveloped Area				
	Surface Soil	3E-06	3E-06	0.07	0.07
	Subsurface Soil	3E-06	2E-06	0.04	0.03
	Developed Area				
	Surface Soil	1E-06	2E-07	0.04	0.03
	Subsurface Soil	8E-07	1E-07	0.04	0.01
	Undeveloped Area				
	Groundwater	7E-04	7E-04	7[3]	6[3]
	Developed Area				
	Groundwater	2E-03	2E-03	58	50
Lifelong Residents [4]	**Northwest Undeveloped Area**				
	Surface Soil	4E-05	4E-05	NA	NA
	Subsurface Soil	2E-04	2E-04	NA	NA
	Southeast Undeveloped Area				
	Surface Soil	1E-05	1E-05	NA	NA
	Subsurface Soil	1E-05	1E-05	NA	NA
	Developed Area				
	Surface Soil	4E-06	2E-06	NA	NA
	Subsurface Soil	3E-06	8E-07	NA	NA
	Undeveloped Area				
	Groundwater	1E-03	1E-03	NA	NA
	Developed Area				
	Groundwater	2E-03	2E-03	NA	NA

Notes:

NA - Not applicable.

1 - USEPA RAGS Part A and Part D specifies hazard indices should be reported to one significant figure. Hazard indices are reported to two significant figures in some instances to show the difference between the two risk estimates.

2- COPCs present at background concentrations:

Undeveloped Area

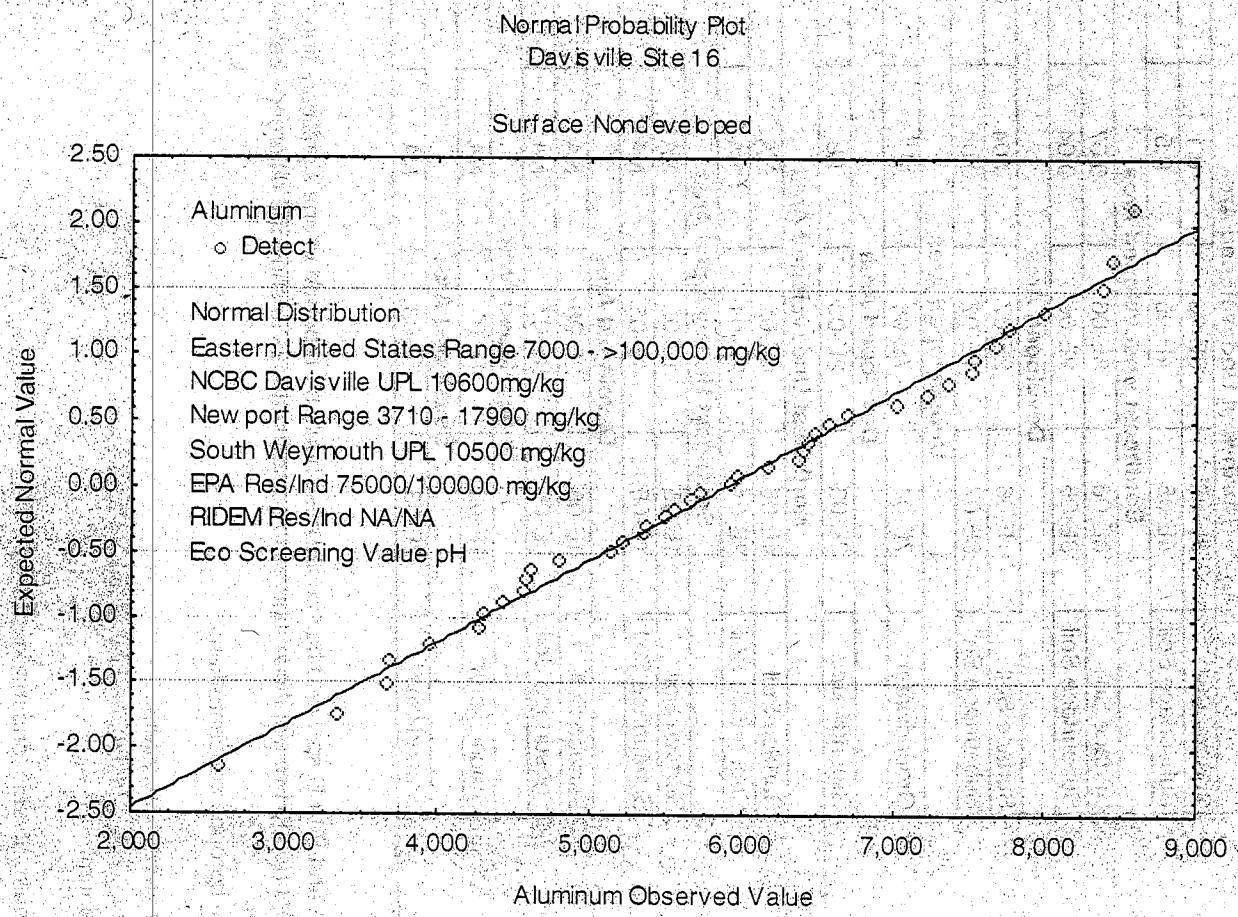
Surface soil - Aluminum and beryllium.
Subsurface soil - Aluminum, arsenic, and beryllium.
Groundwater - Aluminum.

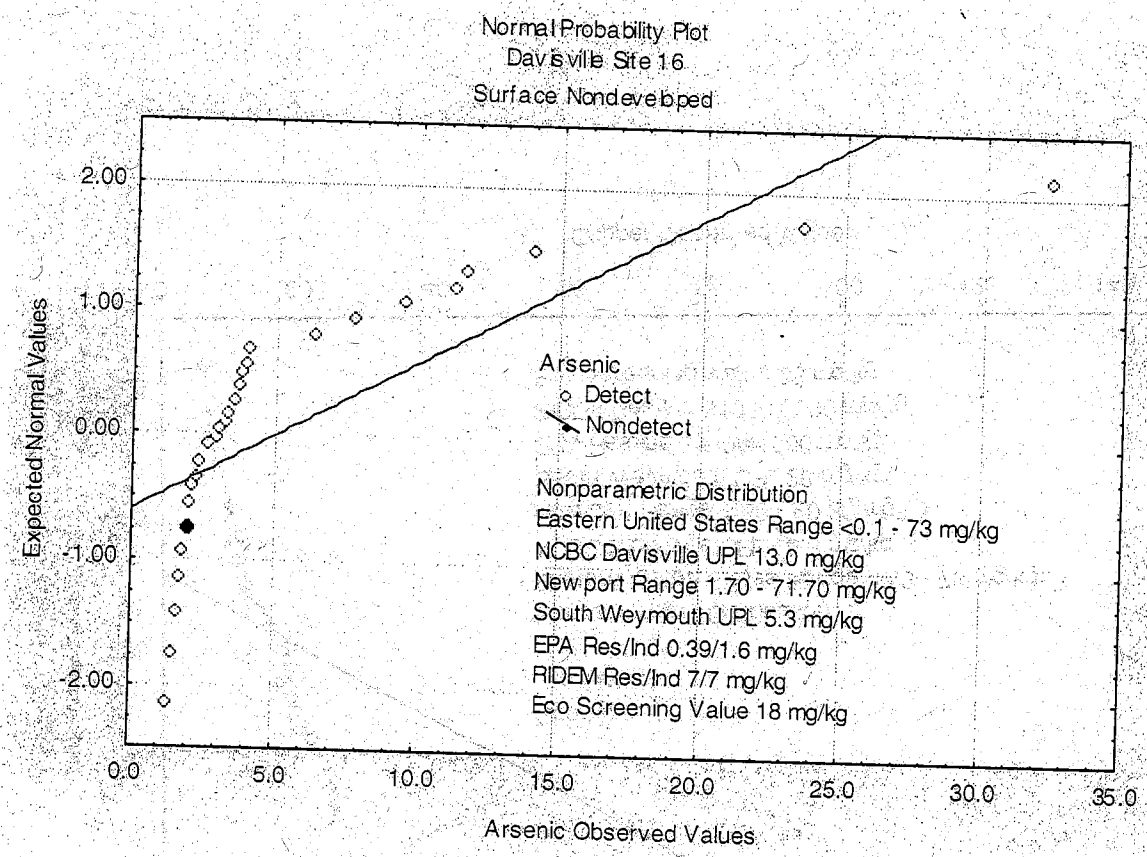
Developed Area

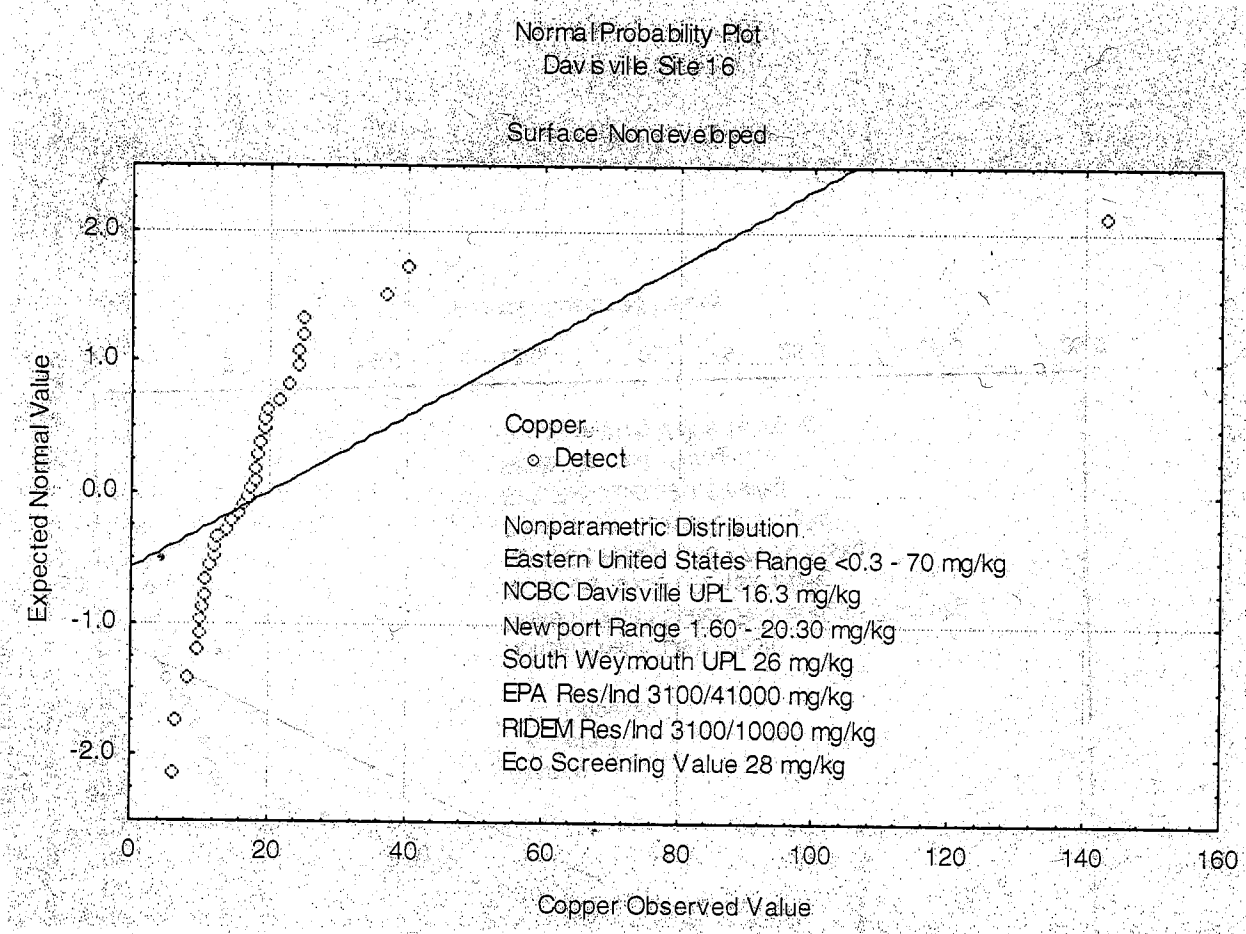
Surface soil - Aluminum, arsenic, and manganese.
Subsurface soil - Aluminum, arsenic, beryllium, iron, and manganese.
Groundwater - aluminum, antimony, silver, and thallium.

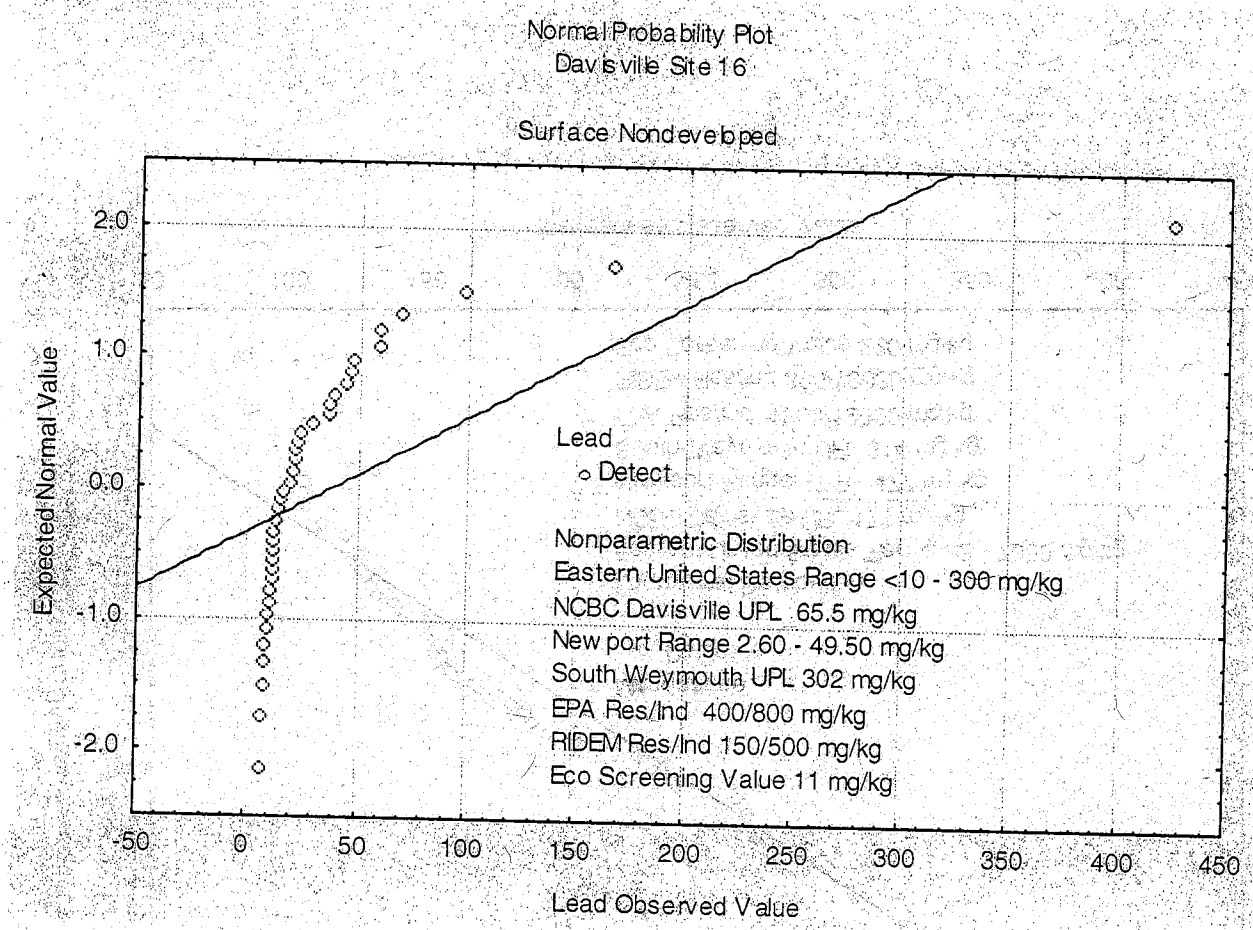
3 - Hazard index for individual target organs were less than or equal to 1.

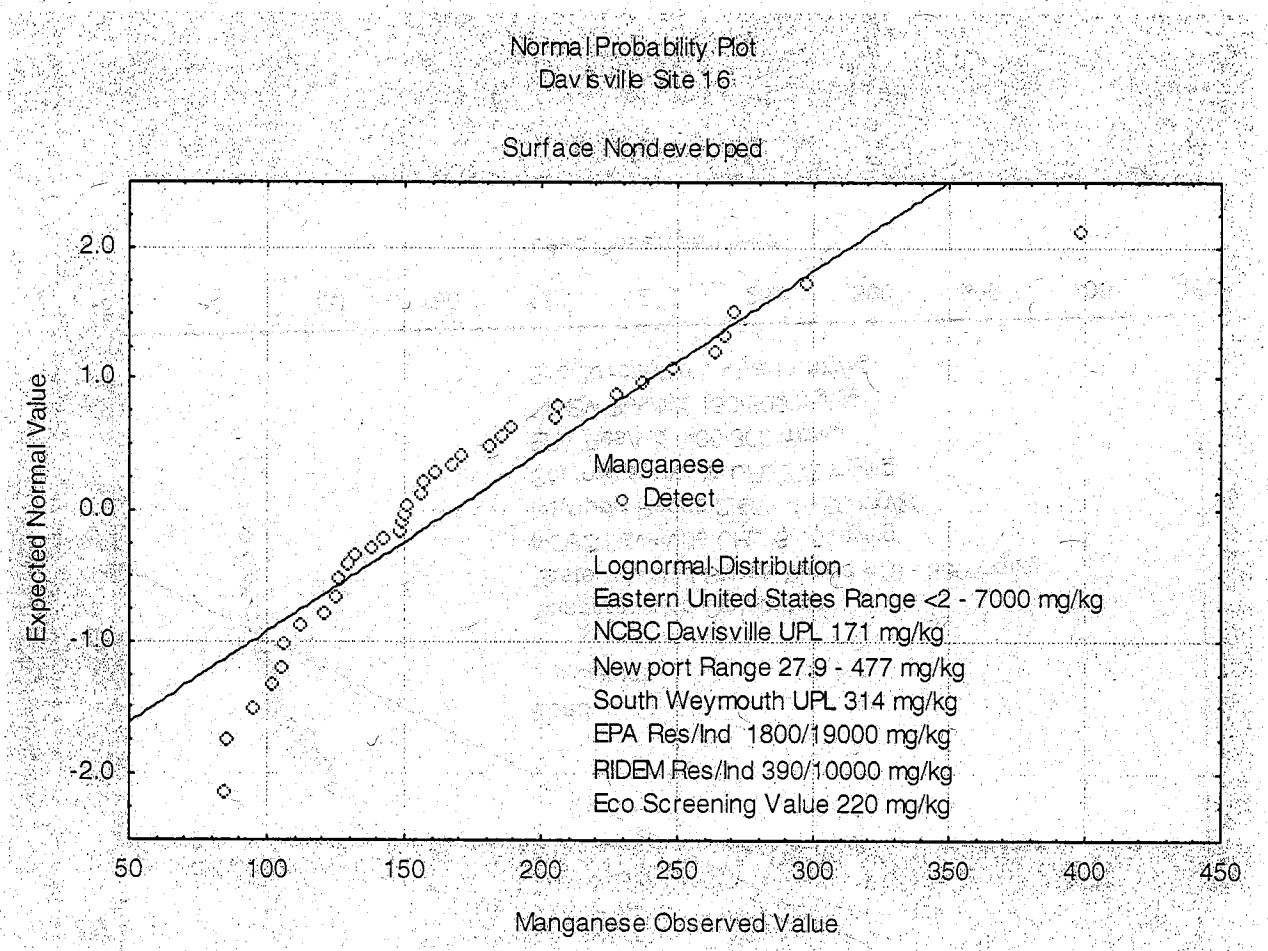
4 - The risk estimates for residential exposure to soils assume a 150 day per year exposure frequency.

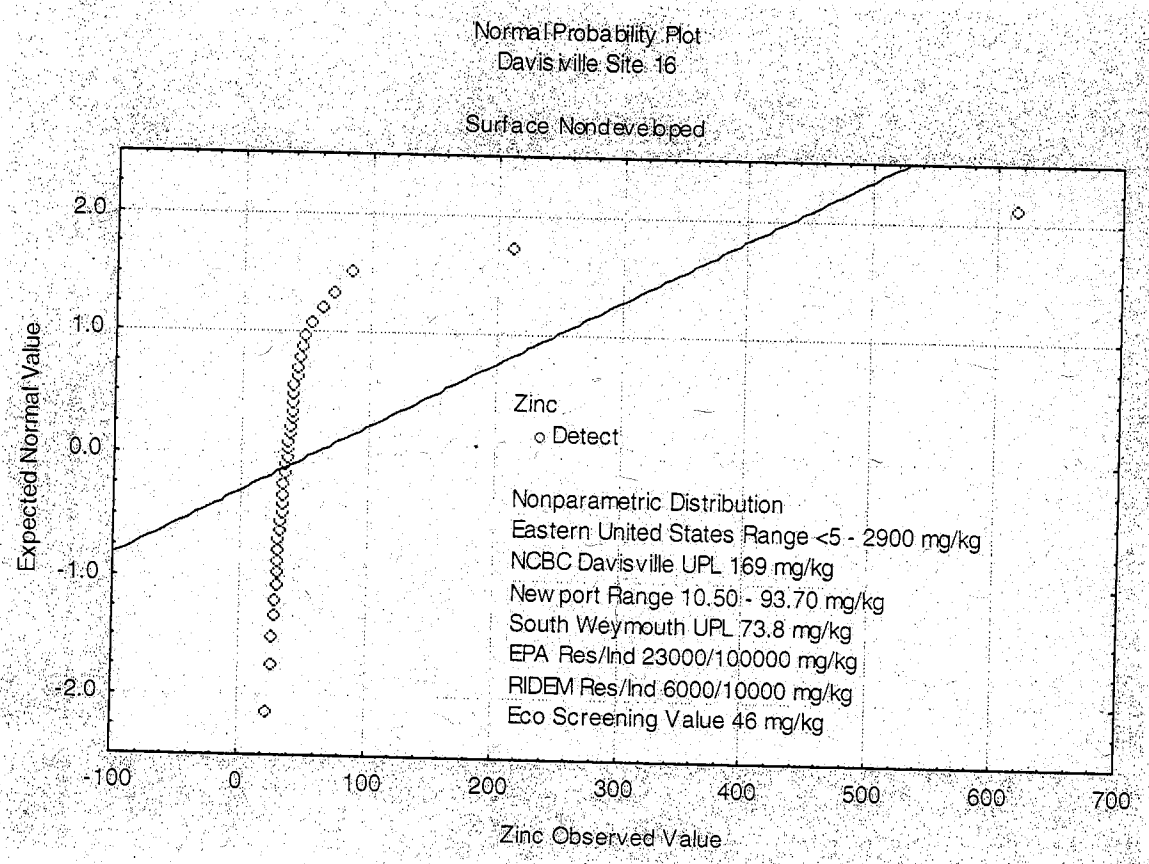

Normal Probability Plot
Davisville Site 16
Surface Nondeveloped
Aluminum
Detect
Normal Distribution
Eastern United States Range 7000 - >100,000 mg/kg
NCBC Davisville UPL 10600mg/kg
New port Range 3710 - 17900 mg/kg
South Weymouth UPL 10500 mg/kg
EPA Res/Ind 75000/100000 mg/kg
RIDEM Res/Ind NA/NA
Eco Screening Value pH
Expected Normal Value
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
Aluminum Observed Value


Normal Probability Plot
Davisville Site 16
Surface Nondeveloped
Expected Normal Values
2.00
1.00
0.00
-1.00
-2.00
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Arsenic Observed Values
Arsenic
Detect
Nondetect
Nonparametric Distribution
Eastern United States Range <0.1 - 73 mg/kg
NCBC Davisville UPL 13.0 mg/kg
Newport Range 1.70 - 71.70 mg/kg
South Weymouth UPL 5.3 mg/kg
EPA Res/Ind 0.39/1.6 mg/kg
RIDEM Res/Ind 7/7 mg/kg
Eco Screening Value 18 mg/kg


Normal Probability Plot
Davisville Site 16
Surface Nondeveloped
Expected Normal Value
2.0
1.0
0.0
-1.0
-2.0
0
20
40
60
80
100
120
140
160
Copper Observed Value
Copper
Detect
Nonparametric Distribution
Eastern United States Range <0.3 - 70 mg/kg
NCBC Davisville UPL 16.3 mg/kg
Newport Range 1.60 - 20.30 mg/kg
South Weymouth UPL 26 mg/kg
EPA Res/Ind 3100/41000 mg/kg
RIDEM Res/Ind 3100/10000 mg/kg
Eco Screening Value 28 mg/kg


Normal Probability Plot
Davisville Site 16
Surface Nondeveloped
Expected Normal Value
2.0
1.0
0.0
-1.0
-2.0
-50
0
50
100
150
200
250
300
350
400
450
Lead Observed Value
Lead
Detect
Nonparametric Distribution
Eastern United States Range <10 - 300 mg/kg
NCBC Davisville UPL 65.5 mg/kg
New port Range 2.60 - 49.50 mg/kg
South Weymouth UPL 302 mg/kg
EPA Res/Ind 400/800 mg/kg
RIDEM Res/Ind 150/500 mg/kg
Eco Screening Value 11 mg/kg


Normal Probability Plot
Davisville Site 16
Surface Nondeveloped
Expected Normal Value
2.0
1.0
0.0
-1.0
-2.0
50
100
150
200
250
300
350
400
450
Manganese Observed Value
Manganese
Detect
Lognormal Distribution
Eastern United States Range <2 - 7000 mg/kg
NCBC Davisville UPL 171 mg/kg
New port Range 27.9 - 477 mg/kg
South Weymouth UPL 314 mg/kg
EPA Res/Ind 1800/19000 mg/kg
RIDEM Res/Ind 390/10000 mg/kg
Eco Screening Value 220 mg/kg


Normal Probability Plot
Davisville Site 16
Surface Nondeveloped
Expected Normal Value
2.0
1.0
0.0
-1.0
-2.0
-100
0
100
200
300
400
500
600
700
Zinc Observed Value
Zinc
o Detect
Nonparametric Distribution
Eastern United States Range <5 - 2900 mg/kg
NCBC Davisville UPL 169 mg/kg
Newport Range 10.50 - 93.70 mg/kg
South Weymouth UPL 73.8 mg/kg
EPA Res/Ind 23000/100000 mg/kg
RIDEM Res/Ind 6000/10000 mg/kg
Eco Screening Value 46 mg/kg

ENCLOSURE 2

RESPONSE TO COMMENTS DATED DECEMBER 12, 2008
RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
REGARDING PHASE III REMEDIAL INVESTIGATION
SITE 16 (CREOSOTE DIP TANK, FIRE FIGHTER TRAINING AREA & BUILDING 41)
NAVAL CONSTRUCTION BATTALION CENTER
DAVISVILLE, RHODE ISLAND

Enclosure 2
January 26, 2009

RESPONSE TO COMMENTS DATED DECEMBER 12, 2008
RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
REGARDING PHASE III REMEDIAL INVESTIGATION
SITE 16 (CREOSOTE DIP TANK, FIRE FIGHTER TRAINING AREA & BUILDING 41)
NAVAL CONSTRUCTION BATTALION CENTER
DAVISVILLE, RHODE ISLAND

Comment No. 1: Page ES-1, Section ES.1, Paragraph 1 *- This paragraph indicates that the entire Site 16 is part of NCBC. The portion of this site that is east of Allens Harbor Road and north of Davisville Road (the extreme eastern portion of the site) is not part of NCBC, but was part of the former Quonset Naval Air Station which was transferred to Rhode Island Economic Development Corporation sometime between 1975 and 1980. Please revise this paragraph to reflect this.*

Response: Good comment. The text will be clarified as requested. The extreme eastern portion of Site 16 was indeed transferred to the Rhode Island Economic Development Corporation in the 1980's.

Comment No. 2: Page ES-8, Section ES-4, Summary of Screening Level Ecological Risk Assessment Results, Paragraph 3 *- This sentence states that per Navy and EPA guidance the initial assessment of COPCs was refined. Please be advised that under RIDEM Remediation Regulations COPCs cannot be dropped from further consideration until it can be shown that both individually and cumulatively that there is no risk from the COPC.*

Response: Chemicals of Potential Concern (COPCs) were selected per the protocol established in the Phase III Quality Assurance Project Plan (QAPP) prepared for Site 16. That protocol is compliant with current Navy policy. Most importantly, the protocol presented in the QAPP uses very conservative human and ecological screening levels to perform the screening. Consequently, one may conclude (with confidence) that a chemical is only eliminated as a COPC if has been demonstrated that both individually and cumulatively that there is no significant risk from that chemical. Please also note that Site 16 is an NPL site and is being addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Consequently, the risk assessments prepared for the site are performed in accordance with Navy and USEPA requirements and guidelines.

Comment No. 3: Page 2-49, Section 2.12.2.13 Additional Tasks Performed During the Phase III RI Field Work, Paragraph 1 *– It is noted that an iridescent, discontinuous film-like sheen was observed at the top of standing water in the bottom of test pits dug for this site. Please state if the film-like sheen material was sampled.*

Response: Both soil and groundwater samples were collected from TP-1 and TP-2. As stated in the text of the first paragraph of Section 2.12.2.13... "Groundwater samples were collected by a bottle-fill method with *the sheen as a component of the sample obtained.*" The analytical results for the samples collected are discussed in both Section 4 and Appendix F (the updated environmental forensics analysis) of the RI.

Comment No. 4: Page 3-4, Section 3.5, Soil, Sentence 1 *- "The term soil generally refers to the first 5 feet of unconsolidated material underlying the ground surface." Please provide a reference for this definition. RIDEM, in its Remediation Regulations (Section 8.02(A)(i)(2)) considers evaluating* ***soil*** *from the ground surface to the top of the water table for a residential scenario. The top of the water table, in many instances can be more than 5 feet below the ground surface.*

Response: The text in this section will be clarified to note that from a risk assessment perspective, receptor exposure to soils includes soils in the 0 to 10 foot below ground surface interval, or if shallower, to soils to the top of the water table. (Please see protocol on page 6-23 of the Remedial Investigation [RI] report.) This is consistent with EPA Region I guidance on this subject. Most importantly, it should be

noted that the groundwater table underlying Site 16 is very shallow. For example, the groundwater underlying the North Central portion of the site is less than 10 feet below ground surface.

Comment No. 5: Page 4-2, Section 4.0, Nature and Extent of Contamination, Paragraph 2 *– While metals may not be a primary contaminate of concern in groundwater, they are a possible contaminate of concern in surface and sub-surface soil. Please revise the text to reflect this.*

Response: The referenced text is not making a statement or judgment as to whether or not metals are COPCs for soils. It is advising the reader as to "why" a site-specific background soil data set is not currently available for Site 16. As noted in Sections 6 and 7, several metals were selected as COPCs and evaluated in the human and ecological risk assessments. The following sentence will be added to the end of the reference paragraph on page 4-2: The nature and extent narrative presented in Section 4 discusses those metals found in groundwater (e.g., arsenic) or soils (e.g., lead) at concentrations exceeding the available background information for Site 16.

Comment No. 6: Page 4-2, Section 4.0, Nature and Extent of Contamination, Paragraph 2 *- In discussing background concentrations of metals for NCBC various locations are presented which could represent background metals concentrations for this site such as NCBC itself, NETC and even out of state bases. This statement should be removed as it is not appropriate to compare Site 16 to other sites where it is not known when and how these studies were conducted. Section 8.06 of the RIDEM Remediation Regulations has a set procedure for the determination of background concentrations. The metals background study conducted for NCBC during the 1990's would not be of much use today as it would not comply with the current RIDEM Remediation Regulations. It is understood such a study was not conducted as part of this remedial investigation. This could lead the public to review the other studies mentioned and draw conclusions about Site 16 which may not be valid.*

Response: The Site 16 RI document clearly acknowledges that a site-specific background soil dataset does not currently exist for Site 16. A small (7 samples only) background soil data set does exist for NCBC Davisville and is referenced in RI reports previously submitted for Sites 07 and Sites 09. This data set and the referenced background data from the scientific literature, NETC Newport, and South Weymouth are the basis of the background discussions/comparisons presented in the draft version of the Site 16 RI. The Navy believes that these data provide useful perspective when making risk management decisions for Site 16 and should be included in the RI. For example, consider the lead concentrations reported for subsurface soils in the North Central area. Although a Site 16 specific background soil data set does not currently exist, the lead concentrations noted in a few of the soil samples collected in the BTEX "hot spot" area clearly exceed *all* of the comparison benchmarks provided (see attached graph from Appendix D.1 [Attachment 1]). Both maximum *and* mean concentrations in the "hot spot" area clearly exceed those available for the comparison datasets. Therefore, the weight of evidence (i.e., the fact that *all* of the background comparison datasets have been exceeded) leads one to conclude that it is likely that some lead concentrations in the North Central area likely *do* exceed background. It should be noted that the referenced background studies for NETC Newport and South Weymouth were rigorous background soil studies scoped and conducted per both Navy and EPA guidance documents. However, for clarity, a statement will be added to the referenced narrative indicating that such background soil datasets are added as "points of reference" for the discussions included in the RI and for risk-management decision making, and are not a substitute for Site 16 specific background soil data set.

Additionally, the Navy has reviewed the requirements established in Section 8.06 of the referenced RIDEM regulations (i.e., Background Concentrations for Soil) and has concluded that both Navy and EPA requirements for background soil datasets are generally as rigorous (if not more rigorous) as those established in the referenced section.

Comment No. 7: Page 4-6, Section 4.1, Overview of Data Presentation for Environmental Media - Surface Water and Seep Data, Paragraph 3, Last Sentence *- "A risk-based concentration developed*

for human exposure to seeps is likely to be at least an order of magnitude greater than the screening criteria presented in Tables 4-58 and 4-59." Please remove this sentence as the statement is based on supposition and not a calculated result. Moreover, this statement would be more appropriate in Chapter 6 (Human Health Risk Assessment) where the calculated result should be shown.

Response: The referenced statement is accurate primarily because of differences in receptor contract rates (e.g., ingestion rates) and exposure frequencies assumed a receptor who is using water supply for domestic purposes (i.e., the basic assumption for the human health screening criteria presented in Tables 4-58 and 4-59) versus that which is plausible for a receptor contacting the seeps at Site 16 (a very limited, intermittent exposure). For example, the drinking water ingestion rate assumed for domestic use of a water supply is 2 liters per day. In contrast, a typical ingestion rate assumed for recreational or trespass scenarios involving surface water bodies is 0.05 liters per hour. Assuming a 4 hour exposure time, the recreational or trespass exposure is, consequently, an order of magnitude less intensive than the domestic use/drinking scenario. Additionally, large boulders have been placed along the Allen Harbor shoreline abutting Site 16. The physical hazards associated with reaching the seeps in question are substantial; frequent, direct physical contact with the seeps (which are only visible at low tide) is very unlikely. Thus, any screening level developed for such an exposure would easily be an order of magnitude greater than those presented in Tables 4-58 and 4-59. This explanation will be added to the RI in support of the statement referenced by the reviewer.

Comment No. 8: Page 4-7, Section 4.1, Overview of Data Presentation for Environmental Media - Sediment, Paragraph 2 *- "However, it should be noted that the screening criteria presented are very conservative for sediments. A risk-based concentration developed for human exposure to sediments is likely to be at least an order of magnitude greater than the screening criteria presented in these tables." These sentences should be removed. For the first sentence the whole point of screening criteria is to be conservative to insure that any potential adverse affects are analyzed. For the second sentence please* see comment 7, above.

Response: Please see response to Comment No. 7. Please note that the screening levels presented in the sediment summary tables are those typically used for soils assuming a residential land use scenario. Thus, the referenced statement is correct because of differences in receptor contract rates (e.g., ingestion rates) and exposure frequencies assumed a receptor who is exposed to soils under a residential land use scenario (i.e., the basic assumption for the human health screening criteria presented in sediment data summary tables) versus that which is plausible for a receptor contacting the sediments underlying Allen Harbor at Site 16. For example, the typical soil ingestion rate assumed for a hypothetical child contacting soils under a residential land use scenario is 200 mg/day. In contrast, the sediments at Site 16 are submerged under several feet of water. Any type of contact with these sediments would be considerably less intensive and less frequent than that assumed for soils under a residential land use scenario. Thus, any screening level developed for such an exposure would easily be an order of magnitude greater than those presented in the sediment data summary tables. This explanation will be added to the RI in support of the statement referenced by the reviewer.

(It should be noted that, importantly, the human health and ecological risk assessments include an analysis of *COPCs selected based on toxicity screening only* as well as an analysis of *COPCs based on toxicity and background screening.*)

Comment No. 9: Page 4-42, Section 4.3.1.1, Undeveloped Area *- It is noted that SVOC contamination has not been fully characterized horizontally in the Creosote Dip Tank Area, Fire Fighting Training Area, BTEX Hot Spot Area and at the septic tanks associated with Building E-107. RIDEM concurs with the Navy recommendation for further surface/shallow subsurface soil sampling prior to the completion of the Feasibility Study.*

Response: Comment noted. The Navy agrees that additional delineation of soil contamination (particularly polycyclic aromatic hydrocarbon [PAH] contamination) in the Northwest section of the North Central area) is necessary in support of the Feasibility Study for Site 16.

Comment No. 10: Page 4-51, Section 4.3.4, Semivolatile Organic Compounds in Sediments, Paragraph 1 *- "The outfall represents overland flow from parking areas and hence does not represent Site 16 chemical releases." It should be noted that the drainage pipes are subject to I/I (inflow/infiltration) and as such a portion of the contaminates could be from Site 16 chemical releases. The reverse is also true that some of the surface runoff could leak from the pipes into the ground before it makes its way to the outfall. This should also be stated in the report.*

Response: The reviewer is correct. All stormwater sewer systems are subject to inflow and infiltration from surface water run-off and shallow groundwater. It is also true that there is likely an exchange of waters/materials between all such systems and the surrounding shallow soils and groundwater. The referenced narrative will be amended to acknowledge these facts. However, it should be noted that the Site 16 system does not extend to the PAH source areas that exist within the North Central area. Additionally, the lack of significant volatile organic contamination in the deep surface waters and sediments of Allen Harbor and in sediment materials collected from within the system during the Phase III RI suggests that the stormwater sewer system is not *currently* acting as a significant transport pathway for the primary contaminants in the Site 16 groundwater (i.e., the volatile organic chemicals). (It is plausible that this pathway may have been more significant in the past.)

Comment No. 11: Page 4-55, Section 4.4.2.5, Deep Bedrock Groundwater Zone *– Please change "deep bedrock overburden monitoring wells" to "deep bedrock monitoring wells".*

Response: Agree. The text will be modified as requested.

Comment No. 12: Page 4-56, Section 4.4.3, Pesticides/PCBs in Seeps, Paragraph 2 *– Please state if the Navy plans on performing a risk analysis for Alpha-BHC and other pesticides since it exceeded a screening criteria.*

Response: The referenced text will be amended to note that, as summarized on Table 6-23, alpha-BHC, dieldrin, and heptachlor expoxide were retained as chemicals of potential concern for the human health risk assessment and were evaluated in the risk analysis. As indicated previously, the ecological risk assessment presented in the Phase III RI document was limited to an evaluation of the surface soils in the North Central area of Site 16. The reader is referred to the Phase II SLERA for the ecological risk evaluation of chemicals in the environmental media of Allen Harbor.

Comment No. 13: Page 4-59, Section 4.6.1, Metals in Soils, Bullet 2 *- This bullet notes that metals concentrations in soils were compared to other bases in Rhode Island, New England and the eastern United States. This statement should be removed for the reasons stated in comment 6. It could, however, be stated that these background levels are just being used as a gauge for comparison to Site 16, but should not be used as a basis for concluding no further study is needed for metals with regard to this media.*

Response: Please see response to Comment No. 6.

Comment No. 14: Section 4, Nature and Extent of Contamination, General Comment *- Based on the discussion in Chapter 4 the majority of contamination has been delineated, though in a number of areas the full extent of contamination has not been fully bounded.*

For soils this would include the north central area (Creosote Dip Tank Area, BTEX Hotspot Area, Fire Fighter Training Area, etc.) and east the Building 41 area. For soils below -5 feet mean sea level soil

contamination has not been bounded to the south of Allen Harbor and to the far east leading to Narragansett Bay for VOCs in soil. For VOC in groundwater there is at least one area in each zone (shallow, intermediate, deep, bedrock and deep bedrock) which has not been fully delineated in terms of extent.

While there is enough information to begin evaluating potential technologies for remedial alternatives for this site additional investigation will be needed to better delineate the extent of contamination. This information will be necessary in order to develop appropriate remedies with accurate cost estimates. Therefore, additional delineation of the contamination should be completed prior to or during the early stages of the Feasibility Study for NCBC IR Site 16.

Response: The Navy agrees with RIDEM that the nature and extent of the majority of the contamination at Site 16 has been delineated. The Navy also agrees that additional sampling is necessary to support the Feasibility Study for Site 16. The recommendations for additional sampling in support of the Feasibility Study for Site 16 were presented in Section ES-5 of the Phase III RI and most are in agreement with the RIDEM recommendations presented in RIDEM Comment No. 14. However, the Navy is not in agreement with the rather broad RIDEM recommendation for additional VOC investigation of soils "south of Allen Harbor and to the east leading to Narragansett Bay." The Navy also believes that, with very few exceptions, the chlorinated volatile organic contamination (CVOC) in the groundwater underlying Site 16 has been delineated to the extent necessary to support the Feasibility Study. As displayed in Figures presented in Volume 4 of the Draft Phase III RI Report for Site 16, the nature and extent investigation of CVOC contamination (in particular) at Site 16 has been conducted in a very rigorous manner. Soil sampling at DPT borings at locations within the North Central area and along systematic grids in the developed area as well as groundwater samples from over 225 monitoring wells has demonstrated that the observed CVOC contamination at Site 16 is likely the result of several releases occurring over the course of time. In particular, the observed patterns suggest significant releases in the North Central area and in the general Building 41 area. While it is possible that more refined grid sampling may reveal additional source areas, these areas are likely to be limited when compared to the source areas already defined. More importantly, such additional information is unlikely to change the "big picture", conceptual site model for Site 16, alter the alternatives selected for evaluation in the Site 16 Feasibility Study, or alter the nature of the land use controls which will be necessary for Site 16. It should be noted that, per the Phase III QAPP, the Phase III investigation was intended to be one last, comprehensive effort to identify major sources of CVOC contamination at Site 16. The number of borings advanced and samples collected was such that at the conclusion of the investigation, one may conclude that additional major sources are unlikely to exist or are already within the major plume areas/source areas identified. The Navy intends to collect any additional information needed to support the Feasibility Study prior to the preparation and submittal of the Final Feasibility Report for Site 16.

Comment No. 15: Page 5-1, Section 5.0 Chemical Fate and Transport, Paragraph 1, Sentence 3 *- Please include TPH in addition to metals and dioxin as contaminates of secondary concern since there were exceedances of RIDEM Remediation Regulations Residential Direct Exposure Criteria.*

Response: Agree. However, it should be noted that, in terms of fate and transport properties, TPH is likely to be similar to the PAHs. TPH is not discussed separately in Section 5 as a COPC for Site 16.

Comment No. 16: Page 5-7, Section 5.2, Contaminate Transport Pathways, Paragraph 3, Bullets 2 and 3 *- This bullet, in reference to natural attenuation, states that the plume outline (extent) is stable or shrinking over time and that concentrations of contaminates in most wells are decreasing over time. While these statements may be true, very few rounds of sampling are available to draw any definitive statements on an overall decrease in contaminate concentrations and plume extent. In addition, the Navy has not fully delineated the extent of the plumes in any one of the strata. Therefore, please remove these bullets.*

Response: At this point of Section 5, please note that the narrative is simply reiterating the lines of evidence that, per Wiedemeir et al (1998), should be considered when evaluating natural attenuation. As noted at the top of page 5-8, the "potential for natural attenuation" specifically at Site 16 is discussed in Sections 5.5 and 5.8.

Comment No. 17: Page 5-11, Section 5.3, Chemical and Physical Properties and Degradation Processes Affecting Contaminate Mobility and Persistence of CVOC, Paragraph 2, Last Sentence - *Given the soil samples that have been taken from this site, please state if the Navy has evaluated the soil for geochemical and microorganisms to determine if the proper conditions exist for the rapid breakdown of CVOC.*

Response: Agree. The referenced text will be amended to state that the Navy has not collect site-specific data regarding the soil micro-organisms present Site 16. However, during the Phase II RI, the Navy did collect a significant amount of groundwater data for purposes of the evaluation of the potential for natural evaluation. As noted above the potential for natural attenuation at Site 16 is discussed in Sections 5.5 and 5.6.

Comment No. 18: Table 5-3, Page 1 of 9, Receptors of Concern, Immediate Upgradient Area - *This section notes that the low-level VOC in this area is unlikely to cause a vapor intrusion problems because buildings have concrete floors. Please note that concrete floors can crack over time providing a pathway for vapors to enter a building. The vapor intrusion scenario should be investigated in the human health risk assessment for this area to insure that existing, as well as future building construction, does not pose an unacceptable risk for vapor intrusion or that proper construction techniques are incorporated into the design of any existing or future buildings in the area.*

Response: The *primary reason* that the vapor intrusion pathway is not considered significant for this area is the fact that low-level contamination only has been detected in this area. The following table summarizes the maximum detected CVOC concentrations versus EPA screening levels for the vapor intrusion pathway:

Monitoring Well	2007 Positive CVOC Results (ug/L)	Screening Level Comparisons
MW 10I	PCE (1.7); TCE (2.9)	TCE = 5 (the current MCL)
MW 74D	TCE 2.5)	PCE = 5 (the current MCL)
MW 84D	1,1-DCA (0.15)	1,1-DCA = 2200

(No positive detections reported for other I,D,R1, or R2 wells in the immediate upgradient area.)
(Screening levels are presented in Table 2C of EPA530-D-02-004 and represent the 1E-06 cancer risk level or an hazard index = 1.)

The actual construction of the buildings in the upgradient area is a *secondary reason* why the vapor intrusion is not a significant exposure pathway for this area. The referenced text will be amended to clarify the analysis.

Comment No. 19: Table 5-3, Page 4 of 9, Receptors of Concern, Creosote Dip Tank Area - *This area has the potential for both commercial/industrial as well as residential use (in the form of hotels or recreational use (proposals over the years have shown both). Please note this in this section.*

Response: Regardless of proposals that may have been forwarded to the Navy in the past, the current leasing restrictions and anticipated future leasing/land transfer restrictions for this area do not include/will not include provisions for any type of residential land use.

Comment No. 20: Table 5-3, Page 5 of 9, Receptors of Concern, Fire Fighting Training Area - *This area has the potential for both commercial/industrial as well as residential use (in the form of hotels or recreational use (proposals over the years have shown both). Please note this in this section.*

Response: Please see response to Comment No. 19.

Comment No. 21: Page 6-5, Section 6.1.2.1, Derivation of Screening Criteria, Screening Levels for Soil and Sediment, Paragraph 2 *- This paragraph notes that COPC selection tables will include the ORNL RSLs and RIDEM Direct Exposure Criteria for commercial/industrial soils. They should also include the RIDEM Residential Direct Exposure Criteria as this will help determine whether an Environmental Land Use Restriction (ELUR) will be required.*

Response: An explanation of the COPC selection protocol for soils and sediments begins on page 6-4. As indicated in the text on page 6-4 (approximately mid-page), the RIDEM Direct Contact Criteria for Residential Soil *were used* to select COPCs for soil and sediment in the HHRA. These criteria are presented in the COPC selection tables for soils and sediments, Tables 6-1, 6-4, 6-7, 6-10, and 6-19.

Comment No. 22: Page 6-5, Section 6.1.2.1, Derivation of Screening Criteria, Screening Levels for Groundwater and Groundwater Seeps, Paragraph 1, Sentence 2 *- The definition for RIDEM GB groundwater is given as "i.e., an area that is presumed not suitable for use as a current or potential source of drinking water". This regulation from Section 8.03(A)(ii) of the Remediation Regulations is used by RIDEM to determine the appropriate cleanup levels for GB classification groundwater. The GB classification of groundwater at this site is not based on the RIDEM Remediation Regulations, but is based on the RIDEM Groundwater Quality Regulations. Section 9.1.3 of the Groundwater Quality Regulations defines GB groundwater as "those groundwater resources designated by the Director which may not be suitable for public or private drinking water use without treatment due to known or presumed degradation". Please change the definition of GB groundwater to that of the Groundwater Quality Regulations since it has not yet been determined that this area cannot be used as a potential future source of groundwater.*

Response: The second sentence will be revised as follows: "The COPC selection tables for groundwater also include the RIDEM GB groundwater objectives because the groundwater underlying Site 16 is currently classified as a GB area.Section 9.1.3 of the RIDEM Groundwater Quality Regulations defines GB groundwater as "*those groundwater sources designated by the Director which may not be suitable for public or private drinking water use without treatment due to known or presumed degradation*)."

Comment No. 23: Page 6-5 & 6, Section 6.1.2.1, Derivation of Screening Criteria, Frequency of Detection Screen *– This paragraph notes, with conditions that if a constituent was detected less than once in 20 samples it was no longer considered as a COPC. Please note this is inconsistent with the RIDEM Remediation Regulations (Section 8.01(A). In order to drop a constituent from further consideration in the risk analysis it must be shown that individually and cumulatively that the constituent poses no unacceptable risk.*

Response: A review of the COPC selection presented in Tables 6-1 through 6-22 indicates that no chemicals were eliminated as COPCs on the basis of frequency of detection. The paragraph discussing the frequency of detection screen will be removed from this section. However, the deletion of the paragraph does not mean that "frequency of detection screen" is not valid for a human health risk assessment. The deletion of the text simply reflects that fact that the toxicity screen took precedent over the frequency screen in all cases. It should be noted that the toxicity screen is very conservative; one may conclude that a constituent dropped from further consideration based on the toxicity screen has been shown individually and cumulatively to pose no unacceptable risk.

Comment No. 24: Page 6-5, Section 6.1.2.2, Decision Rules for Establishing COPCs, Bullet 4 *- This bullet states that chemicals present at naturally occurring levels were not retained as COCs in accordance with Navy guidance. Please state if there are any chemicals the Navy did not retain as a*

result of this bullet. Please note the only background study done at NCBC was for basewide inorganics for groundwater. This study, however, is not in compliance with Section 8.06 of the RIDEM Remediation Regulations.

Response: A protocol for the evaluation/elimination of chemicals as chemicals of potential concern based on a background screen was included in the Phase III Quality Assurance Project Plan (QAPP) for Site 16. The protocol was amended during the preparation of the HHRA for Site 16 such that all chemicals of potential concern (COPCs) selected using the toxicity screen would be evaluated (at some point) in the quantitative risk assessment and risk estimates for such chemicals would be summarized on RAGS Part D Table 9 of the HHRA. However, risk estimates for chemicals of concern only (i.e., those chemicals recommended for further evaluation in the Site 16 Feasibility Study) would be summarized on RAGS Part D Table 10 of the HHRA. RAGS Part D Table 10 provides "the bottom line" results, so to speak, of the HHRA.

It should be noted that the original protocol in the QAPP was amended in response to the EPA request to report risk estimates for all chemicals selected as COPCs based on the outcome of the toxicity screen somewhere in the human health risk assessment (in this case, in RAGS Part D Table 9). The risk assessment protocol also adheres to Navy policy in that it only presents risk estimates for the final COCs in RAGS Part D Table 10; the list of final COCs does not include chemicals present at concentrations reflecting background conditions. The Navy acknowledges that the there is no site-specific background soils data set for Site 16 and that the NCBC background groundwater data set was collected per protocol that precedes the referenced RIDEM Remediation Regulations.

Comment No. 25: Page 6-9, Section 6.1.3.1, Surface Soil (0 to 2 feet) – Undeveloped Area, Last Paragraph, Last Sentence *- Please reference the background study which shows aluminum and beryllium to be within background levels.*

See **Response to Comments No. 25 through No. 34** at end of **Comment No. 34**.

Comment No. 26: Page 6-11, Section 6.1.3.2, Surface Soil (> than 2 feet) – Undeveloped Area, Last Paragraph, Sentence 2 *- Please reference the background study which shows the background concentrations of aluminum, arsenic, and beryllium to be within background levels.*

Comment No. 27: Page 6-12, Section 6.1.3.2, Surface Soil (> than 2 feet) - Undeveloped Area, Last Paragraph, First Sentence *- Please reference the background study reference the study which shows arsenic and aluminum to be within background levels.*

Comment No. 28: Page 6-13, Section 6.1.3.3, Surface Soil (0 to 2 feet) - Developed Area, Paragraph 2, Sentence 2 *- Please reference the background study which shows aluminum, arsenic, and manganese to be within background levels.*

Comment 29: Page 6-14, Section 6.1.3.4, Surface Soil (> than 2 feet) – Developed Area, Paragraph 2, Sentence 3 *– Please reference the study which shows aluminum, arsenic, beryllium, iron, and manganese to be within background levels.*

Comment No. 30: Page 6-16, Section 6.1.3.5, Shallow Overburden Groundwater, Paragraph 1, Sentence 4 *- Please reference the study which shows Cr, Mn, and Ni in unfiltered samples and Cr, Fe, and Mn in filtered samples to be within background levels.*

Comment No. 31: Page 6-17, Section 6.1.3.6, Intermediate Overburden Groundwater, Paragraph 1, Sentence 3 *- Please reference the study which shows Cr, Mn, and Ni in unfiltered samples and Fe, Mn, and V in filtered samples to be within background levels.*

Comment No. 32: Page 6-18, Section 6.1.3.7, Deep Overburden Groundwater, Paragraph 1, Sentence 3 *– Please reference the study which shows Cr, Mn, and Ni in unfiltered samples and Ba, Cr, Fe, Mn, and Ni in filtered samples to be within background levels.*

Comment No. 33: Page 6-18, Section 6.1.3.8, Shallow Bedrock Groundwater, Paragraph 2, Sentence 3 *- Please reference the study which shows Al, Ni, and Tl in unfiltered samples and Fe and Mn in filtered samples to be within background levels.*

Comment No. 34: Page 6-19, Section 6.1.3.9, Deep Bedrock Groundwater, Paragraph 2, Sentence 3 *- Please reference the study which shows Mn in filtered samples to be within background levels.*

Response to Comments No. 25 through No. 34: As discussed in Section 4.0, page 4-2, a Site 16-specific background soil data set was unavailable, but background soil data were available as a result of sampling conducted in other areas of NCBC Davisville and at other Navy facilities in the New England Area (e.g., NETC Newport [Rhode Island], South Weymouth Naval Air Station [Massachusetts]). Literature sources also provide some indication of commonly observed background metals concentrations in soils. Site-specific background concentrations for inorganics in groundwater were established by the Navy during the Basewide Groundwater Inorganics Survey for NCBC Davisville (Stone and Webster Environmental Technology and Services, September 1996). As indicated in the text in Section 6.1.2.1, page 6-8 and in Section 6.4.3, the background comparison for soil and groundwater is presented in Appendix D.1.

Comment No. 35: Section 6.1.3, COPCs Selected for the HHRA, General Comment *– It appears that a number of COPCs have been eliminated from further consideration in the human health risk assessment based on their being within "background values". It is assumed that these are studies that were conducted for NCBC during the early to mid 1990's. While at the time RIDEM approved these background studies, they no longer comply with the current RIDEM Remediation Regulations, amended 2004. As a result, these studies can no longer be used to eliminate COPCs. RIDEM is not aware of any current background studies that have been conducted at the site. In accordance with Section 8.01(A) of the RIDEM Remediation Regulations RIDEM is requesting that COPCs noted in comments 25 thru 34 be included in the HHRA until it can be shown that individually and cumulatively the COPC shows acceptable risk.*

Response: As discussed in Section 6.1.2.1, pages 6-6 and 6-7, and in Section 6.1.2.2, page 6-8, no chemical was initially eliminated as a COPC on the basis of background. As shown on Tables 6-1 through 6-22 all chemicals detected at concentrations exceeding toxicity screening criteria were retained as COPCs and evaluated in the HHRA.Risk estimates for those COPCs are presented in the RAGS Part D Table 9s of the HHRA. The text in Section 6.1.3 does identify chemicals retained as COPCs but present at naturally occurring levels; again, these chemicals were evaluated quantitatively in the HHRA. Please, also see response to Comments 24.

Comment No. 36: Table 6-25, Receptors and Exposure Routes, Construction Workers *- Please state if the Soil Dermal Contact and Soil Ingestion exposure routes include both surface and subsurface soil.*

Response: As discussed in Section 6.2.1.1, page 6-23, and in Table 6-24, construction workers are assumed to be exposed to both surface soil and subsurface soil. The term "Soil" will be replaced in Table 6-25 with phase "Surface/subsurface soil".

Comment No. 37: Pages 6-23 and 24, Section 6.2.1.1, Potential Current and Future Receptors of Concern and Exposure Pathways, Child and Adult Recreation Users & Future Child and Adult Residents *- Please be advised that under the RIDEM Remediation Regulations the Recreational and*

Residential scenarios have the same standard of protection. In addition, a portion of the site is currently used for recreational purposes (marina) and plans have been shown in the past that would have residential uses (hotels).

Response: Please note that, in the RIDEM Remediation Regulations, the definition of "Industrial Commercial Activity" clearly includes outdoor recreation sites with restrictions in place to limit exposure. This point has been acknowledged by RIDEM in their letter dated 19 JAN 2007 (Attachment 2). Accordingly, the Navy does not concur with the reviewer's interpretation that RIDEM Remediation Regulations imply/state that "Recreational and Residential scenarios have the same standard of protection. Also, please note that the referenced area is a marina; the potential for receptor exposure to environmental media is expected to be limited when compared to the exposure anticipated under a residential land use scenario.

Comment No. 38: Table 6-27, Input Parameters Reasonable Maximum Exposures, Page 1 of 4, Incidental Ingestion/Dermal Contact with Soil *– For the adult resident the ingestion rate for soils is stated as 100 mg/day. Appendix D of the RIDEM Remediation Regulations has a default value of 1000 mg/day. Please use this value in the calculations. In addition please explain why a child resident would be at a site for 25,550 days (70 years). This is the Value used for AT_c.*

Response: Appendix D of the RIDEM Remediation Regulations (2004) states that the adult soil ingestion rate is 100 mg/day (not 1000 mg/day). (Please see Attachment 3.) This is also the standard USEPA default soil ingestion rate for adults. Also, a child resident is assumed to be at the site for 6 years under the RME scenario. The value of 25,550 days or 70 years listed by the reviewer is the *averaging time* and not the exposure duration. In accordance with both USEPA and RIDEM guidance an averaging time of 70 years is always used to calculate incremental lifetime cancer risks (regardless of the receptor evaluated). Please note that the exposure factor values referenced by the reviewer are those provided in the Phase III QAPP for Site 16; RIDEM did not previously comment on these exposure factor values during the comment/response cycles for the QAPP. Please also note that Site 16 is an NPL site and is being addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Consequently, the risk assessments prepared for the site are performed in accordance with Navy and USEPA requirements and guidelines.

Comment No. 39: Table 6-28, Input Parameters Central Tendency Exposures, Page 1 of 4 *- For AT_n and AT_c under the All Exposures Section, please explain why the averaging time would be different. Similar to comment 38 please explain why a child resident would be at the site for 70 years. For AT_n please explain why a child resident would only be at the site for 730 days (2 years) and the adult resident would only be at the site for 7 years. It is assumed the child would move with the parent, therefore the averaging time should be the same (though RIDEM Remediation Regulations consider a child scenario for the first 6 years).*

Response: The averaging times for noncarcinogenic exposures presented in Table 6-28 are calculated according to USEPA guidance. For noncarcinogenic exposures, the averaging time is the product of the exposure duration times 365 days per year. (The intake for non-carcinogens is representative of the average over the duration of the exposure.) For carcinogenic exposures, the averaging time is equal to the product of 70 years (i.e., the assumed lifetime of the receptor) times 365 days per year (i.e., 25,550 days). (The intake for carcinogens is representative of the average over the course of a lifetime.) Example calculations are provided in Appendix D. Also, RIDEM does not have any default exposure assumptions for central tendency exposures. The exposure durations of 2 years for child residents and 7 years for adult residents are USEPA default exposure duration values. Please note that the exposure factor values referenced by the reviewer are those provided in the Phase III QAPP for Site 16; RIDEM did not previously comment on these exposure factor values during the comment/response cycles for the QAPP.

Comment No. 40: Chapter 6, Section 6.2.4, General Comment *– Please explain why the central tendency exposure frequency is always one-half the reasonable maximum exposure frequency.*

Response: Only the exposure frequencies listed Table 6-28 for the construction worker, adolescent trespassers, and recreational users are set equal to one half the reasonable maximum exposures. This is because there are no default central tendency exposure frequencies for construction worker, adolescent trespassers, and recreational users; therefore, these values are based on the professional judgment of the risk analyst. The exposure frequencies for industrial workers and hypothetical residents *are* USEPA default exposure frequency values. Please note that the exposure factor values referenced by the reviewer are those provided in the Phase III QAPP for Site 16; RIDEM did not previously comment on these exposure factor values during the comment/response cycles for the QAPP. Most importantly, please note that all risk management decisions for Site 16 will be based on the results of the RME case. The CTE case is added primarily for informational purposes only and to provide perspective on the range of mean to upper bound risk estimates plausible for hypothetical receptor exposure at Site 16.

Comment No. 41: Page 6-46, Section 6.4.2, Interpretation of Risk Assessment Results, Paragraph 1, Sentences 3 & 4 *- "However, the 1 x 10^{-5} risk benchmark should not be viewed as a discrete limit. Risks slightly greater than 1 x 10^{-5} may be considered acceptable (i.e., protective) if justified on site-specific conditions, including any uncertainties about the nature and extent of contamination and associated risks." Section 8.01(A) of the RIDEM Remediation Regulations does not discuss cumulative risks which slightly exceed 1 x 10^{-5}. Exceedances of 1 x 10^{-5} would require evaluation of remedial alternatives. Whether the no action alternative would be the preferred alternative would be a risk management decision. Please include this statement in this section.*

Response: The narrative presented on page 6-46 was included based on general guidance presented in the USEPA RAGS Part D document, page 4-2, under the discussion regarding risk-based remediation goals:

> "The NCP discusses a generally acceptable risk range of 10^{-4} to 10^{-6}. EPA has further clarified the extent of the acceptable risk range by stating that the upper boundary generally is not a discrete line at 1 x 10^{-4}. Risks slightly greater than 1 x 10^{-4} may be considered to be acceptable (i.e., protective) if justified based on site-specific conditions, including any uncertainties about the nature and extent of contamination and associated risks…."

The Navy believes that, in general, the same consideration of "site-specific conditions" should apply when using the RIDEM cumulative risk values as benchmarks of concern for a site. However, the Navy also believes that EPA and RIDEM risk management concerns should be taken into account whenever this case occurs. The narrative on page 6-46 will be amended as follows: "Consequently, a "no further action" recommendation *may be forwarded to EPA and RIDEM risk managers for review and discussion* when the1 x 10^{-5} risk benchmark is exceeded. *Those reviews and discussions may impact the analyses presented in the FS.*" However, it should be noted that the risk estimates for Site 16 are unambiguous in this regard; the FS is proceeding based on risk estimates clearly exceeding the RIDEM cumulative risk benchmarks for the residential and industrial land use scenarios.

Comment No. 42: Page 6-47, Section 6.4.3.1, Soil, Noncarcinogenic Risks - RME, Southeast Undeveloped Area *- Please state if the child resident scenario had HIs in excess of similar to the Northwest Undeveloped Area.*

Response: As stated in the text on page 5-57, for the northwest undeveloped area, the HI for hypothetical child residents exposed to surface soil was less than one and the HI for hypothetical child resident's exposure to subsurface soil was 5. The HIs were less than one for hypothetical child residents exposed to surface soil and subsurface soil in the southeast undeveloped area. The first sentence of the last paragraph on page 6-47 will be amended to read as follow: HIs for all RME-case receptors *(including*

the hypothetical resident child) exposed to surface and subsurface soil in the southeast undeveloped area were less than or equal to unity (1).....

Comment No. 43: Page 6-50, Section 6.4.3.2. Groundwater Undeveloped Area, Paragraph 2, Last Sentence *– This sentence notes that metals concentrations in groundwater are elevated in unfiltered samples versus filtered samples. Please note that RIDEM Remediation Regulations Groundwater Objectives are based on unfiltered samples since it is assumed most people do not filter their groundwater prior to consumption.*

Response: Please note that the incremental lifetime cancer risks and hazard indices for groundwater were calculated using the total (unfiltered) metals concentrations. Also COCs were selected based on HHRA results calculated using the total metals concentrations. The discussion of total versus filtered metal concentrations is presented to provide perspective on the concentrations of metals in groundwater and the potential impact of sample turbidity on the metals concentrations reported for unfiltered samples. The following sentence will be added to the end of the referenced section: It should be noted that the EPCs for COPCs in groundwater were calculated using *unfiltered (total)* metals results.

Comment No. 44: Page 6-55, Section 6.4.3.5, Vapor Intrusion *- Please state if the exposure frequency for the residential scenario used was 350 days/year. Tables 6-42 and 6-43 simply provide the results of the analysis.*

Response: An exposure frequency of 350 days a year was used for the evaluation of hypothetical future residential exposures via the vapor intrusion pathway. All the exposure factor assumptions used in the evaluation of vapor intrusion pathway are presented on the model printouts provided in Appendix D.6.

Comment No. 45: Page 6-57, Section 6.4.3.6, Risks from Lead, Paragraph 1, Last Sentence *– Please see comment 43. In addition, if any public water supply were to be developed from water in this area, concentrations of lead would need to be below 15 ug/l irrespective of any risk assessment performed.*

Response: Please see response to Comment No. 43. Also, please note that the text on page 6-57 and the in-text table on page ES-6 already acknowledges that the lead concentrations detected in unfiltered groundwater samples exceed both federal and RIDEM drinking water criteria. Conservatively, lead is retained as a COC for groundwater (unfiltered samples only) (See page ES-6). However, the impact of turbidity on the metals concentrations in the unfiltered groundwater samples can not be dismissed when interpreting the nature and extent of contamination data or when making risk management decisions for Site 16. As discussed in Section 4, the pattern of lead contamination in the groundwater samples (e.g., the lack of elevated lead concentration in the shallow most overburden well samples), the positive correlation between elevated lead concentrations in unfiltered groundwater samples and elevated turbidity levels, and the lack of significant lead concentrations in filtered groundwater samples (i.e., no concentrations greater that SDWA action level) suggest that the lead concentrations in the unfiltered samples are not indicative of site-related lead contamination in groundwater at Site 16. Finally, please note that any groundwater restrictions established for Site 16 will include a prohibition of domestic use of groundwater in this "GB" classified area.

Comment No. 46: Page 6-58, Section 6.4.3.6, Risks from Lead, Paragraph 1 *- Please explain why the hypothetical residential scenario was not included in this analysis. It seems only the construction worker, industrial worker, and recreational user were considered.*

Response: The evaluation of risks from exposures to lead begins at the bottom of page 6-56. In accordance with USEPA guidance and as discussed in Section 6.2.4.8 and on page 6-56, hypothetical residential exposures to lead *were* evaluated using USEPA's Integrated Exposure Uptake Biokinetic (IEUBK) model. The results of this analysis are presented on page 6-57. The analysis presented in the

first paragraph on page 6-58 is for non-residential exposures which were evaluated using the adult lead model in accordance with USEPA guidance.

Comment No. 47: Chapter 6, General Comment *-Please explain why the Central Tendency Exposure (CTE) averaging time is one-half the Reasonable Maximum Exposure (RME) averaging time. It is understood this is based on professional judgement, however, it is RIDEM's understanding that the Army uses three-fourths of the RME for the CTE. Both branches of the military are part of the Department of Defense therefore it would seem they would use the same criteria.*

Response: Please see response to Comment No. 40. Neither the EPA nor the Department of Defense has a "standard" set of central tendency exposure parameters that covers *all* of the receptors typically evaluated in a human health risk assessment. Although some suggested values have been published by the both the federal EPA and the Department of the Army, the Department of the Navy (DoN) has not specifically evaluated and/or adopted any particular set of CTE values. The DoN relies on the professional judgment of the DoN/contractor risk analysts performing/reviewing site-specific risk assessments. Most importantly, it should be noted that all risk management decisions for Site 16 will be based on the outcome of the RME analysis. The CTE analysis is included for informational purposes only and to provide perspective on range of risk estimates bracketing the mean and upper bound receptor exposures. Changing the CTE exposure factor assumptions at this point in the RI would not significantly alter the risk management's decisions being made for Site 16.

Comment No. 48: Page 8-4, Section 8.2, Summary of Human Health Risk Assessment Results, Bullet 2 *- This bullet states that the sediments in Allen Harbor are submerged and that potential for human contact is limited. Please be advised that shell fishing is very common in this area and this would put human receptors in direct contact with the sediment. This should be noted in this bullet.*

Response: The Navy agrees that shell fishing is common in this area of New England. However, the Navy also believes that it is unlikely that human receptors will be exposed to the sediments underlying the Allen Harbor area adjoining Site 16 while shell-fishing because:

- The vast majority of the referenced sediments are submerged by several feet of water at all times. The sediments are not exposed at low-tide (i.e., shellfishing along a shoreline is not possible.)
- Large (erosion-control) bolders have been placed along the Allen Harbor shorelines which abut Site 16 (i.e., the southern shoreline and southwest corner of the Harbor). Physical access to the referenced sediments would be difficult and dangerous.
- That portion of Allen Harbor abutting Site 16 is an active marina area. Shellfishing would conflict with the current and anticipated future recreational activities occurring at Site 16.

This evaluation will be added to the referenced text on page 8-4.

Comment No. 49: Page 8-5, Section 8.2, Summary of Human Health Risk Assessment Results, Bullet 2 *– This bullet notes that groundwater use restrictions are currently in place for the undeveloped area. Please state if this also applies to the developed area. In addition, if the groundwater cannot be remediated an environmental land use restriction will need to be applied to the whole property upon transfer.*

Response: Per page 6 of the attached Quitclaim Deed dated October 14, 1998 (Attachment 4).... "The Grantee shall notify the Navy, in writing, if a well, for any purpose is installed within Parcel 8 until all action on NCBC Davisville Site 3 is completed and the site is closed under CERCLA." This information will be added to Section 8. Additionally, the Navy agrees that, if the groundwater remedy does not allow

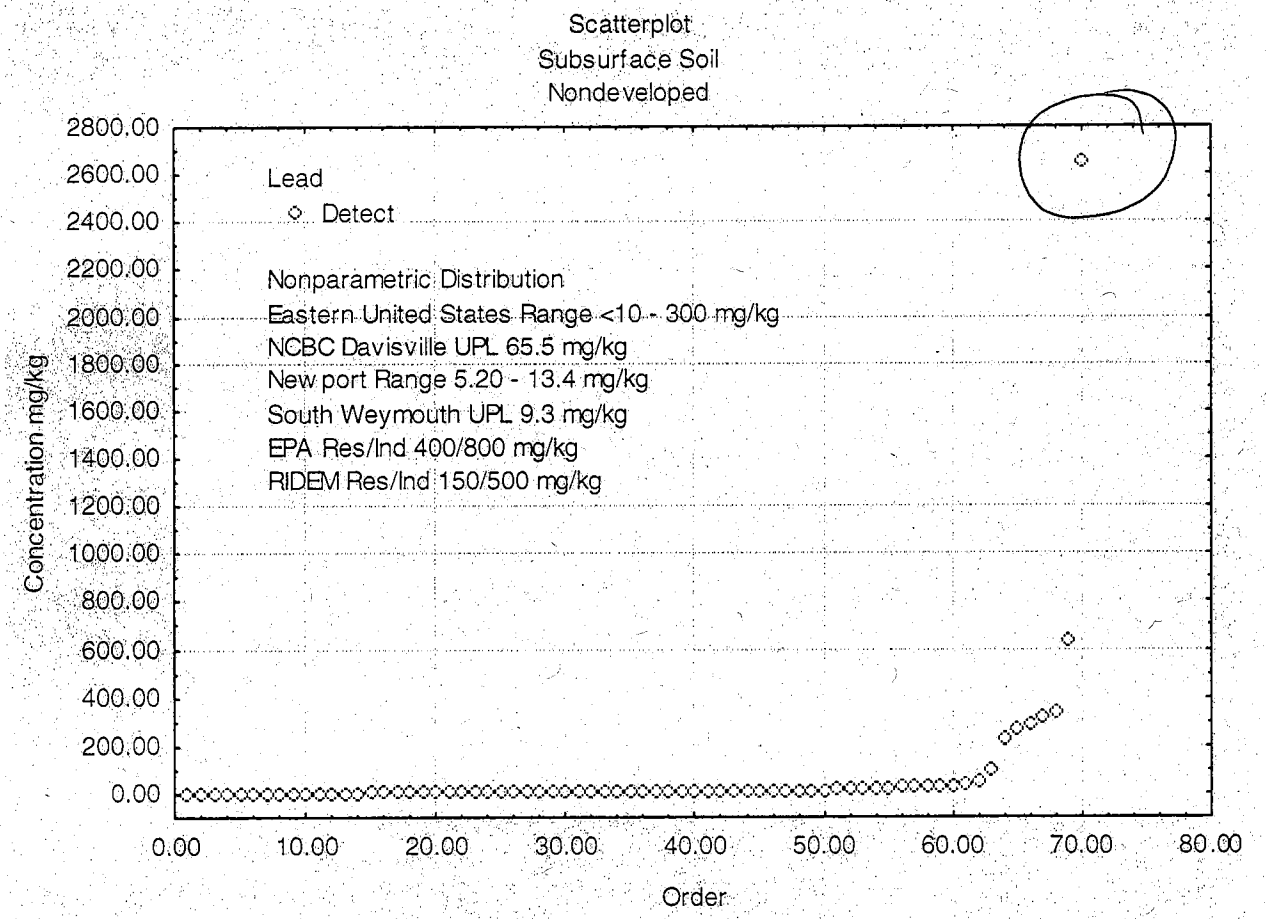
for unrestricted use, an environmental land use restriction will need to be applied to *all* of Site 16 upon property transfer.

Comment No. 50: Page 8-6, Section 8.4, Recommendations for Further Action, Bullet 1 *- This bullet implies that the whole of the northeastern quadrant of Site 16 needs to meet commercial industrial direct exposure criteria. Please be advised that a small portion of the section of land is used for recreational purposes (marina). Under the RIDEM Remediation Regulations recreational uses must meet residential direct exposure criteria. Please note this in this bullet.*

Response: Please see response to Comment No. 37.

ATTACHMENT 1

FROM APPENDIX D.1 OF THE PHASE III RI REPORT
FOR SITE 16



Attachment 1
From Appendix D.1
of Phase III RI
Report.

ATTACHMENT 2

RIDEM CORRESPONDENCE DATED JANUARY 19, 2007
REGARDING APPLICATION OF DIRECT EXPOSURE CRITERIA
FOR RECREATIONAL USE SITES
NAVAL STATION NEWPORT
NEWPORT, RHODE ISLAND

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
235 Promenade Street, Providence, RI 02908-5767 TDD 401-222-4462

January 19, 2007

Robert G Schirmer
Environmental Restoration
Facilities Engineering Command, Mid-Atlantic
Naval Facilities Engineering Command
9742 Maryland Avenue
Norfolk, VA 23511-3095

RE: Application of Direct Exposure Criteria for Recreational Use Sites Naval Station Newport, Newport Rhode Island.

Dear Mr. Schirmer,

The Rhode Island Department of Environmental Management, Office of Waste Management (RIDEM) received your letter regarding the application of Residential and Industrial/Commercial Standards to sites at Naval Station Newport in December 2006. As you are aware, Residential Activity is defined in Section 3.58 of the Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases as amended February 2004. The definition states that:

> Residential Activity shall mean any activity related to (1) residence or dwelling, including but not limited to a house, apartment, or condominium, or (2) school, hospital, day care center, playground or unrestricted outdoor recreational area.

Industrial Commercial Activity is defined under Section 3.34 of the above-cited regulations. The definition states that:

> Industrial Commercial Activity shall mean any activity related to the commercial production, distribution, manufacture or sale of goods or services, or any other related activity as defined by this Section including activities related to out door recreational sites with restrictions in place to limit potential exposure.

As the Department has steadfastly maintained, it is stated in the above regulations that playgrounds or unrestricted outdoor recreational activates are considered residential activities. At the Old Fire Fighter Training Area, the Navy initially stated that they wanted unrestricted outdoor recreational use of Katy Field, which contained a playground, picnic area and a playing field. Under this scenario, please be advised that the residential criteria would be applicable.

It has come to my attention recently that the Navy inquired as to whether it was possible to place restrictions or institutional controls on the aforementioned property for

30% post-consumer fiber

recreational use to limit potential exposure as defined in Section 3.34. This approach may be amenable to the Department in certain limited situations, but the recreational restrictions in place must be verified by the Navy, through formal risk analysis, to be consistent and compatible with an Industrial/Commercial risk scenario. Specifically, if standards other than Residential are to be considered for recreational areas as outlined in your letter, the burden of proof is on the Navy. That is, it must be reasonably proven to the Department that whatever restrictions and institutional controls are in place are protective under all applicable exposure scenarios given the standard applied.

Standards other than residential will only be considered by the Department if it can be proven that by placing an institutional control on a property, and ensuring its proper implementation and conducting the applicable reporting requirements, the applicable standard it is protective under a recreational scenario. Such a course of action would also only be considered by the Department if, as with all remedial actions, RIDEM has the authority to take enforcement actions or require additional investigation and/or remedial activities if the restrictions are not maintained or the use of the property changes.

In regards to RIDEM's regulatory role and our authority on military bases to either ensure that a restriction is maintained and/or take enforcement action if it is not, the Department has not received a satisfactory response in writing to date. Please be advised that the Department will be very reluctant to enter into restrictions on properties until assurances are given by the Navy that we have the authority to ensure that such restrictions are maintained. The Department is amenable to various avenues to address this issue including clearly outlining our regulatory authority with respect to restrictions or institutional controls through a Memorandum of Understating or modifying the Federal Facilities Agreement, if applicable.

We look forward to your response. If you have any questions please contact Paul Kulpa at (401) 222-2797, extension 7111, or myself at extension 7141.

Sincerely,

Matthew D. DeStefano
Supervising Engineer
Office of Waste Management

cc: Leo Hellested, DEM OWM
Paul Kulpa, DEM OWM
Richard Gottlieb, DEM OWM
Cornelia Mueller, NSN
Brian Olsen, EPA Region I
Kymberlee Keckler, EPA Region I

ATTACHMENT 3

PAGE 82 (RESIDENTIAL DEFAULT INPUT PARAMETERS)
FROM RIDEM REMEDIATION REGULATIONS
(DEM-DSR-01-93; FEBRUARY 2004)

State of Rhode Island and Providence Plantations

Department of Environmental Management

Office of Waste Management

AS AMENDED

August 1996
February 2004

Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases

Short Title: Remediation Regulations

DEM-DSR-01-93

$$C = \left(\frac{TDHA \; x \; IR_{at\text{-}w}}{IR_{at\text{-}s} \; x \; CF_{AT}} \right)$$

RESIDENTIAL DEFAULT INPUT PARAMETERS			
ORAL INGESTION			
TERM	**DESCRIPTION**	**UNITS**	**VALUE**
C	Concentration Of Contaminant In Soil	mg/kg	Calculated
CPSo	Carcinogenic Potency Slope Factor (Oral)	$(mg/kg/d)^{-1}$	Chemical Specific
RfDo	Reference Dose (Oral)	mg/kg/d	Chemical Specific
RISK	Target Cancer Risk Level	Dimensionless	1 E-06
HI	Hazard Index	Dimensionless	1.0
BW_a	Body Weight (Adult)	kg	70
BW_c	Body Weight (Child Ages 1-6)	kg	15
AT	Averaging Time (Carcinogens)	yr	70
AT_c	Averaging Time (Child Ages 1-6)	yr	6
IRS_a	Soil Ingestion (Adult)	mg/d	100
IRS_c	Soil Ingestion (Child Ages 1-6)	mg/d	200
CF	Conversion Factor	mg-d/kg-yr	3.65 E08*
EF	Exposure Frequency	d/yr	350
ED_a	Exposure Duration (Adult)	yr	24
ED_c	Exposure Duration (Child Ages 1-6)	yr	6
ORAL ACUTE TOXICITY			

ATTACHMENT 4

QUITCLAIM DEED DATED OCTOBER 14, 1998

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
200 STOVALL STREET
ALEXANDRIA, VA 22332-2300

IN REPLY REFER TO
31 December 1997

From: Commander, Naval Facilities Engineering Command
To: Commanding Officer, Northern Division, Naval Facilities Engineering Command

Subj: INTERAGENCY ASSIGNMENT OF NAVY BASE CLOSURE PROPERTY AT THE FORMER NAVAL CONSTRUCTION BATTALION CENTER, DAVISVILLE, RHODE ISLAND, TO THE DEPARTMENT OF TRANSPORTATION'S MARITIME ADMINISTRATION

Encl: (1) ASN(I&E) memo of December 30, 1997

1. The Assistant Secretary of the Navy (Installations and Environment) has approved the assignment of approximately 259 acres of land, more or less, and certain personal property at the former Naval Construction Battalion Center, Davisville, Rhode Island, to the Department of Transportation's Maritime Administration for subsequent conveyance to the Rhode Island Economic Development Corporation for use as a port. You are delegated to complete the assignment to the Maritime Administration upon completion of the applicable Finding(s) of Suitability to Transfer. This conveyance will be a public benefit conveyance with a 100% public benefit allowance. Enclosure (1) is forwarded for your continuing action.

JOHN J. KANE
By direction

DEPARTMENT OF THE NAVY
THE ASSISTANT SECRETARY OF THE NAVY
(INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON, D.C. 20350-1000

December 30, 1997

MEMORANDUM FOR COMMANDER, NAVAL FACILITIES ENGINEERING COMMAND

Subj: INTERAGENCY ASSIGNMENT OF NAVY BASE CLOSURE PROPERTY AT THE FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE, RHODE ISLAND, TO THE DEPARTMENT OF TRANSPORTATION'S MARITIME ADMINISTRATION

Ref: (a) COMNAVFACENGCOM memo of December 30, 1997

In accordance with reference (a) and pursuant to the authority vested in the Secretary of Defense by the provisions of 40 U.S.C. § 484(q), and a delegation of that authority to the Secretary of the Navy, I have approved the assignment of approximately 259 acres of improved land and certain personal property at the former Naval Construction Battalion Center Davisville, Rhode Island, to the Department of Transportation's Maritime Administration for subsequent conveyance to the Rhode Island Economic Development Corporation for use as a port. This transfer is for a public benefit allowance of 100%. You or your designee are hereby authorized to complete this assignment to the Maritime Administration upon completion of the applicable Finding(s) of Suitability to Transfer.

ROBERT B. PIRIE, JR.

PORT FACILITY PROPERTY INSTRUMENT OF DISPOSAL
QUITCLAIM DEED, INDENTURE, or otherwise
as necessary to meet local requirement

CITY OF WASHINGTON)
)
DISTRICT OF COLUMBIA)

1. THIS INDENTURE, made this the 14th day of October 1998 between the UNITED STATES OF AMERICA, acting by and through the Secretary of Transportation, as delegated to the Maritime Administrator, Maritime Administration (herein called the "Grantor"), under and pursuant to the power and authority provided by the National Defense Authorization Act for Fiscal Year 1994 (P.L. 103-160) at Section 2927 dated November 30, 1993, the Federal Property and Administrative Services Act of 1949 (40 U.S.C. 471-544) (Act) at 40 U.S.C. 484q, the Federal Property Management Regulations Title 41, Code of Federal Regulations (CFR) Part 101-47.308-10, the Utilization and Disposal of Surplus Federal Real Property for Development or Operation of a Port Facility Regulation Title 46 CFR Part 387, and the Rhode Island Economic Development Corporation (herein called the "Grantee").

2. WITNESSETH, that the said Grantor, for and in consideration of the assumption by the Grantee of all the obligations and its taking subject to certain terms, reservations, restrictions and conditions and its agreement to abide by, certain other terms, reservations, restrictions and conditions, all as set out hereinafter, has remised, granted, released and forever quitclaimed and by these presents does remise, grant, release and forever quitclaim to the Grantee, without warranty, express or implied, under and subject to the terms, reservations, restrictions, conditions and exceptions, all as hereinafter expressed and set out, all title and claim which the Grantor has in and to that certain property, comprising 96 acres of land, more or less, together with all improvements thereon, situate, lying and being in Town of North Kingstown, County of Washington, State of Rhode Island and Providence Plantations, being a portion of the formerly known Naval Construction Battalion Center (NCBC Davisville), Davisville, RI, and described in detail in Attachment A hereof, for the use stated therein.

3. ALSO, there is hereby conveyed by this quitclaim deed (Deed) items of personal property for port facility purposes situated at the property as described in Attachment A hereof and such personal property is likewise described in detail in Attachment B hereof, and conveyed for the use stated therein.

4. WHEREAS, all the property hereby conveyed has heretofore been declared surplus to the needs of the UNITED STATES OF AMERICA ("Government"), the property was excessed by the Department of the Navy and is presently available for disposal and its disposal has been heretofore authorized by the Department of the

Navy, acting pursuant to the Act, the Federal Property Management Regulations 41 CFR Part 101-47 and authority delegated to the Secretary of Defense under Public Law 101-510 and redelegated to the Secretary of the Navy.

5. WHEREAS, the surplus real property shall be used and maintained in perpetuity for the purpose for which it was conveyed, and that if the property ceases to be used or maintained for that purpose, all or any portion of the property shall, in its then existing condition, at the option of the Government, revert to the General Services Administration.

6. TO HAVE AND TO HOLD the same on an "as is where is" basis, together with all and singular the appurtenances thereunto belonging or in anyway appertaining, and all the title or claim whatsoever of the Grantor, either in law or in equity and subject to the terms, reservations, restrictions and conditions set forth in this instrument, to the only proper use, benefit and behalf of the Grantee.

7. NOW THEREFORE, by the acceptance of this Deed or any rights hereunder, the Grantee, agrees that the conveyance of all the property conveyed by this instrument, is accepted subject to the following terms, reservations, restrictions and conditions set forth in subparagraph (a) and (b) of this paragraph which shall run with the land in addition to further terms, reservations, restrictions and conditions as set forth elsewhere in the Deed:

(a) That, except as provided in subparagraph (A) of numbered paragraph 8, the property conveyed by this instrument shall be used for development or operation of a port facility in perpetuity. As used in this instrument, the term "Port Facility" shall mean any structure and improved property, including services connected therewith whether located on waterfront or inland, which is used, or intended for use, in developing, transferring or assisting maritime commerce and water dependent industries, including, but not limited to, terminal and warehouse buildings, piers, wharves, yards, docks, berths, dry and cold storage spaces, bulk and liquid storage terminals, tank farms, aprons, cranes and equipment used to load and discharge cargo and passengers from vessels, multimodal transfer terminals, transshipment and receiving stations, marinas, foreign trade zones, shipyards, industrial property, fishing and aquaculture structures, mixed use waterfront complexes, connecting channels, port landside transportation access routes.

(b) That, except as provided in subparagraph (A) of the numbered paragraph 8, the entire Port Facility including all structures, improvements, facilities and equipment in which this instrument conveys any interest shall be maintained at all times in safe and serviceable condition, to assure its efficient operation and use, provided, however, that such maintenance shall be required as to structures, improvements, facilities and

equipment only during the useful life thereof, as determined by the Grantor or his successor in function.

8. FURTHER, by the acceptance of this Deed or any rights hereunder, the Grantee, also assumes the obligation of, agrees to abide by, and this conveyance is made subject to, the following terms, reservations, restrictions and conditions set forth in subparagraphs (A) to (CC), inclusive, of this paragraph:

A. That no property conveyed by this Deed shall be mortgaged or otherwise disposed of or rights or interest granted by the Grantee without the written consent of the Grantor. However, the Grantor will only review leases of five years or more to determine the interest granted therein. Further, if Grantee has requested Grantor's approval in writing and furnished to Grantor therewith a copy or any written lease or agreement for use of the property, or any portion thereof, for a term of five years or more, and Grantor has not either given its written approval or disapproval within sixty (60) days of receipt of the Grantee's request, approval of the request will be deemed to have been given.

B. Property conveyed for a Port Facility shall be used and maintained for the use and benefit of the public on fair and reasonable terms, without discrimination. In furtherance of this term (but without limiting its general applicability and effect) the Grantee specifically agrees (1) that it shall keep the Port Facility open to the maritime uses expressed in the application without discrimination between such types and kinds. Provided, that the Grantee may establish such fair, equal, and nondiscriminatory conditions to be met by all users of the Port Facilities as may be necessary for the safe and efficient operation of the Port Facility; and provided, further, that the Grantee may prohibit or limit any given type and kind of maritime use of the Port Facility if such action is necessary for the safe operation of the Port Facility, (2) that in its operation and the operation of port facilities at the port, neither it nor any person or organization occupying space or facilities thereupon shall discriminate against any person or class of persons by reason of race, color, creed, sex, age, marital status, political affiliation or non-affiliation, national origin, religion, handicap or sexual orientation in the use of any of the facilities provided for the public at the port, and (3) that in any agreement, contract, lease, or other arrangement under which a right or privilege at the port is granted to any person, firm or corporation to conduct or engage in any maritime activity for furnishing services to the public at the port, the Grantee shall insert and enforce provisions requiring the contractor: (a) to furnish said service on a fair, equal and nondiscriminatory basis to all users thereof, and (b) to charge fair, reasonable, and nondiscriminatory prices for each unit for service, provided, that the contractor may be allowed to make reasonable and nondiscriminatory discounts, rebates, or other similar types of price reductions to volume purchasers.

C. The Grantee shall, insofar as it is within its powers and to the extent reasonable, adequately protect the water and land access to the Port Facility. The Grantee shall, either by the acquisition and retention of easement or other interest in or rights for the use of land or by adoption and enforcement of zoning regulations, prevent the construction, erection or alteration of any structure in the access routes to and from the Port Facility.

D. The Grantee shall operate and maintain in a safe and serviceable condition, as deemed reasonably necessary by Grantor, the port and all facilities thereon and connected therewith which are necessary to service the maritime users of the Port Facility and shall not permit any activity thereon which would interfere with its use as a Port Facility.

E. The Grantee does hereby release the Government, and shall take whatever action may be required by the Grantor to assure the complete release of the Government from any and all liability the Government may be under for restoration or other damage under a deed or other agreement covering the use by the Grantee or its lessees, upon which, adjacent to which, or in connection with which, any property transferred by this instrument was located or used.

F. The Port Facility is subject to the provisions of Title 46 CFR Part 340.

G. The Grantee shall: (1) furnish the Grantor with annual or special Port Facility financial and operational reports as requested, (2) furnish the Grantor with an annual utilization report that demonstrates that the Port Facility is being used in accordance with the terms and conditions of the Deed, and (3) upon reasonable request of the Grantor, make available for inspection by any duly authorized representative of the Grantor the Port Facility, at which the property described herein is located, and all Port Facility records and documents affecting the port, including deeds, leases, operation and use agreements, regulations, and other instruments and shall furnish to the Grantor a true copy of any such document.

H. Where construction or major renovation is not required or proposed, the Port Facility shall be placed into use within twelve (12) months from the date of this conveyance. Where construction or major renovation is contemplated at the time of conveyance, the property shall be placed in service according to the redevelopment time table approved by the Grantor in the Port Facility Redevelopment Plan (PFRP) section of the Grantee's application.

I. The Grantee shall not enter into any transaction which would operate to deprive it of any of the rights and powers necessary to perform or comply with any or all of the terms, reservations, restrictions and conditions set forth herein, if an arrangement is made for management or operation of the Port Facility by any agency or

person other than the Grantee, it shall reserve sufficient rights and authority to ensure that such Port Facility shall be operated and maintained in accordance with these terms, reservations, restrictions and conditions.

J. The Grantee shall keep up to date at all times a Port Facility layout map of the property described herein showing: (a) the boundaries of the Port Facility and all proposed additions thereto, and (b) the location of all existing and proposed port facilities and structures, including all proposed extensions and reductions of existing port facilities.

K. In the event that any of the aforesaid terms, reservations, restrictions and conditions are not met, observed, or complied with by the Grantee, whether caused by the legal inability of said Grantee to perform any of the obligations herein set out, or otherwise, the title, right of possession and all other rights conveyed by this Deed to the Grantee, or any portion thereof, shall at the option of the Grantor revert to the Government in its then existing condition sixty (60) days following the date upon which demand to this effect is made in writing by Grantor or his successor in function, unless within said sixty (60) days such default or violation shall have been cured and all such terms, reservations, restrictions and conditions shall have been met, observed, or complied with, or if such cure cannot be reasonably accomplished within 60 days, Grantee within 60 days commences the cure and diligently prosecutes it to completion, in which event said reversion shall not occur and title, right of possession, and all other rights conveyed hereby, except such, if any, as shall have previously reverted, shall remain vested in the Grantee.

L. If the construction of any of the foregoing terms, reservations, restrictions and conditions recited herein as provisions or the application of the same as provisions in any particular instance is held invalid, the particular term, reservation, restriction or condition in question shall be construed instead merely as conditions upon the breach of which the Grantor may exercise its option to cause the title, interest, right of possession, and all other rights conveyed to the Grantee, or any portion thereof, to revert to it, and the application of such term, reservation, restrictions or condition as provision in any other instance and the construction of the remainder of such terms, reservations, restrictions and conditions as provisions shall not be affected thereby.

M. The Grantee shall remain at all times a State, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the Virgin Islands, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, or any political subdivision, municipality, or instrumentality thereof.

N. The Grantee shall comply at all times with all applicable provisions of law, including, but not limited to, the Water Resources Development Act of 1990.

O. The Grantee shall not modify, amend or otherwise change its approved PFRP without the prior written consent of Grantor and shall implement the PFRP as approved by the Grantor.

P. The Government, under Section 120 (h)(3) of the Comprehensive, Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), warrants that: (1) all remedial action necessary to protect human health and the environment with respect to any hazardous substance on the property has been taken and (2) any additional remedial action found to be necessary after the date of the conveyance shall be conducted by the Government, consistent with statutory obligations. This covenant and warrant does not include asbestos and lead based paints. See Attachments C (Finding of Suitability to Transfer), D (Environmental Baseline Survey to Transfer), and E (Final Basewide Environmental Baseline Survey. A Memorandum of Agreement between the Departments of Education, Health and Human Services, Interior and Transportation and the Department of Defense and the Departments of the Army, Navy and Air Force delineates responsibilities for environmental obligations for the property. See Attachment F.

Q. The Government reserves the right of access to any and all portions of the herein described land for purposes of environmental investigation, remediation or other corrective action. This reservation includes right of access to and use of, to the extent permitted by law, available utilities at reasonable cost to the Government. These rights shall be exercisable in any case in which a remedial action, response action or corrective action is found to be necessary after the date of conveyance of herein described land, or such access is necessary to carry out a remediation action, response action or corrective action on adjoining property. Pursuant to this reservation, the United States, (including but not limited to United States Environmental Protection Agency (EPA), Region 1), and the State of Rhode Island and their respective officers, agents, employees, contractors and subcontractors shall have a right, upon reasonable notice to Grantee or the then owner and any authorized occupant of the property, to enter upon the herein described tracts of land and conduct investigations and surveys, to include drilling, testpitting, borings, data and record compilation and other activities related to environmental investigation, and to carry out remedial or removal actions as required or necessary under applicable authorities, including but not limited to monitoring wells, pumping wells, and treatment facilities. The Grantee shall notify the Navy, in writing, if a well, for any purpose is installed within Parcel 8 until all action on NCBC Davisville Site 3 is completed and the site is closed under CERCLA.

R. The Grantee agrees that in the event, the Grantor exercises its option to revert all right, title, and interest in and to any portion of the property to the General Services Administration, or Grantee voluntarily returns title to the property in lieu of a reverter, then the Grantee shall provide protection to, and maintenance of the property

at all times until such time as the title is actually reverted or returned to and accepted by the General Services Administration. Such protection and maintenance shall, at a minimum, conform to the standards prescribed in 41 CFR Part 101-47.4913 in effect as of the date of the conveyance.

S. Grantor expressly reserves from this conveyance all mineral rights including, but not limited to, oil, gas and coal. The listing of these minerals does not limit the kinds of minerals subject to the reservation.

T. The Government reserves all right, title, and interest in and to all property of whatsoever nature not specifically conveyed, together with right of removal thereof from the Port Facility within one (1) year from the date of the Deed. During such period, the Government, its agents, customers, transferees, and successors shall have the right of ingress to and egress from the Port Facility for the purposes of using, disposing of by sale or otherwise, and removing such property.

U. Preservation Covenant for Historic Property. Deleted.

V. Lead-Based Paint and Polychlorinated Biphenyls (PCBs) Conditions.

(1) Prior to use of any property on the Port Facility by children under seven (7) years of age, the Grantee shall remove all lead-based paint hazards and all potential lead-based paint hazards from the property in accordance with all Federal, State and local lead-based paint laws and regulations.

(2) The Grantee agrees to indemnify the Government to the extent allowable under applicable law from any liability arising by reason of the Grantee's failure to perform the Grantee's obligations hereunder with respect to the elimination of immediate lead-based paint health hazards, the prohibition against the use of lead-paint, and the Grantee's responsibility for complying with applicable Federal, State and local lead-based paint laws and regulations. See Attachment E.

(3) The facilities may contain PCB light ballasts. The Grantee agrees to indemnify the Government to the extent allowable under applicable law from any liability arising by reason of the Grantee's failure to perform the Grantee's obligation hereunder with respect to the elimination of any PCB health hazards, and the Grantee's responsibility for complying with applicable Federal. State and local PCB laws and regulations.

W. Presence of Asbestos.

The Port Facility may be improved with buildings and facilities and equipment that may contain asbestos-containing materials. The Final Environmental Summary Document

prepared by ERM-West, Inc. discloses the condition and location of any known asbestos-containing materials. See Attachment C. WARNING!

(1) The Grantee is warned that the Port Facility contains asbestos-containing materials. Unprotected or unregulated exposure to asbestos in product manufacturing, shipyard, and building construction workplaces have been associated with asbestos-related diseases. Both the Occupational Safety and Health Administration (OSHA) and EPA regulate asbestos because the potential hazards associated with exposure to airborne asbestos fibers. Both OSHA and EPA have determined that such exposure increases the risk of asbestos-related diseases, which include certain cancers and which can result in disability or death.

(2) The Grantee is invited, urged, and cautioned to inspect the Port Facility prior to entering into this Deed. More particularly, the Grantee is invited, urged, and cautioned to inspect the Port Facility as to its asbestos content and condition and any hazardous or environmental conditions relating thereto. The Government shall assist the Grantee in obtaining any authorization(s) which may be required in order to carry out any such inspection(s). The Grantee shall be deemed to have relied solely on its own judgement in assessing the overall condition of all or any portion of the Port Facility, including without limitation, any asbestos hazards or concerns.

(3) No warranties, either express or implied, are given with regard to the condition of the Port Facility including, without limitation, whether the Port Facility does or does not contain asbestos or is or is not safe for a particular purpose. The failure of the Grantee to inspect or to be fully informed as to the condition of all or any portion of the Port Facility shall not constitute grounds for any claim or demand for adjustment or withdrawal by the Grantee from the agreement formed by the execution of any Deed(s).

(4) The description of the Port Facility set forth in the Application and any other information provided therein with respect to the Port Facility is based on the best information available to the Department of the Navy and is believed to be correct, but an error or omission, including but not limited to the omission of any information available to the Department of the Navy or any other Federal agency, shall not constitute grounds or reason for non-performance of the agreement formed by the execution of the Deed(s) or any claim by the Grantee against the Government including, without limitation, any claim for allowance, refund, deduction, or payment of any kind.

(5) The Government assumes no liability for damages for personal injury, illness, disability, or death to the Grantee or to the Grantee's successors, assigns, employees, invitees, or any other person subject to the Grantee's control or direction or to any other person, including members of the general public, arising from or incident to the purchase, transportation, removal, handling, use, disposition, or other activity

causing or leading to contact of any kind whatsoever with asbestos on the Port Facility, whether the Grantee, has or have properly warned or failed to properly warn the individuals(s) injured.

(6) The Grantee further agrees that in its use and occupancy of the Port Facility it shall comply with all Federal, state, and local laws relating to asbestos. See Attachment E.

X. Protection of Wetlands. Certain portions of the Port Facility are jurisdictional "wetlands," as determined by the New England District of the Army Corps of Engineers. All construction on those portions of the Port Facility shall comply with Department of the Army WETLAND CONSTRUCTION RESTRICTIONS contained in Title 33, Code of Federal Regulations, Sections 320 through 330, as amended, and any other applicable Federal, State, or local wetlands regulations.

Y. Based upon coordination between the Department of the Navy and the Federal Aviation Administration (FAA) as recommended in House Report Number 95-1053, entitled "FAA Determination of 'No Hazard' for Structures Near Airports," it has been determined that the only public airports within six nautical miles of the property are Newport State Airport, Quonset State Airport, and T.F. Green State Airport. FAA has been appraised of the proposed disposal of the property, and that the Government's conveyance document will contain a provision that the Grantee, its successors and assigns and every successor in interest to the property herein described, or any part thereof, must prohibit any construction or alteration on the property unless a determination of no hazard to air navigation is issued by FAA in accordance with 14 CFR Part 77, "Objects Affecting Navigable Airspace," or under the authority of the Federal Aviation Act of 1958, as amended.

Z. The Grantee agrees to maintain, indemnify and hold harmless the Grantor and the Government from any and all claims, demands, costs or judgements for damages to persons or property that may arise from the use of the property by the Grantee, guests, employees, lessees.

AA. The Grantor on written request from the Grantee may grant release from any of the terms, reservations, restrictions and conditions contained in the deed, or the Grantor may release the Grantee from any terms, restrictions, reservations or conditions if the Grantor determines that the property so conveyed no longer serves the purpose for which it was conveyed.

BB. The Grantor shall make reforms, corrections or amendments to the deed if necessary to correct such deed or to conform such deed to the requirements of applicable law.

CC. The Quonset-Davisville Access and Services Agreement is incorporated as Attachment G.

IN WITNESS WHEREOF, the Grantor and Grantee have caused this to be executed on the 14th day of ~~August~~ OCTOBER 1998.

UNITED STATES OF AMERICA
SECRETARY OF TRANSPORTATION

By: MARITIME ADMINISTRATOR

(Seal)

By: Gal C. Richard
Secretary
Maritime Administration

Attest:

By: Sarah J. Washington
Title: Asst. Secretary

CITY OF WASHINGTON)
) ss:
DISTRICT OF COLUMBIA)

I, the undersigned, a Notary Public in and for the District of Columbia, do hereby certify that Gal C. Richard, officially known to me as Secretary, Maritime Administration, U.S. Department of Transportation, United States of America, personally appeared before me in said District, and executed as Grantor the foregoing Quitclaim Deed, and acknowledged the same to be his/her free act and deed in such official capacity.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this 14th day of ~~August~~ October 1998.

{SEAL}

Jeannette D. Steel
NOTARY PUBLIC

My Commission expires: 1/31/99

[illegible] Board
[illegible] for the District of Columbia
[illegible] Expires January 31, 1999

ACCEPTANCE

The Rhode Island Economic Development Corporation does hereby accept this and by such acceptance agrees to all of the terms and condition thereof.

Executed this 25 day of ~~August~~ September 1998.

Rhode Island Economic Development Corporation, as Grantee

(Seal)

By: John Swan

Attest:

Title: Executive Director

By: Robert I. Stolzman

Title: Secretary

I, Robert I. Stolzman, acting as attorney for the Rhode Island Economic Development Corporation herein referred to as the "Grantee," do hereby certify: That I have examined the foregoing and the proceedings taken by the Grantee relating thereto, and find that the acceptance thereof by the Grantee has been duly authorized and that the execution thereof is in all respects due and proper and in accordance with the laws of the State of Rhode Island, and further that, in my opinion, the Quitclaim Deed constitutes a legal and binding compliance obligation of the Grantee in accordance with the terms thereof.

Dated at Providence RI this 25 day of ~~August~~ September 1998.

By: Robert I. Stolzman

Title: Atty for RIEDC

PORT FACILITY PROPERTY INSTRUMENT OF DISPOSAL
Attachment A

As specified on Page 1, in numbered paragraph 2, of the foregoing dated ~~August~~ October 14, 1998, this is Attachment A.

The following real property (Parcel No. 8) is hereby conveyed for Port Facility use, which property has been determined essential, suitable, desirable or reasonably necessary to fulfill the immediate and foreseeable requirements of the Grantee for the development, improvement, operation or maintenance of a Port Facility.

That certain parcel or tract of land together with all improvements thereon situated in the Town of Noth Kingstown, County of Washington, State of Rhode Island and Providence Plantations, and being bounded and described as follows:

Beginning at a Point in the Northwesterly Corner of this Parcel, Said Point having State of Rhode Island Plane Coordinates (1969 Adjustment) of 193,685.847 N and 521,450.264 E:

Thence Bearing North Seventy Eight Degrees Fifty Two Minutes Twenty Seven Seconds East (N-78deg-52'-27"-E) a Distance of One Thousand Eighty Five and Forty Eight Hundredths Feet (1,085.48') to a Point;

Thence Bearing North Seventy Seven Degrees Fifty Nine Minutes Thirty Three Seconds East (N-77deg-59'-33"-E) a Distance of One Hundred Thirty Nine and Ninety Six Hundredths Feet (139.96') to a Point;

Thence Bearing North Seventy Degrees Eighteen Minutes Twenty Eight Seconds East (N-70deg-18'-28"-E) a Distance of Two Hundred Eighteen and Sixty One Hundredths Feet (218.61') to a Point;

Thence Bearing South Thirty Two Degrees Twenty Six Minutes Thirty Seconds East (S-32deg-26'-30"-E) a Distance of Two Hundred Forty One and Twenty Six Hundredths Feet (241.26') to a Point;

Thence Bearing North Seventy Four Degrees Forty Six Minutes Forty Two Seconds East (N-74deg-46'-42"-E) a Distance of Two Hundred Thirty Eight and Eighty Six Hundredths Feet (238.86') to a Point;

Thence Bearing South Eighty Seven Degrees Thirty Six Minutes Fifty One Seconds East (S-87deg-36'-51"-E) a Distance of Two Hundred Forty Eight and Eight Six Hundredths Feet (248.86') to a Point;

Thence Bearing South Sixty Eight Degrees Fifty Seven Minutes Fifty Five Seconds East (S-68deg-57'-55'-E) a Distance of Two Hundred Seventy and Forty Eight Hundredths Feet (270.48') to a Point;

Thence Bearing South Sixty Degrees Thirty One Minutes Twenty Three Seconds East (S-60deg-31'-23"-E) a Distance of One Thousand Three Hundred Fifty Five and Ninety Hundredths Feet (1,355.90') to a Point in the Face of a Bulkhead;

Thence Bearing South Twenty Nine Degrees Twenty Five Minutes Thirty Three Seconds West (S-29deg-25'-33"-W) and Following the Face of the Aforesaid Bulkhead a Distance of One Thousand Ninety Two and Ninety Four Hundredths Feet (1,092.94') to the Mean High Water Line of Narragansett Bay;

Thence Bearing South Twenty Nine Degrees Twenty Five Minutes Thirty Three Seconds West (S-29deg-25'-33"-W) and Following the Face of the Aforesaid Bulkhead a Distance of One Thousand Ninety Two and Ninety Four Hundredths Feet (1,092.94') to the Mean High Water Line of Narragansett Bay;

Thence Bearing Northwesterly, Westerly, and Southwesterly, and Following the Mean High Water Line of Narragansett Bay a Distance of Six Hundred Forty Two Feet, More or Less (642'+-) to a Point;

Thence Bearing North Sixty Degrees Twenty Eight Minutes Thirty Nine Seconds West (N-60deg-28'-39"-W) a Distance of Three Hundred Ninety Three Feet, More or Less, (393'+-) from the Mean High Water Line of Narragansett Bay to a Point;

Thence Bearing South Sixty Eight Degrees Fifty Five Minutes Twenty Four Seconds West (S-68deg-55'-24"-W) a Distance of Four Hundred Fifty Eight and Forty Five Hunddredths Feet (458.45') to a Point;

Thence Bearing North Sixty Degrees Thirty One Minutes Seven Seconds West (N-60deg-31'-07"-W) a Distance of One Thousand Five Hundred Seventy Two and Zero Hundredths Feet (1,572.00') to a Point;

Thence Bearing North Eighty One Degrees Nineteen Minutes Forty Six Seconds West (N-81deg-19'-46"-W) a Distance of Sixty Five and Forty Five Hundredths Feet (65.45') to a Point;

Thence Bearing South Sixty Seven Degrees Five Minutes Thirty Six Seconds West (S-67deg-05'-36"-W) a Distance of Eighty Three and Twenty One Hundredths Feet (83.21') to a Point;

Thence Bearing South Forty Six Degrees Thirty Seven Minutes Thirty Five Seconds West (S-46deg-37'-35"-W) a Distance of Twenty Six and Twenty Four Hundredths Feet (26.24') to a Point;

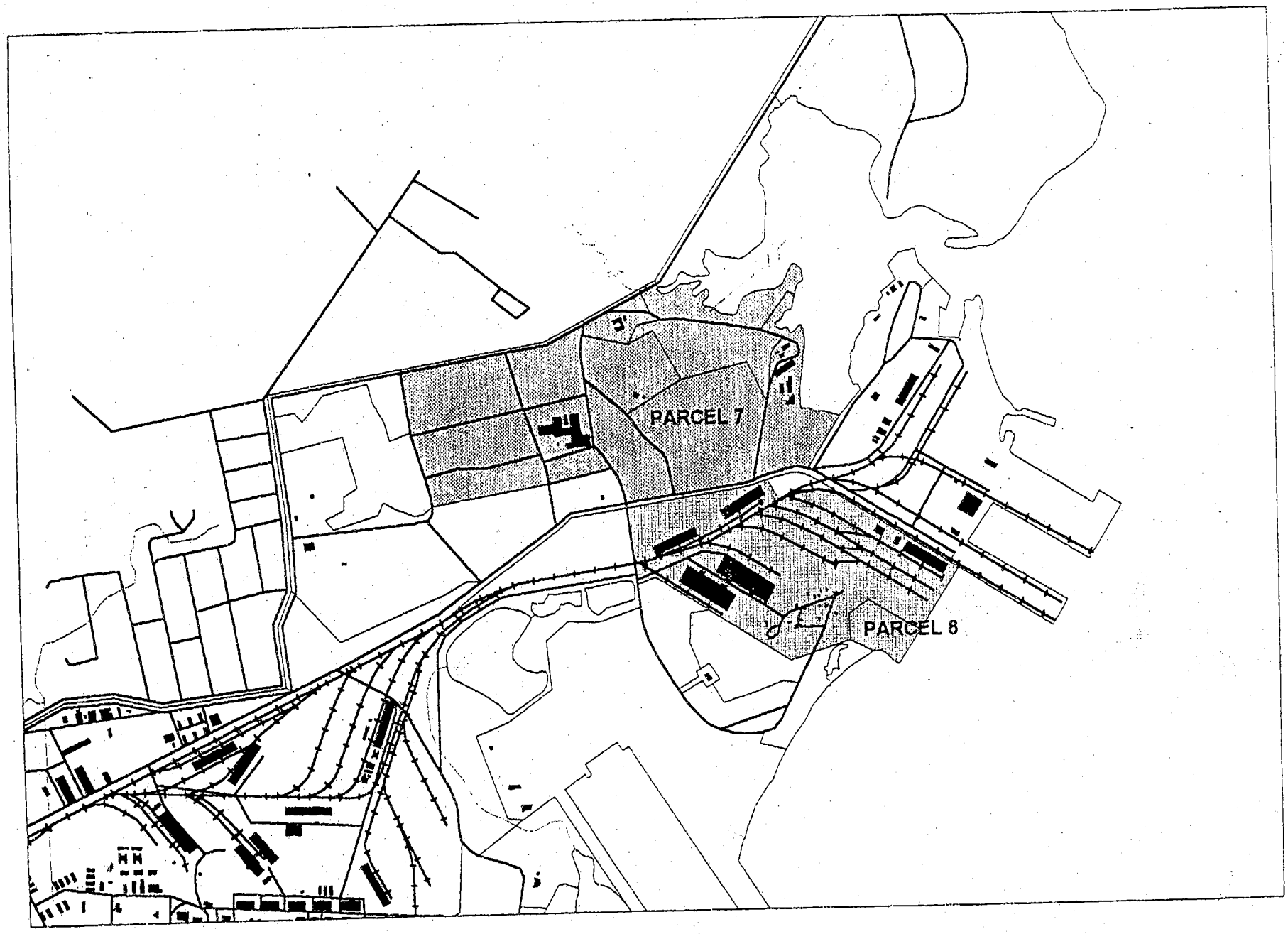
Thence Bearing North Four Degrees Thirty Eight Minutes Thirty Eight Seconds West (N-04deg-38'-38"-W) a Distance of One Hundred Thirty Seven and Seventy Two Hundredths Feet (137.72') to a Point;

Thence Bearing North Four Degrees Thirty Six Minutes Forty Seconds West (N-04deg-36'-40"-W) a Distance of Six Hundred Fifty Four and Sixty Hundredths Feet (654.60') to the Point and Place of Beginning.

The above Described Parcel Being Bounded Westerly and Northerly by Land of the United States of America; Easterly by Waters of Narragansett Bay ; Southerly in Part by Land of the United States of America, and in Part by Waters of Narragansett Bay; and Containing Ninety Six (96) acres, More or Less.

TOGETHER WITH all rights of way, in common with others, of access to and egress from said parcel and the right to have the use, in common with others, of utilities and appurtenant rights of way for the enjoyment of said parcel by the Grantee, and subject to that document known as the Quonset-Davisville Access and Services Agreement (the "Agreement") dated September 11, 1980 between the United States of America and the Rhode Island Port Authority and Economic Development Corporation, and recorded in Book 348, Page 289 of the Records of Land Evidence for the Town of North Kingstown on September 12, 1980, which Agreement is incorporated herein by reference.

FURTHER, TOGETHER WITH all riparian and littoral rights appurtenant to said parcel.


PARCEL 7
PARCEL 8

For the Personal Property Description Attachment, contact EFANE.

The Finding of Suitability for Transfer (FOST) is not included. To view the FOST, return to the document index and select the document.

The Environmental Baseline Survey (EBS) is not included. To view the EBS, return to the document index and select the document.

MEMORANDUM OF AGREEMENT

BETWEEN

THE DEPARTMENT OF EDUCATION

THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

THE DEPARTMENT OF THE INTERIOR

THE DEPARTMENT OF TRANSPORTATION

AND

THE DEPARTMENT OF DEFENSE

THE DEPARTMENT OF THE ARMY

THE DEPARTMENT OF THE NAVY

THE DEPARTMENT OF THE AIR FORCE

THIS AGREEMENT is made between the Departments of Education, Health and Human Services, Interior, and Transportation (hereinafter collectively referred to as the "Sponsoring Federal Agencies"), and the Department of Defense (hereinafter "DoD") and the Departments of the Army, Navy, and the Air Force (hereinafter collectively referred to as the "Military Departments").

WITNESSETH, THAT:

WHEREAS, Sponsoring Federal Agencies will evaluate and approve or disapprove an application from a Public Benefit Recipient for certain real property (the "Property") on a military installation, and in so doing will rely upon the Military Department's assessment of the condition of the Property in relation to the specific requirements of the Public Benefit Recipient's approved program, as described in the application; and

WHEREAS, a Sponsoring Federal Agency, acting as a conduit through which title will ultimately pass from the United States to the Public Benefit Recipient, will request assignment of the Property under the authority provided by the Federal Property and Administrative Services Act of 1949, 40 U.S.C. § 484(k), as amended, and regulations promulgated thereunder; and

PORT F, LITY PROPERTY INSTRUMENT OF D)SAL
Attachment G

MODIFICATION NO. 1 TO
QUONSET - DAVISVILLE ACCESS AND SERVICES AGREEMENT

This MODIFICATION NO. 1, entered into this 17th day of September 1996, by and between the UNITED STATES OF AMERICA, acting, by and through the DEPARTMENT OF THE NAVY and under the delegated authority of the GENERAL SERVICES ADMINISTRATION (the "United States"), and the RHODE ISLAND ECONOMIC DEVELOPMENT CORPORATION ("RIEDC"), successor in name to the RHODE ISLAND PORT AUTHORITY AND ECONOMIC DEVELOPMENT CORPORATION, a governmental agency and public instrumentality of the State of Rhode Island,

WITNESSETH

WHEREAS, on September 11, 1980, the United States and RIEDC entered into the Quonset-Davisville Access and Services Agreement (the "Agreement") which provided for the benefit of the real estate of each party thereto for (a) access by road and railroad and, (b) certain utility services then presently available, and;

WHEREAS, by numbered paragraph 2 of the Agreement, the parties hereto have certain rights, in common with all others entitled thereto (a) to pass and repass with railway equipment over railroad tracks then laid out at the Quonset Point Naval Air Station or Davisville Naval Construction Battalion Center, together with the right to maintain, repair, and replace such tracks; and (b) to discontinue or close off all or any portion of any railway track on its property or alter the location thereof, provided it shall first obtain the written approval of all other

parties thereto, and;

WHEREAS, the RIEDC desires to modify the Agreement to provide for the extension of existing railroad track within the Affected Areas described in said Agreement from and to the respective Affected Areas owned by the parties hereto, and;

WHEREAS, the United States of America is agreeable thereto,

NOW, THEREFORE, the United States and the RIEDC, in consideration of the mutual undertakings, covenants and agreements contained herein and for other valuable consideration, hereby covenant and agree as follows:

A. Modify the Agreement as follows:

Page 5, numbered Paragraph 2 - Delete the second sentence of this paragraph and replace it with the following new second sentence:

"Any party may discontinue or close off all or any portion of any railway track on its property, or alter the location thereof, or may extend any portion of said railway track to the property of any party hereto, provided it shall first obtain the approval of all other parties hereto, which approval will not be unreasonably witheld or delayed."

B. The parties hereto acknowledge that the Affected Areas owned by the United States of America are subject to the Federal Facility Agreement (FFA), dated March 23, 1992, among the Department of the Navy, Environmental Protection Agency, and the Rhode Island Department of Environmental Management, under the

Comprehensive Environmmental Response Compensation and Liability Act, Section 120. Said agreement, as it may be amended from time to time, the FFA, is incorporated herein by reference, and to the extent that the FFA is inconsistent with this Agreement, the FFA shall take precedence.

C. The RIEDC agrees to record this Modification No. 1 in the Records of Land Evidence of the Town of North Kingstown, Rhode Island, to furnish such recordation data to the United States, and to pay all costs associated with recording this Modification No. 1.

Except as modified herein, all other terms and conditions of the Agreement shall remain in full force and effect.

IN WITNESS WHEREOF, the parties have caused these presents to be executed this 17th day of September, 1996.

UNITED STATES OF AMERICA
Acting by and Through the
DEPARTMENT OF THE NAVY

By: [signature]
MARIAN E. DIGIAMARINO
Special Assistant for
Real Estate
Base Closure Team
Real Estate Contracting Officer

RHODE ISLAND ECONOMIC
DEVELOPMENT CORPORATION

By: [signature]
Executive Director
(Title)

QUONSET-DAVISVILLE ACCESS AND SERVICES AGREEMENT

AGREEMENT entered into this 11th day of September, 1980, by and between the UNITED STATES OF AMERICA, acting by and through the ADMINISTRATOR OF GENERAL SERVICES, and the RHODE ISLAND PORT AUTHORITY AND ECONOMIC DEVELOPMENT CORPORATION, a governmental agency and public instrumentality of the State of Rhode Island,

W I T N E S S E T H:

WHEREAS, the real estate (hereinafter the "Surplus Lands") located in North Kingstown, Rhode Island formerly known as Quonset Point Naval Air Station ("Quonset NAS") and known as Davisville Naval Construction Battalion Center ("Davisville CBC") have, with the exception of certain land retained by the Navy at Davisville CBC ("Navy Retained Land"), been declared to be surplus by the appropriate agencies of the United States of America (the "United States") and turned over to the Administrator of General Services ("GSA") for disposition, and

WHEREAS, a plan (the "Plan") entitled "Conveyance Map Q; Quonset State Airport, N. Kingstown, R.I. Scale 1"-500'; Drawn by P.R. Miozza; Dated 1/13/75" as revised, consisting of six sheets has been filed in the Records of Land Evidence of the Town of North Kingstown on November 28, 1978, describing portions of Quonset NAS that are the subject of transactions hereinafter described, which Plan is incorporated herein by reference, and

ENCLOSURE (5)

WHEREAS, the Rhode Island Port Authority and Economic Development Corporation ("Port Authority"), a governmental agency and instrumentality of the State of Rhode Island, ("the State"), has acquired by Deed from the United States Area B-3 as shown on the Plan and by Deed from the State Areas RL-1, RL-2, RL-3 and RL-4 as shown on the Plan (the"Reverter Land"), which acquisition of Reverter Land was pursuant to a Declaration of Termination of Interest by the United States, and

WHEREAS, the Port Authority is contemporaneously herewith and in reliance on this agreement acquiring the remainder of the Surplus Lands with the exception of certain portions thereof being retained by the United States or previously conveyed to third parties by the United States (the "1980 Purchase Property") which property is more particularly described in Exhibit A attached hereto, and

WHEREAS, it is contemplated that within six months of date hereof the areas shown on the Plan as RL-2, RL-3 and RL-4 will be transferred to the United States by the Port Authority so that they can be consolidated with portions of the areas shown on the Plan as A-1, A-2 and A-3 to make a complete airport operational area, part of which will be made available to the Department of Defense by long term lease or otherwise for the purpose of providing Air National Guard facilities thereon, and thereafter it is contemplated that such airport operational area together with areas B-1-a,

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RI PORT AUTHORITY
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B-1-b and B-2 as shown on the Plan will be transferred to the Port Authority or the State, and

WHEREAS, the divided nature of the title to the Surplus Lands and of the Navy Retained Land makes it necessary to provide for the benefit of the real estate of each party hereto for (a) access by road and railroad and (b) utility services presently available, including water, gas, electricity, steam (both process and heating), telephone, street lighting, fire alarm, sewage collection and treatment and storm drainage (collectively "Utility Services"), and

WHEREAS, the United States and the Port Authority wish by this instrument to evidence their mutual understandings and agreements concerning such access and Utility Services, which understandings and agreements will benefit and burden, as appropriate, the following areas: RL-1, RL-2 RL-3, RL-4, A-1, A-2, A-3, B-1a, B-1-b, B-2 and B-3 as shown on the Plan; the 1980 Purchase Property, Navy Retained Land, and portions of the Surplus Lands being retained by the United States for conveyance to third parties or otherwise, (hereinafter collectively the "Affected Areas").

NOW, THEREFORE, the United States and the Port Authority, in consideration of the mutual undertakings, covenants and agreements contained herein and for other valuable consideration, hereby covenant and agree as follows:

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1. Each of the parties hereto (as hereinafter defined) shall have the right, but in common with all others entitled thereto, to pass and repass on foot and by vehicle over streets and roads as presently laid out in any of the Affected Areas (excluding that portion of Narraganset Road located between the easterly sideline of Saratoga Street and the westerly sideline of Lexington Street) and in all other areas of the former Quonset NAS and Davisville CBC as reasonably necessary or desirable to provide access from the public highways to the Affected Areas owned by any of them and between portions of their respective, Affected Areas, together with the right to maintain, repair and replace such streets and roads. Any party may discontinue or close off all or any portion of a street or road on its property in which any other party hereto has rights under the preceding sentence or alter the location thereof, provided it shall first obtain the approval of any other such party, which approval will not be unreasonably withheld or delayed. Notwithstanding the foregoing, any party may subject the streets or roads on its property to reasonable regulation to enable oversize loads to be moved along such streets and roads and otherwise to provide for the safety and convenience of authorized users. The rights and obligations created hereby with respect to such streets and roads shall terminate as to any street or road or portion thereof which is accepted as a town or state road or highway.

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2. Each of the parties hereto shall have the right, in common with all others entitled thereto, to pass and repass with railway equipment, but in common with all others entitled thereto, over railroad tracks now laid out at Quonset NAS or Davisville CBC as may be reasonably necessary or desirable to provide access from connecting railroad main lines to the Affected Areas, together with the right to maintain, repair and replace such tracks. Any party may discontinue or close off all or any portion of any railway track on its property or alter the location thereof provided it shall first obtain the approval of all other parties hereto, which approval will bot be unreasonably withheld or delayed. Notwithstanding the foregoing, any party may subject the railroad tracks on its property to reasonable regulation to enable oversize loads to be moved along such tracks and otherwise to provide for the safety and convenience of authorized users.

3. For purposes of this agreement the term "Utility Structure" shall include any pipe, pole, conduit, wire, cable, ducts, fixtures, buildings or other improvements, together with any equipment appurtenant to any of the foregoing, necessary to provide, convey or transmit Utility Services. Any party may enter upon the property of any other party hereto and upon any street or road in which it has rights under paragraph 1, regardless of the ownership of the land on which such street or road is located, for the purposes of connecting to, maintaining, replacing or pro-

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viding any Utility Structure therein to provide a Utility Service to an Affected Area owned by it, subject to the regulations of the party or other person or entity which is providing such Utility Service.

4. No party hereto shall dismantle, remove or interfere with (except in connection with an adequate replacement) the operation of any Utility Structure located on its property that is used to transmit water, gas, electricity, steam, fire alarm, telephone or telegraph intelligence to or transport sewage or storm drainage from property of any other party hereto unless it shall first obtain the approval of the other parties hereto which approval will not be unreasonably withheld or delayed.

5. No party hereto which is in possession of any Utility Structure, whether or not located on an Affected Area, that is necessary to provide a Utility Service to property of any other party shall terminate the provision of such service or substantially curtail the level or quality of such service (except to the extent such curtailment shall result from circumstances not reasonably within its control) unless it shall first obtain the approval of all other parties hereto so benefited or served, which approval will not be unreasonably withheld or delayed; provided, however, that a party may terminate a Utility Service and covenants related thereto without such approval in connection with a transaction by which a municipality, state or local authority or a public utility

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expressly assumes the obligation of providing such Utility Service to any other party hereto, which termination shall end such party's obligation to provide the same under this agreement; and provided, further, that a party may terminate a Utility Service without such approval for so long as a recipient or user of such service fails to pay all generally applicable charges (on pro rata basis or at the prevailing commercial rate, whichever is higher) therefor.

6. Nothing herein shall be deemed to affect the obligations under the existing Protection and Maintenance Agreement, as amended, with respect to the Surplus Lands between the United States Navy and the State, which is administrered by the Port Authority.

7. The terms "party" or "parties hereto" wherever used in this agreement mean the United States and the Port Authority.

8. In the event that a party hereto desires to transfer or grant an interest to any person, other than to a party hereto, (i) in any real estate in an Affected Area or (ii) in any real estate of a party hereto on which is located a Utility Structure that is used to transmit water, gas, electricity, steam, telephone or telegraph intellignece to or transport sewage or storm drainage from property of any other party hereto (any of which interests are hereinafter referred to as "Transferred Property") (a) such party shall subject such Transferred Property to the specifically described burdens imposed by this agreement on the party making

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such transfer and its property so transferred, and (b) such party may grant or otherwise transfer with such Transferred Property, and as an appurtenance thereto, specifically described easements or other rights created under this agreement for the benefit of the party making such transfer and of the property so transferred, and may describe the specific burdens to which the Transferred Property is subject and the rights by which it is benefited in such instrument or by reference to identifiable maps, plans or drawings maintained by the Port Authority; provided, however, that no such instrument or instruments of transfer shall be effective unless recorded in the Records of Land Evidence for said Town of North Kingstown.

9. This agreement may be amended or terminated by an instrument in writing signed by the parties hereto which is recorded in the Records of Land Evidence of said Town of North Kingstown.

10. The Port Authority, having received pursuant to its deed from the State of the areas shown on the Plan as RL-1, RL-2, RL-3 and RL-4 which was recorded in the Records of Land Evidence of the Town of North Kingstown on November 28, 1978, certain easements and rights appurtenant to the premises described therein which are the subject of this agreement, hereby agrees that such easements and rights are reserved to the Port Authority and will be transferred or granted by it only in conformity with the provisions of this agreement.

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11. This agreement supercedes in all respects the Quonset Access and Services Agreement entered into between the parties hereto on November 20, 1978 and recorded in the Records of Land Evidence of the Town of North Kingstown on November 28, 1978.

IN WITNESS WHEREOF, the parties have caused these presents to be executed this 11th day of September, 1980.

UNITED STATES OF AMERICA
Acting By and Through the
ADMINISTRATOR OF GENERAL
SERVICES

By L. F. Bretta
L.F. BRETTA
Regional Administrator
General Services Administration
Boston, Massachusetts

RHODE ISLAND PORT AUTHORITY AND
ECONOMIC DEVELOPMENT CORPORATION

By Virgil A. Nolan Jr.
VIRGIL A. NOLAN, JR.

COMMONWEALTH OF MASSACHUSETTS)
COUNTY OF SUFFOLK) ss.

In Boston, in said County and State, on this 11th day of September, 1980, before me personally appeared L. F. BRETTA, Regional Administrator, General Services Administration, Boston, Massachusetts, duly empowered and authorized and delegated by the Administrator of General Services, to me known and known by me to be the party executing the foregoing instrument and he acknowledged

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said instrument by him duly executed to be the free act and deed of the UNITED STATES OF AMERICA, and his free act and deed individually, and in his capacity as Regional Administrator General Services Administration, Boston, Massachusetts.

WILLIAM F. MANLEY
NOTARY PUBLIC
MY COMMISSION EXP.
Oct 19, 1...

Notary Public
William F. Manley

STATE OF RHODE ISLAND
COUNTY OF PROVIDENCE

In Providence on the 12th day of September, 1980, before me personally appeared the above named Virgil A. Nolan, Jr. to me known and known by me to be the Deputy Director of RHODE ISLAND PORT AUTHORITY AND ECONOMIC DEVELOPMENT CORPORATION and he acknowledged said instrument by him executed to be his free act and deed in his capacity as Deputy Director and the free act and deed of said RHODE ISLAND PORT AUTHORITY AND ECONOMIC DEVELOPMENT CORPORATION.

Notary Public
E. Jerome Batty

08/31/95 THU 10:01 FAX 401 295 8345 RI PORT AUTHORITY 00

EXHIBIT A

Those certain lots or parcels of land, together with all buildings and improvements thereon, comprising a portion of the former Quonset Point Naval Air Station and Davisville Construction Battalion Center, in the Town of North Kingstown, Rhode Island, and being more particularly described in the deed of even date herewith from the United States of America to the Rhode Island Port Authority and Economic Development Corporation, which deed is to be recorded in the Records of Land Evidence of the Town of North Kingstown prior to the recording of this instrument.

DEPARTMENT OF THE NAVY
NORTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
10 INDUSTRIAL HIGHWAY
MAIL STOP, #82
LESTER, PA 19113-2090

IN REPLY REFER TO

11011
Code 09TA/ND
Ser 98-151
May 20, 1998

VIA FEDERAL EXPRESS

Mr. William J. Aird
Maritime Administration
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, DC 20590

Dear Mr. Aird:

By letter dated September 8, 1997, the Secretary, Maritime Administration, requested the assignment of approximately 259 acres of land, together with all improvements thereon, identified as Parcel 7 and Parcel 8, at the former Naval Construction Battalion Center (NCBC), Davisville, Rhode Island for conveyance to the Rhode Island Economic Development Corporation (RIEDC) for the development or operation of a port facility. Subsequently, by letter dated November 25, 1997, the Secretary, Maritime Administration, amended the assignment request to include certain personal property. **Please note that this letter pertains only to Parcel 8, consisting of approximately 96 acres, and the personal property.** Parcel 7 will be the subject of future correspondence upon issuance of a Finding of Suitability to Transfer (FOST).

Pursuant to the authority vested in the Secretary of Defense by the provisions of 40 U.S.C. 484(q), and a delegation of that authority to the Secretary of the Navy, and approval of the assignment request by the Assistant Secretary of the Navy (Installations and Environment), by enclosure (1), I hereby assign the above described Parcel 8, together with all improvements thereon, and the aforementioned personal property to the Secretary, Maritime Administration, for conveyance to RIEDC for port facility purposes as authorized by and pursuant to Section 203 (q) of the Federal Property and Administrative Services Act of 1949, as amended, (40 U.S.C 484 (q)).

This assignment is subject, however, to the terms and conditions of the FOST dated May 8, 1998. Your attention is directed particularly to paragraph 6 of the FOST which requires certain conditions be included in the transfer deed regarding response or corrective action found to be necessary and access by the United States and the State of Rhode Island to the parcel after the date of transfer. Also, please ensure that the transfer package includes the notification provision specified in the last sentence of paragraph 6

of the FOST. A copy of the FOST, the Environmental Baseline Survey for Transfer (EBST), and the Final Basewide Environmental Baseline Survey, Naval Construction Battalion Center (NCBC) Davisville, North Kingstown, Rhode Island (applicable excerpt), are enclosed for your records as enclosures (2), (3), and (4) respectively. Enclosure (5) is a copy of the Quonset-Davisville Access and Services Agreement dated September 11, 1980. Enclosures (2) through (5) are to be provided to the Grantee as part of the conveyance documents. Also, enclosures (4) and (5) are to be incorporated into the conveyance documents by reference.

Additionally, Parcel 8 is located within six nautical air miles of three airports. Thus, the following Avigation Clause is to be incorporated in the language of the deed:

Based upon coordination between the Department of the Navy and the Federal Aviation Administration (FAA) as recommended in House Report Number 95-1053, entitled "FAA Determination of 'No Hazard' for Structures Near Airports," it has been determined that the only public airports within six nautical air miles of this property are the Newport State Airport, Quonset State Airport, and T. F. Green State Airport. FAA has been apprised of the proposed disposal of the property, and that the Government's conveyance document will contain a provision that the grantee, its successors and assigns and every successor in interest to the property herein described, or any part thereof, must prohibit any construction or alteration on the property unless a determination of no hazard to air navigation is issued by FAA in accordance with 14 CFR Part 77, "Objects Affecting Navigable Airspace," or under the authority of the Federal Aviation Act of 1958, as amended.

The RIEDC and the Town of North Kingstown, RI have entered into separate Memorandums of Agreement with the Rhode Island Historical Preservation and Heritage Commission regarding the identified historic resources at the former NCBC Davisville. These agreements and a letter dated June 2, 1997 from the Advisory Council On Historic Preservation are contained in enclosure (6) for your information.

A legal description of the assigned property together with appropriate grants for access, utilities, and riparian and littoral rights is provided as enclosure (7). Enclosure (8) is a listing of the assigned personal property.

Further, the assignment of this property is made subject to your compliance with the provisions of the National Environmental Policy Act of 1969, as amended, Executive Orders 11988 and 11990, concerning Floodplain Management and Protection of Wetlands, the Clean Air Act of 1990, as amended, and other appropriate guidelines, regulations, laws and executive orders pertaining to the future use of the property.

Also, enclosed for your records are copies of the Report of Excess Property for Parcel 8, a Real Estate Summary Map, and a General Development Map (enclosures (9) through (11) respectively).

No objection is interposed to conveyance of the real (including all improvements thereon) and personal property at 100% public benefit allowance, subject to the usual terms and conditions in transfers of property for on-site port facility use.

The responsibility for custody and accountability of the property and the protection and maintenance thereof, pending disposition, will be governed by the provisions of Federal Property Management Regulation 101-47.402.

Upon completion of the conveyance, please provide this office with two copies of the executed deed.

If you have any questions on this matter, please call me at Area Code 610, 595-0763.

Sincerely,

Marian E. DiGiamarino

MARIAN E. DIGIAMARINO
Special Assistant for Real Estate
Base Closure Team
Real Estate Contracting Officer

Enclosures

MODIFICATION NO. 1 TO

QUONSET - DAVISVILLE ACCESS AND SERVICES AGREEMENT

This MODIFICATION NO. 1, entered into this 17th day of September 1996, by and between the UNITED STATES OF AMERICA, acting, by and through the DEPARTMENT OF THE NAVY and under the delegated authority of the GENERAL SERVICES ADMINISTRATION (the "United States"), and the RHODE ISLAND ECONOMIC DEVELOPMENT CORPORATION ("RIEDC"), successor in name to the RHODE ISLAND PORT AUTHORITY AND ECONOMIC DEVELOPMENT CORPORATION, a governmental agency and public instrumentality of the State of Rhode Island,

WITNESSETH

WHEREAS, on September 11, 1980, the United States and RIEDC entered into the Quonset-Davisville Access and Services Agreement (the "Agreement") which provided for the benefit of the real estate of each party thereto for (a) access by road and railroad and, (b) certain utility services then presently available, and;

WHEREAS, by numbered paragraph 2 of the Agreement, the parties hereto have certain rights, in common with all others entitled thereto (a) to pass and repass with railway equipment over railroad tracks then laid out at the Quonset Point Naval Air Station or Davisville Naval Construction Battalion Center, together with the right to maintain, repair, and replace such tracks; and (b) to discontinue or close off all or any portion of any railway track on its property or alter the location thereof, provided it shall first obtain the written approval of all other

ENCLOSURE (5)

parties thereto, and;

WHEREAS, the RIEDC desires to modify the Agreement to provide for the extension of existing railroad track within the Affected Areas described in said Agreement from and to the respective Affected Areas owned by the parties hereto, and;

WHEREAS, the United States of America is agreeable thereto,

NOW, THEREFORE, the United States and the RIEDC, in consideration of the mutual undertakings, covenants and agreements contained herein and for other valuable consideration, hereby covenant and agree as follows:

A. Modify the Agreement as follows:

Page 5, numbered Paragraph 2 - Delete the second sentence of this paragraph and replace it with the following new second sentence:

"Any party may discontinue or close off all or any portion of any railway track on its property, or alter the location thereof, or may extend any portion of said railway track to the property of any party hereto, provided it shall first obtain the approval of all other parties hereto, which approval will not be unreasonably witheld or delayed."

B. The parties hereto acknowledge that the Affected Areas owned by the United States of America are subject to the Federal Facility Agreement (FFA), dated March 23, 1992, among the Department of the Navy, Environmental Protection Agency, and the Rhode Island Department of Environmental Management, under the

Comprehensive Environmmental Response Compensation and Liability Act, Section 120. Said agreement, as it may be amended from time to time, the FFA, is incorporated herein by reference, and to the extent that the FFA is inconsistent with this Agreement, the FFA shall take precedence.

C. The RIEDC agrees to record this Modification No. 1 in the Records of Land Evidence of the Town of North Kingstown, Rhode Island, to furnish such recordation data to the United States, and to pay all costs associated with recording this Modification No. 1.

Except as modified herein, all other terms and conditions of the Agreement shall remain in full force and effect.

IN WITNESS WHEREOF, the parties have caused these presents to be executed this 17th day of September, 1996.

UNITED STATES OF AMERICA
Acting by and Through the
DEPARTMENT OF THE NAVY

By: Marian E. DiGiamarino
MARIAN E. DIGIAMARINO
Special Assistant for
Real Estate
Base Closure Team
Real Estate Contracting Officer

RHODE ISLAND ECONOMIC
DEVELOPMENT CORPORATION

By: [illegible]
Executive Director
(Title)

1 Kate

N/RIDU

QUONSET-DAVISVILLE ACCESS AND SERVICES AGREEMENT

AGREEMENT entered into this 11th day of September, 1980, by and between the UNITED STATES OF AMERICA, acting by and through the ADMINISTRATOR OF GENERAL SERVICES, and the RHODE ISLAND PORT AUTHORITY AND ECONOMIC DEVELOPMENT CORPORATION, a governmental agency and public instrumentality of the State of Rhode Island,

W I T N E S S E T H:

WHEREAS, the real estate (hereinafter the "Surplus Lands") located in North Kingstown, Rhode Island formerly known as Quonset Point Naval Air Station ("Quonset NAS") and known as Davisville Naval Construction Battalion Center ("Davisville CBC") have, with the exception of certain land retained by the Navy at Davisville CBC ("Navy Retained Land"), been declared to be surplus by the appropriate agencies of the United States of America (the "United States") and turned over to the Administrator of General Services ("GSA") for disposition, and

WHEREAS, a plan (the "Plan") entitled "Conveyance Map Q; Quonset State Airport, N. Kingstown, R.I. Scale 1"-500'; Drawn by P.R. Miozza; Dated 1/13/75" as revised, consisting of six sheets has been filed in the Records of Land Evidence of the Town of North Kingstown on November 28, 1978, describing portions of Quonset NAS that are the subject of transactions hereinafter described, which Plan is incorporated herein by reference, and

ENCLOSURE (5)

WHEREAS, the Rhode Island Port Authority and Economic Development Corporation ("Port Authority"), a governmental agency and instrumentality of the State of Rhode Island, ("the State"), has acquired by Deed from the United States Area B-3 as shown on the Plan and by Deed from the State Areas RL-1, RL-2, RL-3 and RL-4 as shown on the Plan (the"Reverter Land"), which acquisition of Reverter Land was pursuant to a Declaration of Termination of Interest by the United States, and

WHEREAS, the Port Authority is contemporaneously herewith and in reliance on this agreement acquiring the remainder of the Surplus Lands with the exception of certain portions thereof being retained by the United States or previously conveyed to third parties by the United States (the "1980 Purchase Property") which property is more particularly described in Exhibit A attached hereto, and

WHEREAS, it is contemplated that within six months of date hereof the areas shown on the Plan as RL-2, RL-3 and RL-4 will be transferred to the United States by the Port Authority so that they can be consolidated with portions of the areas shown on the Plan as A-1, A-2 and A-3 to make a complete airport operational area, part of which will be made available to the Department of Defense by long term lease or otherwise for the purpose of providing Air National Guard facilities thereon, and thereafter it is contemplated that such airport operational area together with areas B-1-a,

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B-1-b and B-2 as shown on the Plan will be transferred to the Port Authority or the State, and

WHEREAS, the divided nature of the title to the Surplus Lands and of the Navy Retained Land makes it necessary to provide for the benefit of the real estate of each party hereto for (a) access by road and railroad and (b) utility services presently available, including water, gas, electricity, steam (both process and heating), telephone, street lighting, fire alarm, sewage collection and treatment and storm drainage (collectively "Utility Services"), and

WHEREAS, the United States and the Port Authority wish by this instrument to evidence their mutual understandings and agreements concerning such access and Utility Services, which understandings and agreements will benefit and burden, as appropriate, the following areas: RL-1, RL-2 RL-3, RL-4, A-1, A-2, A-3, B-1a, B-1-b, B-2 and B-3 as shown on the Plan; the 1980 Purchase Property, Navy Retained Land, and portions of the Surplus Lands being retained by the United States for conveyance to third parties or otherwise, (hereinafter collectively the "Affected Areas").

NOW, THEREFORE, the United States and the Port Authority, in consideration of the mutual undertakings, covenants and agreements contained herein and for other valuable consideration, hereby covenant and agree as follows:

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1. Each of the parties hereto (as hereinafter defined) shall have the right, but in common with all others entitled thereto, to pass and repass on foot and by vehicle over streets and roads as presently laid out in any of the Affected Areas (excluding that portion of Narraganset Road located between the easterly sideline of Saratoga Street and the westerly sideline of Lexington Street) and in all other areas of the former Quonset NAS and Davisville CBC as reasonably necessary or desirable to provide access from the public highways to the Affected Areas owned by any of them and between portions of their respective, Affected Areas, together with the right to maintain, repair and replace such streets and roads. Any party may discontinue or close off all or any portion of a street or road on its property in which any other party hereto has rights under the preceding sentence or alter the location thereof, provided it shall first obtain the approval of any other such party, which approval will not be unreasonably withheld or delayed. Notwithstanding the foregoing, any party may subject the streets or roads on its property to reasonable regulation to enable oversize loads to be moved along such streets and roads and otherwise to provide for the safety and convenience of authorized users. The rights and obligations created hereby with respect to such streets and roads shall terminate as to any street or road or portion thereof which is accepted as a town or state road or highway.

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2. Each of the parties hereto shall have the right, in common with all others entitled thereto, to pass and repass with railway equipment, but in common with all others entitled thereto, over railroad tracks now laid out at Quonset NAS or Davisville CBC as may be reasonably necessary or desirable to provide access from connecting railroad main lines to the Affected Areas, together with the right to maintain, repair and replace such tracks. Any party may discontinue or close off all or any portion of any railway track on its property or alter the location thereof provided it shall first obtain the approval of all other parties hereto, which approval will bot be unreasonably withheld or delayed. Notwithstanding the foregoing, any party may subject the railroad tracks on its property to reasonable regulation to enable oversize loads to be moved along such tracks and otherwise to provide for the safety and convenience of authorized users.

3. For purposes of this agreement the term "Utility ..ucture" shall include any pipe, pole, conduit, wire, cable, ducts, fixtures, buildings or other improvements, together with any equipment appurtenant to any of the foregoing, necessary to provide, convey or transmit Utility Services. Any party may enter upon the property of any other party hereto and upon any street or road in which it has rights under paragraph 1, regardless of the ownership of the land on which such street or road is located, for the purposes of connecting to, maintaining, replacing or pro-

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viding any Utility Structure therein to provide a Utility Service to an Affected Area owned by it, subject to the regulations of the party or other person or entity which is providing such Utility Service.

4. No party hereto shall dismantle, remove or interfere with (except in connection with an adequate replacement) the operation of any Utility Structure located on its property that is used to transmit water, gas, electricity, steam, fire alarm, telephone or telegraph intelligence to or transport sewage or storm drainage from property of any other party hereto unless it shall first obtain the approval of the other parties hereto which approval will not be unreasonably withheld or delayed.

5. No party hereto which is in possession of any Utility Structure, whether or not located on an Affected Area, that is necessary to provide a Utility Service to property of any other party shall terminate the provision of such service or substantially curtail the level or quality of such service (except to the extent such curtailment shall result from circumstances not reasonably within its control) unless it shall first obtain the approval of all other parties hereto so benefited or served, which approval will not be unreasonably withheld or delayed; provided, however, that a party may terminate a Utility Service and covenants related thereto without such approval in connection with a transaction by which a municipality, state or local authority or a public utility

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expressly assumes the obligation of providing such Utility Service to any other party hereto, which termination shall end such party's obligation to provide the same under this agreement; and provided, further, that a party may terminate a Utility Service without such approval for so long as a recipient or user of such service fails to pay all generally applicable charges (on pro rata basis or at the prevailing commercial rate, whichever is higher) therefor.

6. Nothing herein shall be deemed to affect the obligations under the existing Protection and Maintenance Agreement, as amended, with respect to the Surplus Lands between the United States Navy and the State, which is administrered by the Port Authority.

7. The terms "party" or "parties hereto" wherever used in this agreement mean the United States and the Port Authority.

8. In the event that a party hereto desires to transfer or grant an interest to any person, other than to a party hereto, (i) in any real estate in an Affected Area or (ii) in any real estate of a party hereto on which is located a Utility Structure that is used to transmit water, gas, electricity, steam, telephone or telegraph intellignece to or transport sewage or storm drainage from property of any other party hereto (any of which interests are hereinafter referred to as "Transferred Property") (a) such party shall subject such Transferred Property to the specifically described burdens imposed by this agreement on the party making

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such transfer and its property so transferred, and (b) such party may grant or otherwise transfer with such Transferred Property, and as an appurtenance thereto, specifically described easements or other rights created under this agreement for the benefit of the party making such transfer and of the property so transferred, and may describe the specific burdens to which the Transferred Property is subject and the rights by which it is benefited in such instrument or by reference to identifiable maps, plans or drawings maintained by the Port Authority; provided, however, that no such instrument or instruments of transfer shall be effective unless recorded in the Records of Land Evidence for said Town of North Kingstown.

9. This agreement may be amended or terminated by an instrument in writing signed by the parties hereto which is recorded in the Records of Land Evidence of said Town of North Kingstown.

10. The Port Authority, having received pursuant to its deed from the State of the areas shown on the Plan as RL-1, RL-2, RL-3 and RL-4 which was recorded in the Records of Land Evidence of the Town of North Kingstown on November 28, 1978, certain easements and rights appurtenant to the premises described therein which are the subject of this agreement, hereby agrees that such easements and rights are reserved to the Port Authority and will be transferred or granted by it only in conformity with the provisions of this agreement.

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11. This agreement supercedes in all respects the Quonset Access and Services Agreement entered into between the parties hereto on November 20, 1978 and recorded in the Records of Land Evidence of the Town of North Kingstown on November 28, 1978.

IN WITNESS WHEREOF, the parties have caused these presents to be executed this 11th day of September, 1980.

UNITED STATES OF AMERICA
Acting By and Through the
ADMINISTRATOR OF GENERAL
SERVICES

By L. F. Bretta
L.F. BRETTA
Regional Administrator
General Services Administration
Boston, Massachusetts

RHODE ISLAND PORT AUTHORITY AND
ECONOMIC DEVELOPMENT CORPORATION

By Virgil A. Nolan, Jr.
VIRGIL A. NOLAN, JR

COMMONWEALTH OF MASSACHUSETTS)
COUNTY OF SUFFOLK) ss.

In Boston, in said County and State, on this 11th day of September, 1980, before me personally appeared L. F. BRETTA, Regional Administrator, General Services Administration, Boston, Massachusetts, duly empowered and authorized and delegated by the Administrator of General Services, to me known and known by me to be the party executing the foregoing instrument and he acknowledged

08/31/95 THU 10:00 FAX 401 295 6345 RI PORT AUTHORITY 010

said instrument by him duly executed to be the free act and deed of the UNITED STATES OF AMERICA, and his free act and deed individually, and in his capacity as Regional Administrator General Services Administration, Boston, Massachusetts.

WILLIAM F. MANLEY
NOTARY PUBLIC
MY COMMISSION EXPIRES
Oct 15, 19..

Notary Public
William F. Manley

STATE OF RHODE ISLAND
COUNTY OF PROVIDENCE

In Providence on the 12th day of September, 1980, before me personally appeared the above named Virgil A. Nolan, Jr. to me known and known by me to be the Deputy Director of RHODE ISLAND PORT AUTHORITY AND ECONOMIC DEVELOPMENT CORPORATION and he acknowledged said instrument by him executed to be his free act and deed in his capacity as Deputy Director and the free act and deed of said RHODE ISLAND PORT AUTHORITY AND ECONOMIC DEVELOPMENT CORPORATION.

Notary Public
F. Jerome Batty

08/31/95 THU 10:01 FAX 401 295 8345 RI PORT AUTHORITY 011

EXHIBIT A

Those certain lots or parcels of land, together with all buildings and improvements thereon, comprising a portion of the former Quonset Point Naval Air Station and Davisville Construction Battalion Center, in the Town of North Kingstown, Rhode Island, and being more particularly described in the deed of even date herewith from the United States of America to the Rhode Island Port Authority and Economic Development Corporation, which deed is to be recorded in the Records of Land Evidence of the Town of North Kingstown prior to the recording of this instrument.