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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

November 12, 1991

Adrienne P. Townsel, Project Manager
Department of the Navy
Northern Division
Naval Facilities Engineering Command
Philadelphia, PA 19112-5094

Re: Review Comments on Draft IR Study

Dear Ms. Townsel:

This office is in receipt of the report entitled "Draft Report, Installation Restoration Study, Naval Submarine Base-New London, Groton, Connecticut" dated August 1991 and prepared by Atlantic Environmental Services for the Navy. Upon review of this document, this office offers the following comments. Attached for your information and review are comments and concerns from the National Oceanic and Atmospheric Administration's (NOAA) review of the document.

General Comment: Upon review of the document, a list of deviations from the proposed work plan needs to be documented:

- Torpedo Shop: MW3, TB3 and TB4 locations are all shifted from the proposed plan.
- Goss Cove: An upgradient well was proposed, but none was installed. Of all the borings and wells proposed, only TB-3 was installed at the proposed location.
- Spent Acid Storage Area: GPR and probing of the tank was proposed, but results of those activities are not documented in the report.
- Area A: Two soil samples were supposed to be collected from each of five borings, but only one was collected from MW7.
- Area A Wetland: Two surface water samples were specified in the Plan of Action, but based upon review of the report, none were discussed in the report.
- Area A Wetland: Five soil samples per boring were proposed for borings 2WTB1 to 2WTB8 (for a total of 40 samples), but only 24 were collected, according to Table 4-24.
- Area A Downstream: Only one surface water/sediment sample was collected at North lake, rather than two as

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indicated in the Work Plan.

- DPDO (DRMO): The two battery storage area surface soil grab samples and eight of the proposed borings were not performed as specified in the Field Sampling Plan.

- Lower Subase: Of all the wells proposed, MW-1, 2, 3, 7, 10, 14 and 15 were placed in their proposed locations, the rest were not. Of all proposed ground water samples, sample WE2 was omitted. A 48-hour pumping test was proposed, but was not performed.

- The Navy indicated to EPA in the March 6, 1991 response to comments letter, that a study of tidal fluctuations was performed (comment DPDO 3, page 5). These results and the methodology used should be included in this report.

Page Specific Comments

Page i, Table of Contents Section 1.2.5.8 should indicate the Area A Landfill, Area A wetland, and Area A Downstream Watercourse.

Page 1-1, ¶ 3 This paragraph should indicate that NSB-NLON was proposed for listing on the National Priorities List on October 26, 1989 and was listed on August 30, 1991.

Page 1-5, Section 1.2.3.1 Is there a map or a better definition of which areas of the base fall under the different groundwater classifications?

Page 1-6, Figure 1-3 A legend on this figure should be included to indicate current public water supplies.

Page 1-7, Section 1.2.5 The report should indicate that five (5) sites were dropped from the IAS and the reasoning for their elimination.

Page 1-9, Section 1.2.5.2 The approximate size of this site should be included in the text.

Page 1-13, Figure 1-7 This figure refers to both the north and south system leaching fields, but there is nothing in the text in Section 1.2.5.3 on page 1-12 which identifies these systems. Please clarify.

Page 1-16, ¶ 1 This paragraph should include a brief statement when construction of the Nautilus Museum occurred.

Page 1-21, ¶ 3 (a) This paragraph indicates that based on the IAS report, the landfill opened sometime before 1957. However,

this office is in receipt of aerial photographs, one of which is dated April 10, 1957, copies of which have been forwarded to your office. Review of this aerial clearly indicates that there is no activity in the landfill area in 1957.

(b) This is the first mention of the base incinerator. A very brief discussion of the incinerator should be included, e.g. location, type of wastes burned, etc.

Page 1-21, ¶ 5 The report provides information relative to a concrete pad. Is the pad still existing? Is the pad located at Building 373? This information should be provided in the report.

Page 1-21, ¶ 6 This paragraph should also make reference to information contained on page 1-3 in the Step IA Verification Study, namely, that "When a battery was overhauled, spent sulfuric acid solution was transferred to barrels and transported to Area A for disposal. The acid was poured into trenches dug with a bulldozer and subsequently covered with soil."

Page 1-23, ¶ 1 As noted in a previous comment, review of the April 1957 aerials did not indicate any activity in this area. Also, is the approximate quantity of dredge spoils which were deposited in the wetland known?

Page 1-23, ¶ 5 During a previous site visit, the condition described in this paragraph relative to the potential for ground water from the stream to discharge to North Lake was examined. I had questioned the need for this overflow, since there exists another overflow structure on the southwestern corner of North Lake. It was felt that the possibility of water from the stream discharging to North Lake should be eliminated through the capping of this pipe.

Page 1-38, last ¶ This section should also note that during the summer season, the water in North Lake is chlorinated.

Page 1-44, Table 1-6 A figure should be included to show the sampling locations at North Lake.

Page 2-2, ¶ 4 This paragraph states the detection limits for volatile organic and semivolatile organic compounds using CLP methods are 1 ppb for aqueous samples. However, sample quantitation limits of 5 to 50 ug/L (ppb) are listed in Table 2-1. Although some analytes are detectable below these concentrations, it should be noted, that several analytes, notably vinyl chloride and substituted phenols, will likely not be detected at 1 ppb without significant modification to the method. Additionally, historical precision and accuracy data is not applicable to concentrations below the quantitation limit.

Page 2-2, ¶ 5 It is unclear whether the detection limits used in

the risk assessment (for non-detect samples) were those stated in this paragraph or those provided in Table 2-1 (page 2-3). In some cases, the difference in detection limits is an order of magnitude (i.e., 1 vs. 10).

Page 2-10, ¶ 1 This office was not able to review the results of the geophysical investigations, since this report has not been made available. It is recommended that the Navy provide this report to EPA for review.

Page 2-11, ¶ 1 Soil gas calibrations for VOCs were performed using non-standard techniques which were not specified in the Plan of Action. Atlantic prepared calibration standard using either a benzene in air standard or a headspace standard of a mixture of components in water. The use of headspace aqueous mixtures is not advised. A standard mixture of volatile components in air should be utilized to calibrate the instrument for future soil gas investigations.

An estimate of the approximate air concentrations (ppb v/v) of the aqueous headspace standards should be provided to EPA to allow a review of the data generated from soil gas surveys conducted to date.

This section describes the component identification and quantitation technique. This discussion should be expanded to describe how data from the quality control samples was utilized, including acceptance criteria for duplicates, background samples and calibration standards. The text should be expanded to include component identification criteria.

The calibrants did not include either 1,2-dichloroethene isomers or vinyl chloride which are major degradation products of tetrachloroethene and trichloroethane. Since the latter were found at some of the sites surveyed, the impact of this omission on the reported soil gas data should be evaluated and discussed.

The last paragraph states that soil gas quantitation "...took all soil gas peaks into account." It is unclear whether peaks which did not match calibration standard retention times were also included in the reported concentration.

Page 2-12 The relationship of peak area to analyte concentration (v/v in air) should be provided in addition to the absolute peak area and concentration classifications shown in the table at the top of the page. Assignment of an air concentration allows the data to be compared to that obtained at other Superfund sites.

Additionally, Appendix A should be revised to include all standard and sample chromatograms for the soil gas survey. This data should be provided to EPA to allow verification of the conclusions of the surveys.

Page 2-12, ¶6 The sentence states that <1½-inch hollow stem augers were used to drill soil borings, but does not state whether this dimension is inside or outside diameter. The difference is important in determining the drilled diameter for input into slug test analysis models.

Page 2-13, ¶ 3 The rationale for the selection of each subsurface soil sample sent out for laboratory analysis should be provided. It should be brief and possibly be supplied in table form.

Page 2-23, Section 2.8 The following are general comments relative to the groundwater investigation that was conducted at the NSB-NLON:

(1) The fragmentation of groundwater information according to individual sites or study areas creates confusion. It is recommended that the Navy approach the project by first looking at the base as a whole. Divisions within the base should be on the basis of the Northern Subase Watershed Area and the Central/Southern Subase Watershed Area (see Fig. 3-5). Then each site should be appropriately discussed in light of its location and impact on the watershed in which it exists.

(2) Consistent with the above comment on base and basin-wide approaches to the project, the groundwater investigation (Section 2.8) would be greatly improved if groundwater potentiometric surface maps were constructed for the base as a whole and for the individual basins. These maps should also include the following:

(a) surface elevation data from ponds located within the mapped areas.

(b) groundwater level data from wells located outside the base property.

(c) plots of groundwater divides (to determine whether the groundwater divides coincide with the surface water divides).

(3) The Navy should install continuous water level recorders in the following areas:

(a) in places along the borders of the base that may be within the areas of influence of nearby private wells.

(b) in wells near North Lake to determine whether North Lake is a discharge area for contaminated groundwater.

Page 2-26 The water level and bedrock elevations on this table

should also be displayed using a contour map. If additional water level measurements were collected on subsequent days, these data should also be reported.

Due to the proximity of the NSB to the ocean, it is very likely that variation in water level elevations occurs continuously throughout the day. The text of this report does not describe what efforts were made to quantify this behavior or to correct ground water elevation data for it.

Page 2-27 The screen length and screened interval shown for well 2DMW16S do not agree. These values should be corrected.

Page 2-29, ¶ 1,3 and 4 Boring log and well construction information has not been provided for the bedrock wells. Thus, refinement of the subsurface bedrock system beyond the U.S.G.S. reconnaisance mapping is apparently still lacking after this field effort

Page 2-29, ¶ 2 (a) This paragraph states that all overburden monitoring wells were completed with a sand pack around the screen below a bentonite seal. However, six wells at the lower subase, 13MW8, 9, 15, 16, and 17 were all completed with backfill around the screen without a clay seal, according to the logs (despite the fact that the soil was contaminated). Atlantic provides no explanation for this deviation in the text of the report.

(b) Although we understand the need to accurately define the water table, we disagree with the Navy's approach of screening wells over several stratigraphic units (e.g. 7MW3S). Future screens should be set to characterize individual stratigraphic units. We do not see why well screens can not be smaller than 10 feet.

Page 2-29, ¶ 3 The procedure for drilling bedrock wells should describe the criteria for when drilling ceased.

EPA typically discourages the use of mud rotary drilling, especially through intervals in which a screen will be placed (e.g., an adjacent overburden well). The text should indicate whether mud was utilized through screened intervals in the well being installed or adjacent wells.

Page 2-29, ¶ 7 The text states that bedrock wells were developed using compressed air, but that two wells were developed with a submersible pump. The reason for the different development method should be stated.

Page 2-30, ¶ 6 (a) The text states that for the purpose of evaluating bedrock well slug test data, the saturated thickness of the bedrock aquifer was assumed to be 150 feet. Later in the

document (p. 3-16, ¶ 1), the explanation for this assumption is that the average depth of most residential wells is 150 feet. This assumption is not necessarily correct. Most residential wells are only drilled to sufficient depth to establish the minimum necessary production required for the dwelling supplied by the well. Productive fractures often lie deeper; therefore, a 150 foot limit on bedrock aquifer thickness is probably not valid.

The description of hydraulic conductivity test procedures does not explain why a drilled radius of 0.25 feet (3 inches) was used in the hydraulic conductivity calculations. Since the report had previously stated that the auger diameter was 4.5 inches (presumably inside diameter), the auger outside diameter is probably at least 8 inches and probably larger.

(b) On this page and Appendix B, the numerical raw data needs to be provided for the hydraulic conductivity tests.

Page 2-31, ¶ 2 The text should indicate the minimum time interval between well development and ground water sampling.

Page 2-31, ¶ 3 (a) This paragraph indicates that samples for metals analysis were field filtered. No mention is made here or in other sections of the report of collection and analysis for total metals. All data reporting tables throughout the report should be relabeled to show that results represent dissolved metals only. Future investigations, designed to collect risk assessment quality data, should include analysis for total metals.

(b) Future groundwater sampling events should utilize an interface probe in all wells prior to purging.

Page 2-41 DQO Level 4, as defined by EPA RI/FS guidance can only be achieved by applying EPA guidance for data validation. The latter is provided in the November 1, 1988 revision of the "Region I Laboratory Data Validation Guidelines for Evaluating Organics Analysis."

EPA data validation requires verification of a percentage of sample calculations from the analytical raw data. This verification is not required by NEESA Level C validation. Since EPA requires data used in risk assessments to satisfy Level 4 DQOs, additional validation of the reported analytical data is necessary.

The last paragraph in Section 2.11.3 refers to completed data review checklists which supply sample-specific validation information. These completed checklists are not provided in Appendix C, as implied. Data evaluation summaries, listing specific data qualification actions taken for all analyses,

should be prepared and submitted to EPA as part of the data validation process. Additionally, data quality tables should be prepared to summarize all surrogate and matrix spike recovery data, all field duplicate and laboratory duplicate data and all field blank data.

A separate appendix summarizing all validated analytical results should be prepared. Additionally, a second data summary appendix, sorted by site and medium, should be submitted. Together with data validation summaries, these two appendices should provide sufficient data for EPA to verify the values presented in risk assessment tables.

The DQOs listed in Section 2.11.4 are not consistent with those provided in Appendix C. For example, the DQO for precision is listed as 20 percent difference in Section 2.11.4 and as 30 percent (aqueous samples) and 50 percent (soil samples) on page 11 in Appendix C. Similarly, accuracy objectives in Section 2.11.4 do not correspond to those in Appendix C.

Page 2-43 The derivation of the completeness for the investigation should be expanded either here or in Appendix C to allow for independent verification of the reported percentage. The number of valid results based on surrogate, matrix spike and duplicate data should be itemized.

Page 3-2, ¶ 3 In discussing SCS soil descriptions, the text should state that 1) SCS soil grain size ranges are different from those used in geological and engineering practice; 2) SCS descriptions are only based upon the first five feet of soil from the surface; and 3) descriptive permeability ranges for a given soil type correspond to specific numerical values.

Pages 3-5 and 3-6 With regard to Sections 3.3 Bedrock Geology and Sections 3.4 Surficial Geology, the following should be undertaken:

(a) Construct larger scale base-wide and watershed maps of the surficial and bedrock geology based on literature and observations (including boring log information).

(b) The bedrock map should include:

(i) topography of the bedrock surface. For example, the description on p. 3-27 (2nd para. from bottom) is not an adequate characterization of the complicated bedrock surface in the area of Area A and the OBDA.

(ii) symbols that identify the orientation of joints and fractures in the bedrock outcrops.

(iii) the location of wells and borings.

(c) Important hydrogeologic features of the site should be labelled on all maps and cross sections.

Page 3-9, Figure 3-4 This figure needs to clarified with respect to ground moraine deposits which appear as both stippled and hatched areas, some of which are adjacent to each other. Also, no description is present in the legend for the latter deposit.

Page 3-12, Section 3.6 (a) The use of the term "obtained" is unclear. This sentence should simply state that groundwater is "present" in stratified drift, till and bedrock.

(b) The fine-grained stratified drift aquifer appears to be a major site feature. Therefore, the following needs to be mapped:

(i) the edges of the aquifer.

(ii) the thickness of the aquifer.

(iii) the former location of Crystal Lake.

(iv) the locations of wells within the aquifer.

(v) groundwater potentiometric surface and flow directions.

Page 3-12, Section 3.7 The following are general comments of items that appear in this section:

(a) The bedrock surface is mapped in many cross sections as the point of auger refusal. The text and cross sections should note that refusal does not necessarily mean that the top of bedrock has been encountered.

(b) A key needs to be provided for the lithology symbols used in the boring logs and cross sections.

(c) The cross section views should also indicate the water elevations in the wells and the interpolated water table surface.

(d) The cross section lines in map view should connect the actual boring points because the areas represented in the cross sections are in many cases different from the line is drawn.

Page 3-12, Section 3.7.1 Torpedo Shops (a) In the first paragraph on page 3-15, borings should be undertaken to determine the contact between the Mamacoke Fm and the Sterlin Plutonic Group. This contact may be fault-controlled and may be a preferred pathway for migration of contaminated groundwater.

(b) A boring log or a monitoring well construction detail was not provided in the Appendix for well 7MW1.

(c) The text in the third paragraph on page 3-15 states that Atlantic personnel measured the bedrock outcrops at the torpedo shop. The measurement locations should be posted on the site map. The measurement data should be included in the report appendices.

(d) The text appears to omit a description of the western part of the site. Here the boring log data indicates a discrepancy where silt and sand deposits overlie sand and gravel deposits at boring TB71 rather than reversed as shown in boring logs for 7TB2 and 7MW2S and the cross section of Figure 3-7. This discrepancy further questions the actual presence of the predominant sand and silt deposits shown to exist between 7MW2S and 7TB5 in Figure 3-7.

(e) The boring log for 7NMW3S is not consistent with the cross section view (Fig 3-7).

(f) The drainage swale is a significant hydrogeologic feature in the torpedo shops area and should be included in the cross section view (Fig 3-7).

<u>Page 3-24, Section 3.7.5 Area A and OBDA</u> (a) On page 3-27, ¶ 5, this paragraph describes cores drilled in selected bedrock wells at Area A. Appendix B provides no descriptions of these cores, other than the interval cored. A complete log of the cored interval should be included as a standard part of the boring log so that the log can be compared to the description in the text.

(b) On page 3-27, ¶ 6 this paragraph discusses bedrock topography based upon boring data at Area A. Atlantic should prepare a bedrock topography map based upon well control, geophysics, and rock outcrops.

(c) On page 3-27, ¶ 7, the text states that Atlantic personnel measured the bedrock outcrops at Area A. The measurement data should be included in the report appendices. The paragraph has no discussion of how these measurements tie into known data on rock structure in this area, or whether the joints in the outcrops show any correlation to foliation orientation, as fractures in the cores described in paragraph 5 seem to do.

(d) In Figure 3-16, the north arrow on this figure is rotated approximately 44 degrees east of its actual orientation. Bedrock joint strike and dip orientations plotted on this figure therefore may not be correct and should be checked.

There are many more bedrock outcrops in the area which should be surveyed for fracturing and jointing orientations.

(e) In the second paragraph on page 3-33, Figure 3-4 does not clearly show the features described here. Again, basin-wide geologic maps would be very useful.

(f) The following two comments are relative to Figure 3-18 and Appendix B:

(1) the locations of auger refusals at shallow depths should be re-drilled a few feet away before that location is exited. For example, boring 2WTB4, located in a difficult area in the center of the Area A Wetland, was drilled only to 0.83 feet. No effort seems to have been made to confirm whether or not this refusal was a local anamoly (e.g. a boulder).

(2) the draft report should explain the rationale behind the placement of approximately 25 feet of sand filter pack material below the well screen in 2LMW9S. The representativeness of the data collected from this well is likely to be very uncertain.

(3) cross-section B-B′ would better represent conditions if the following were done:

(a) 2LTB5 was not utilized because this point creates the illusion of an undulating bedrock surface which may not exist.

(b) 2LTB1 should be utilized, since it is actually located on the line B-B′.

However, it is recommended that cross section B-B′ be redrafted along the line of borings labelled 21MW13S, 2LMW13D, 2LMW9S, 2LMW13D, 2LTB1, 2WTB1, 2WTB6 and 2WTB7.

(g) The following comments are relative to Figure 3-19 on page 3-32.

(1) In cross section C-C′ on page 3-32, data from 2LMW7 (approx. 120 feet away from line) is used rather than 2WTB2 (approx. 20 feet away from line). The hydrology varies between these points, for example:

(a) fill is absent at 2WTB2 while 2LMW7 identifies 16 feet of fill.

(b) top soil is identified below the dredge spoil at 2WTB2, yet this top soil is absent at depth at 2LMW7S.

(2) In cross section C-C′ and the text both 2LTB3 and 2LTB1, which are located between 2LMW7 and 2LMW9, encountered refusal at 66.6 ft MSL and 64 ft, respectively,

while 2LMW7 encountered bedrock at 53 ft MSL and 2LMW9S encountered refusal at 42.5 ft MSL. Either the cross section conceptualization is incorrect or refusal within the dredge spoil can not be assumed to be the top of the bedrock.

(3) Boring 2LMW9S identifies several units below the dredge spoil which strongly suggest the presence of fill rather than "natural" sand and gravel. Cross section C-C′ should reflect this condition.

(4) The use of 2MW16 next to 2MW15 in cross section C-C′ may be misrepresenting the local geology in light of the topographic high between the two borings.

Page 3-35, ¶ 1 A rationale for the procedure used to measure ground water elevations in offsite wells needs to be provided. Why was an initial measurement taken, the well pumped, remeasured and the lowest measurement used?

Page 3-36, ¶ 1 (a) Vertical head gradients are discussed in this paragraph, but no calculations are included in this report. The text mentions a ± 1 foot upward gradient in one case, but it is not clear if the 1 foot is the head difference between the two wells or a gradient of +1 ft/ft.

(b) We don't believe that one round of groundwater elevation is sufficient to conclude that bedrock groundwater does not discharge into North Lake. Continuous recorders should be installed at the 2DMW16 wells in addition to head measurements in North Lake to determine groundwater/surface interactions between North Lake and the groundwater system.

Page 3-38,39 These two cross sections, which intersect at 6TB3, do not match. 6TB3 has different stratigraphy in each cross section and for other wells, the stratigraphy is incomplete. For example, silt and clay on the logs is shown as sand and silt on the cross section. The length of cross section B-B′ in Figure 3-23 is 565 feet, but the cross section line in Figure 3-21 is 458 feet.

Page 3-40, ¶ 5 A review of the abbreviated single well pumping test for well 6MW2 shows that the well was not pumped long enough to get meaningful data. The transmissivity was calculated from early time data only (0.001 minutes to 10 minutes). However, review of the semi-log plot shows that the rate of drawdown increased after 10 minutes. This delayed yield is usually due to dewatering effects in an unconfined aquifer, thus early time data is not representative of overall aquifer conditions. Had the pumping test been run out to 1000 minutes instead of 62 minutes, a greater ▲s for use in the time-drawdown analysis would have been calculated.

By using the ▲s for the data from 10 to 62 minutes, a T of 1058 ft^2/day and a K of 53 ft/day can be calculated using the time-drawdown method. This result is much closer to the text book value of 50 ft/day that Atlantic ultimately relies on for their estimates of flow velocity and aquifer discharge to the Thames River. In reality, had the pumping test been run to 1000 minutes, the drawdown data would have to have been corrected for the effects of an unconfined aquifer or the time-drawdown method would not have been a valid analysis.

Page 3-41 Given the massive bedrock outcrop and rapid elevation change east of the railroad tracks, the elevation 2 foot and especially the 3 foot contour (above ground elevation 70) in the overburden aquifer shown in this figure are suspect and should be reviewed.

Page 3-42, Section 3.7.7 Lower Subase With regards to this section, the construction of wells with backfill filter packs in wells 13MW8, 13MW9, 13MW15, 13MW16, and 13MW17 deviates from the April 1989 Final Plan of Action (Appendix B) and description of work in the Draft Report (i.e. the "clean washed Ottawa sand" p. 2-29, 2nd para.). The rationale for this deviation needs to be provided.

Page 4-2, ¶ 4 The statement for ARAR and TBC using arsenic as an example is inappropriate.

Page 4-2, ¶ 6 The use of the published background values for inorganic concentrations in soil is not acceptable. The reference cited includes background concentrations calculated from the entire Eastern United States. All efforts should be made to obtain actual samples for the determination of background values. The objective of this is to analyze "clean" samples specifically associated with the site. The use of USGS survey information may be used as a last resort only.

A wide range of inorganic concentrations are found throughout the region, as soil types and bedrock geology varies. Furthermore, use of the "95 percent value limit" as a typical background concentration is not reasonable; this implies the assumption that subase soils, in the absence of site-specific contamination, have some of the highest inorganic concentrations found in the Eastern U.S. Uncontaminated local background samples should be collected.

Page 4-3 These tables on ARARs are currently being reviewed by the Office of Regional Counsel.

Page 4-3 This table would be more useful if it contained citations for each requirement. At this stage of the investigation, the Navy should be able to explicitly reference specific citations for sites especially for chemical- and

location-specific ARARs. The broad references to regulations will make it difficult to determine which aspects of each regulation is ARAR/TBC criteria. A number of these ARARs should also be included in the action specific listing if they apply to the use of technologies and allowable discharge/emissions limitations (i.e., CAA, NESHAP, etc.).

It is unclear why the RCRA Solid Waste Standards are categorized as "Not ARAR" instead of "Potential ARAR." Appendix D states that Bunker A-86 is one of six areas which contain solid waste. Similarly, it is also unclear why this table categorizes the Federal RCRA UST Standards and state UST regulations as "Not ARAR." Again, Appendix D (Page D-2) states that the Torpedo Shops site is one of three sites that contain underground petroleum storage tanks. This table should be corrected accordingly to reflect the status of ARARs as explained in Appendix D.

The Toxic Substances Control Act (TSCA) should be categorized as "TBC" for the Torpedo Shops since PCB contamination has been detected in this area.

Page 4-3 The analytical methods utilized for this study do not provide aqueous detection limits suitably low for several of the ground water ARARs or TBCs listed in Table 4-2. Of particular concern are the volatile organics vinyl chloride, benzene, chloromethane and 1,2-dichloroethane and several semivolatile organic polynuclear aromatic hydrocarbons (PAHs).

The April 1989 Final Quality Assurance/Quality Control and Data Management Plan, prepared for the Navy by Atlantic, provided a summary of analytical methods in Table 5-5. The table listed EPA's "Methods for Determination of Organic Compounds in Finished Drinking Water and Raw Source Water" in addition to EPA "SW-846 Test Methods for Evaluating Solid Waste" as methods to be employed in addition to the CLP SOW protocol. The EPA drinking water Method 524.2 and SW-846 Method 8310 provide aqueous detection limits more appropriate to the study objectives than CLP methods.

Page 4-4 For presentation purposes, it is recommended that the Navy separate Area A and OBDA as discussed in previous discussions. This column is misleading when, for example, TSCA is considered TBC for Area A but not for OBDA.

Page 4-7 It is unclear why the Navy categorizes federal RCRA and state UST Standards as "Not ARAR" for the Torpedo Shops. Appendix D states (1) (Page D-2) that the Torpedo Shops site contains underground petroleum storage tanks, and (2) (Page D-14) the Naval Installation Program does address oil and petroleum contamination.

It is also unclear why the Navy categorizes the federal RCRA and state Solid Waste Regulations as "Not ARAR" for the Rubble Fill at Bunker A-86, and why the Navy categorizes the state Solid Waste Management Regulations as "Potential ARAR" for the CBU Drum Storage Area. These categorizations are not consistent with discussions in Appendix D which state that these regulations are potentially applicable for the Bunker A-86, and not applicable for CBU Drum Storage Area. This table should be corrected to reflect discussions Appendix D.

It is unclear why the Navy categorizes the PCB Regulations under TSCA as "Not ARAR" for the Torpedo Shops Site. Appendix D (Page D-15) states that "It is believed that the PCB contamination in Goss Cove, DRMO, and Area A Landfill resulted from the storage of transformers containing greater than 50 ppm of PCBs. At the Torpedo Shop, the source of PCBs is unknown." Since these standards regulate the disposal and cleanup of PCBs, the Navy should include the federal PCB regulations as ARAR.

The Navy should also categorize the Connecticut Siting Council Hazardous Facility Siting Regulations as "Potential ARAR" for all sites since the need for construction of any new hazardous waste disposal facilities has yet to be determined.

<u>Page 4-9, Table 4-2</u> The following revisions are necessary relative to groundwater:

(1) Barium has a proposed MCL and MCLG of 2000 ppb.
(2) Cadmium has a final MCL and MCLG of 5 ppb.
(3) Chromium has a final MCL and MCLG of 100 ppb.
(4) Copper has a proposed MCL and MCLG of 1300 ppb.
(5) Lead has a final action level of 15 ppb based on treatment technique. FR. (Vol. 56, No. 110, 6/7/91).
(6) Silver does not have a final MCL.
(7) Gross Alpha MCL is 15 pCi/L.
(8) Chloroform does not have a final MCL.
(9) 1,2 Dichloroethene has a final MCL of 70 ppb.
(10) Ethylbenzene has a final MCL of 700 ppb.
(11) Tetrachloroethene has a final MCL of 5 ppb.
(12) Xylene has a final MCL of 10000 ppb.
(13) Endrin does not have a final MCL of 0.2 ppb.
(14) Methoxychlor has a final MCL of 40 ppb.
(15) PBCs should be corrected to PCBs.

<u>Page 4-9, Table 4-2</u> The additional revisions to this table are necessary:

(1) Soil does not have chemical specific ARARs or TBCs. It is not understandable why the same number presented as ARARs for ground water are also presented as TBCs for soil for some compounds. Also, the values presented for PCBs and dioxin and TCLP values for some compounds may be action

specific rather than chemical specific ARARs and TBCs.

(2) What is the purpose of listing maring AWQCs for inland surface waters?

(3) It is not appropriate to compare AWQC to ground water.

Page 4-16 References to ARARs should include dates, since these are updated regularly.

Page 4-18, Section 4.5 (a) In the 3rd paragraph, the values of TCE and PCE are compared to the TBC values. As previously noted, there are no TBC values for soil.

(b) It is indicated on page 4-25 that pesticide "blocks" were placed on the wetland ice and dispursed vial melting of the ice. The detection of delta-BHC and Methoxyclor may indicated disposal in this area and should be further examined.

Page 4-25, Section 4.6 (a) There is no discussion of the results from samples of surface water and sediment samples from the Torpedo Shop area (e.g. 7SW and 7SD). These items must be included in this section.

(b) The septic tanks from the torpedo shops should be sampled in future phases of the work.

Page 4-26, Figure 4-3 The Navy indicated that soil borings and wells would be positioned based on the results of soil gas surveys, in a March 6, 1991 response letter to EPA (response 1a, page 1). However, there is no soil sample, boring or well located at the soil gas "hot spots" which were observed at the north leach field. This omission should be explained, and if possible, a soil boring should be advanced at the location of the hot spot in subsequent field investigations.

Page 4-35, Section 4.7.3 Trace to low levels of 1,2 dichloroethane and TCE were found at SG1 and SG9 which appear to outside the extent of the previous fill areas. Also, high levels of PAHs were found in 8TB3 which also appears to be outside of these areas. Future work will have to expand investigations in that area.

Page 4-38, Figure 4-6 The text should indicate why soil borings were not located within the areas of soil gas hot spots which are indicated on this map.

Page 4-63, ¶ 1 The separately bound geophysical report should be provided.

Page 4-64, Section 4.11.1.4 On page 1-21, reference is made to a concrete pad where drums, etc. were stored. However, review of

the sampling locations does not appear that any borings or sampling was performed in this area. Please provide the rationale.

Page 4-102, Section 4.11.4 This office does not agree with the third sentence in the fourth paragraph which commences with "As discussed in Section 3.0, the..." for the following reasons:

(a) Section 3.0, (p. 3-36) states that "bedrock groundwater likely does not discharge into North Lake." Whether or not bedrock groundwater discharges into North Lake has not yet been conclusively determined because the Navy's presumption is based on one round of water level measurements from one well pair.

(b) The water table was found to be 1.3 ft. below ground surface during the 3/21/91 water level measurement event. At this elevation, groundwater from the overburden aquifer can be expected to be discharging into North Lake. If and when the lake is emptied out, then the chances are even greater that groundwater will discharge into it.

(c) It appears that the Plan of Action was not followed by having only one of two planned soil lab analyses from 2LMW7S and, instead, having one unplanned lab soil analysis for boring 2LTB2. The rationale for this deviation and for the selection of all other subsurface soil sample locations need to be provided.

(d) Analytical data for well 2LMW13S is not provided in Tables 4-32 and 4-33 or Plate 4-2, yet it is described in the text as a location where cadmium was detected (p. 4-102). The data for this well needs to be provided.

(e) A boring log for 2WMW4S needs to be provided.

Page 4-145, Figure 4-32 Based upon the text, it is unclear how the soil contamination limits shown in the figure were defined.

Page 4-147 Table 4-51 Radiological screening values were exceeded at the Goss Cove Landfill, Area A and the DRMO; exceedances were attributed to natural sources at these sites. Additional radiological screening at sites believed to represent typical background conditions for the area is necessary to support this hypothesis given the possibility of radiological contamination based on site history.

Page 4-151, ¶ 1 Additional investigations and collection of surface water and sediment samples may be required to fully evaluate potential impact of the lower subase site on the Thames River. While no seeps were observed during a waterfront inspection, contamination was found in other media, and seeps are

likely to be periodic.

Page 5-1, ¶ 4 The text acknowledges that solubility, vapor pressure, Henry's Law constant, K_{oc}, and K_{ow} are dependent on temperature. The applicable temperatures for these parameters should be provided in Table 5-1.

Page 5-1, ¶ 6 The last sentence of this paragraph indicates that solution into the liquid phase will control the rate of volatilization for some materials. This sentence is not clear. Henry's Law is an equilibrium coefficient and the rate of solution into the water phase will not influence this parameter. This sentence should be clarified.

Page 5-4 Footnote (c) K_{oc} values are estimated by the method presented by Lyman et al. (1982). The last sentence on Page 7-11 provides a method of estimation of K_{oc} attributed to Markwell et al. (1989). A consistent method of estimation of all of the mobility parameters should be used.

Page 5-5, ¶ 3 Soil characteristics such as porosity, soil water content and soil bulk density are discussed as parameters which are important in determining the mobility of contaminants at NSB-NLON. Organic carbon content, pH, eH, cation exchange capacity, particle size distribution, clay content are also important. However, it does not appear that these parameters have been measured at the site. These parameters should be measured. If they are already known they should be discussed in this section.

Page 5-5, ¶ 3,4 The movement and mobility of light and dense non-aqueous phase liquids should be discussed in these sections.

Page 5-9, ¶ 4 Dibenzofuran is measured as part of the semi-volatile analysis. In locations where dibenzofuran was detected, an analysis for all chlorinated dioxin/furan compounds should be performed.

Page 5-11, ¶ 1 The last sentence in this paragraph should be amended to include the presence of other metals which will also influence the mobility of metals in the environment.

Page 5-12, Section 5.2.1.1 A conceptual model for each site should be presented or referenced in this section to illustrate the various exposure routes resulting from contamination at each site. This would clarify the presentation of exposure routes and ensure that all exposure routes are considered.

Page 5-13, Section 5.2.1.3 Some discussion on the phenomena of precipitation of dissolved metals in estuaries should be mentioned. This phenomena occurs when metals which are in equilibrium with fresh water encounter elevated levels of anions present in salt water. Flocculation and precipitation of these

metals has been demonstrated in these situations. This mechanism should be considered and the possibility of contaminant accumulation in the estuary should be discussed.

Page 5-14, last ¶ The statement "...and the following inorganics above MCLs: barium, sodium, iron and manganese" is confusing, because only barium has a current MCL of 2 ppm.

Page 5-15, ¶ 3 It is not clear if the metals concentration presented for the ground water is determined using filtered or unfiltered ground water samples. Both filtered and total metals should be measured in the ground water. This will allow the evaluation of the presence of metals in the colloidal size material. Facilitated transport of colloidal material by ground water has been demonstrated as a mechanism of transport for otherwise insoluble and immobile materials.

This same paragraph indicates that metal compounds are tightly bound in the soils. This is inconsistent with the fact that arsenic, cadmium, chromium and lead exceed TCLP TBC values. This sentence should be modified to include this information.

Page 5-16, Section 5.2.2.8 The statement "The following other organics were measured above ARAR or TBC values: iron, manganese, sodium and aluminum" is inappropriate. For ground water, MCLs and MCLGs are ARARs and drinking water Health Advisories are TBCs. For the four metals listed above, only sodium has drinking water equivalent level which may be considered as TBC. Secondary MCL for the other three inorganics are neither ARARs or TBCs unless there are state standards for these compounds. Based on this statement and other previous statements in the documents that when it comes to compare contaminant concentrations to ARARs and TBCs, it is not clear what standard the values are being compared to.

Page 5-17, ¶ 2 Variability of transmissivity in the fractured bedrock is mentioned in this paragraph. The significance and impact of fractured material on contaminant transport should be mentioned in Section 5.2.1.2.

Page 5-18, ¶ 1 As noted in a previous comment, the recommendation was made to plug the invert in order to eliminate the possible condition of water from the stream discharging to North Lake at times of high flows. This comment should be reiterated in this paragraph.

Page 5-18, ¶ 2 Lead and copper are identified as contaminants of concern in surface water. The suspected source of this material should be identified.

Page 5-18, ¶ 5 This paragraph states that not enough data is available to define the most significant pathway for cyanide.

This argument is used several times in the report and strongly indicates that additional data is required at these sites. See comment for Page 5-5, ¶ 3 for additional data requirements. An aqueous geochemistry model should be used to evaluate the speciation of all inorganics of concern. This will allow an evaluation of the mobility of the inorganics at the site in light of site specific aqueous geochemistry.

Page 5-18, ¶ 6 The presence of chlorinated dioxin at this site should be investigated. See comment for Page 5-9, ¶ 4.

Page 5-19, ¶ 4 Reduced conditions are indicated as the possible mechanisms for precipitation of metals. The eH of the soils and ground water at each Step II site should be measured.

Page 6-1, ¶ 2 The risk assessment guidance used should have been USEPA, 1989, not USEPA, 1990, as stated.

Page 6-2, ¶ 7 Which EPA's guidance is the statement in the paragraph referring to?

Page 6-3, ¶ 6 Trespassers may need to be considered for future scenarios; fences and guards may not be in place in the future, if areas of the base are closed or become inactive.

The potential for future use of ground water as a source of drinking water on the base or in neighboring residential areas should be considered. The state classification for ground water at the base is either GA/drinkable or GB/may require treatment before consumption. Some ground water is too saline for human consumption, and may not need to be considered in future use scenarios. The potential for contaminant plumes reaching residential areas offbase and the likelihood of base closure should be evaluated and discussed in the risk assessment.

Page 6-6, Section 6.1.3 This section is just a general outline of how to select compounds of concern, and no actual selection process is presented in this document. Table 6-2 does not indicate what compounds are selected for what medium. A contaminant-specific rationale should be provided for each contaminant excluded from further consideration. Exclusion of inorganics based on regional concentrations is inappropriate (see comment for Page 4-2, ¶ 6). Information on the concentration of chloroform and isophorone should be provided here, as well as information on the toxicity of diethylphthalate. In addition, there is some reservation to the use of natural background as determined in this study to eliminate and choose inorganic COCs.

Page 6-9, ¶ 2 The arithmetic mean was used to calculate average exposure point concentrations. Information should be provided on the distribution of the data. Contaminant data is frequently distributed log-normally; if this is the case for this data set,

the geometric mean would be more appropriate than the arithmetic mean.

Page 6-11, ¶ 1 During our recent site visit in October, the area east of North Lake was in the process of being fenced to prohibit any children from entering the area downstream of Area A. This information should be provided in the report, and any resulting assumptions should be revised.

Page 6-14, ¶ 2 Accessibility of the Overbank disposal area from Area A should be addressed. Future exposure scenarios involving trespassers should be developed for this area.

It would have been useful to summarize samples taken, and contaminants detected and levels recorded for the CBU Drum storage area here.

Page 6-14, ¶ 3 See comment Page 6-14,¶ 2. The possibility of future exposures of trespassers at the Rubble Fill site should be considered.

Page 6-14, ¶ 6 Additional exposure scenarios (e.g., exposure of children to surface soils and exposures involving the Thames River) should be considered for the Goss Cove site as appropriate data are collected.

Page 6-16 A higher ingestion rate of soil (i.e., 480 mg/day) is appropriate for utility maintenance workers for this and other similar scenarios; such exposure is probably more typical of yard work, for which the higher ingestion rate is derived, than indoor activity, which reflects a lower rate (EPA, 1991).

Pages 6-16 to 6-81, Tables 6-3 to 6-23 These tables are very tedious and much information has been repeated. The unnecessary data and unexposed pathways were also presented. It is necessary to make the following changes to represent only the information necessary for quantitative risk assessment:

(a) Omit the data for all the "no potential exposure" pathways in Tables 6-3 to 6-23.

(b) Although the average time is 70 years for carcinogens, the average time for noncarcinogens is the same as years exposed (i.e., exposure duration).

(c) The standard exposure frequency should be 350 days in accordance with the OSWER Directive 9285.6-03 Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors".

(d) Ingestion rate for surface water is incorrect. If a person swims 2.6 hrs per day and ingests 50 ml/hr, the

ingestion rate should be 0.12 l/day. The 1.2 l/day is based on a 24 hour period, and it is not possible that a person will swim 24 hours per day.

Page 6-17 Wherever possible, particulate emission models should be taken from Estimation of Air Emissions from Cleanup Activities at Superfund Sites Interim Final. EPA 450/1-89-003.

Page 6-22 See comment for page 6-16 regarding soil ingestion rate.

Page 6-31 The number of hours given in the notes column here and in Table 6-13 does not add to the number of hours used for the daily exposure period.

Page 6-34, ¶ 1 Future use of contaminated ground water (originating from Landfill A) as a drinking water supply should be considered as state classification of the ground water allows for the possibility of future use as drinking water and future base closure may be a possibility.

Page 6-34, ¶ 4 Current exposure parameters assume a 6 to 9 year old child will be exploring the area over a 6 year period. The age group exposed should be redefined to cover a 6 year period consistent with a reassignment of duty at this base.

Page 6-35 The ingestion rate given (200 mg/day) is for children under 6 years old. The lower ingestion rate of 100 mg/day should be used for the age group under consideration here.

The daily exposure period, exposure duration, and exposed body parts given here, and in other tables involving similar scenarios, all seem low for potential exploration during the summer, although probably appropriate for spring and fall exploration. If these levels are low because a zonal approach is being taken, this should be discussed and justified in the text.

Page 6-40 Dermal absorption of contaminants from surface water may need to be considered for this scenario, especially given the assumption in this table that the child's entire body is being exposed.

Page 6-41 As noted in a previous comment, the daily exposure period for swimming is estimated to be 2.6 hours per day and not 4 hours per day. The ingestion rate given on page 6-43 seems incorrect; assuming 50 ml/hr over 2.6 hours = 0.12 l/day, not the 1.2 l/day given. Also, please provide the skin permeability rate assumed here and in other tables.

Page 6-44 See comment above for Page 6-16 regarding the soil ingestion rate.

Page 6-47, ¶ 3 A justification should be provided for not considering the following future exposure scenarios for the DRMO site: (1) exposure of child trespassers to surface soils, and (2) effects of contaminated ground water discharge on surface water in the Thames River.

Page 6-72, ¶ 2 If further investigations reveal contaminant discharge into the Thames River, additional exposure scenarios may need to be considered.

Page 6-72, ¶ 3 If utilities are buried at 15 feet, contact with soils slightly below this depth should be considered, as well as contact with soils at and above this depth.

Page 6-82 The title of section 6.2.3: "Quantification of exposure" is not appropriate for Step I sites.

Page 6-84, Section 6.2.3.2 In the first paragraph of this section, see comment for Page 6-9,¶ 2 regarding distribution of data.

Page 6-85, ¶ 2 A description of the analytical models used to estimate airborne concentrations of fugitive dust must be clarified/expanded.

Page 6-85, ¶ 3 Wherever possible, particulate emission models should be taken from Estimation of Air Emissions from Cleanup Activities at Superfund Sites Interim Final. EPA 450/1-89-003.

Particulate emissions modeling and air dispersion modeling should be performed to evaluate airborne particulate concentrations at locations remote from the excavations.

Page 6-89, Section 6.2.4.2 Terms used should be consistent with EPA's superfund guidance. "ADD" is not consistent with the term in the guidance.

Page 6-89, ¶ 6 The averaging period for chronic exposures to non-carcinogens should match the exposure duration. This discussion implies the exposure duration for all chronic doses was assumed to be one year.

Page 6-91 Medium specific equation with all the parameters should be presented. For non-carcinogens, the average time should be the same as exposure durations. A 30 year exposure duration is recommended if no site specific data is available in accordance with the "standard exposure factors" of the OSWER Directive 9285.6-03. The statement in the sixth paragraph for long term concentration and the way to assess noncarcinogens is inappropriate.

Page 6-91, ¶ 2 The text should provide the "standard chemical

intake equations" used to calculate average daily doses.

Page 6-91, ¶ 8 The uncertainty discussion is extremely weak as written. The probable effect on calculations (i.e., increasing or decreasing exposure estimates) of factors listed should be discussed, as suggested in RAGS.

Page 6-93, ¶ 1 It is incorrect to calculate all the non-carcinogenic effects for all the compounds of interest. In fact, if the compound does not have RfD or other relevant noncarcinogenic toxicity data, it is impossible to assess this compound's noncarcinogenic effect.

Page 6-95, Table 6-28 The values presented in this table are not updated. The CPF of benzo(a)pyrene should be used as the default value for the CPFs of other carcinogenic PAHs. Benzo(g,h,i)Perylene should be deleted from the carcinogenic PAHs category because it is a Group D compound. Also, it is not appropriate to list default RfDs for C-PAHs or include the calculation of C-PAHs for noncarcinogenic effects. For the noncarcinogenic PAHs, if there are no verified RfD available, the interim RfD for naphthalene should be used as the default value.

Page 6-99 The following comment is relative to note q to explain why we do not use the proposed MCL for lead to derive an RfD.

A critical assumption implicit to the RfD is the concept of threshold (i.e., a dose level exists below which adverse health effects will not occur). This assumption precludes developing RfDs based on effects for which thresholds have not been established from experimental or epidemiological data or for chemicals for which theoretical considerations suggest the absence of a threshold. Carcinogens fall into this latter category; for example, theoretical considerations suggest a finite probability that cancer could arise from the interactions of a single molecule of a mutagen with DNA (U.S. EPA 1986a).

Unlike the case for carcinogens, there is no widely accepted theoretical basis for the absence of a threshold for many of the health effects associated with lead exposure. However, analyses of correlations between blood lead levels and ALA-D activity, vitamin D and pryrmidine metabolism, neuro-behavioral indices, growth and blood pressure indicate that associations may persist through the lowest blood lead levels in the populations tested (≤10-15 ug/dl). Thus, it is possible that if a threshold for the toxic effects of lead exists, it may lie within a range of blood levels < 10-15 ug/dl; however, the data currently available are not sufficient to adequately define the dose-response relationship for many of the toxic effects of lead in populations having blood lead levels, 10 ug/dl. Hence, it is not possible to confidently identify a blood lead level below which no undesirable health effects would occur.

The range of 10-15 ug/dl for blood levels represents a "level of concern". A level of concern is not the same as a threshold. In this case, a level of concern represents a blood lead level associated with health effects that warrant attention from a medical or governmental regulatory standpoint, and does not imply that a biological or toxicological effect may not occur at lower levels of exposure (Davis, 1990).

The complex nature of lead exposure has not prevented advances in our understanding of dose-response relationships for lead in humans because many of the health effects of lead in humans are correlated with blood lead levels. Thus, blood lead (ug/dl) is more an appropriate benchmark for exposure than a level in air (mg/m^3) or an oral exposure level (mg/kg/day). Although it is unclear if health thresholds exist for many lead exposure scenarios, significant concern is associated with blood lead levels. By estimating changes in blood lead levels, one may estimate change in risk of experiencing health effects associated with the blood lead level. By examining changes in blood lead distribution, estimates of population risk may be derived. It is possible to define critical changes of blood lead levels and associated effects. In this way, blood lead levels can be used to define risk in a relative sense.

It is currently feasible to utilize the biokinetic model to provide predictions of blood lead levels that will result from any given range of route-independent lead uptake rates and vice versa (U.S. EPA, 1989a). These models allow benchmark blood lead levels to be related quantitatively to route-independent uptake rates and can provide estimates of frequency distributions of blood lead levels associated with any given uptake.

In summary, the RfD approach at this time, is inappropriate for lead based on our current understanding of the dose-response relationship and unresolved toxicological issues, for the various effects of lead and multimedia nature of lead exposure. Multimedia exposure analysis coupled with predictive biokinetic models, however, provide a powerful tool for developing an alternative and more useful alternative risk assessment strategy for lead.

<u>Page 6-99</u> Toxicity data should be based on IRIS. If the compound does not have toxicity value on IRIS, then HEAST should be referenced. A FY-1991 HEAST is now available.

<u>Page 6-103, ¶ 5</u> The reason for not investigating the possibility of contaminant vapors entering the museum (presumably because the site is paved) should be stated.

<u>Page 6-104, Section 6.4.2.1</u> It is not appropriate to use the term "ADD(life)", because the dose should be calculated based on site specific duration (less than 30 years) or use the standard

duration of 30 years.

Page 6-105, ¶ 4 A zonal approach may be appropriate for evaluating risks from some media. For example, several sites may all contribute to risk for residence via inhalation, and therefore should be combined in final risk estimates.

Page 6-117, ¶ 4 See comment for Page 6-91,¶ 8 regarding the uncertainty discussion.

Page 7-1, ¶ 4 The EPA guidance referenced for ecological risk assessment (EPA, 1986) is incorrect; EPA, 1989 and EPA, Region I, 1989 are the correct citations.

Page 7-2, ¶ 5 The report states: " Compounds of concern were detected in environmental media at the CBU Drum Storage Area and OBDANE sites at very low concentrations, and therefore these sites were excluded from further assessment. The Rubble Fill at Bunker A-86 site was only qualitatively evaluated from a human health risk standpoint." A discussion should be provided as to whether or not there are any potential ecological receptors at or near these sites and a table provided showing levels of contamination detected and appropriate benchmarks before stating there are no ecological risks from these sites.

Page 7-3, ¶ 2 The compounds of interest used for the ecological assessment were identical to those selected for the human health risk assessment. Selection of contaminants of concern for the ecological risk assessment should consider potential to bioaccumulate and any differences in toxicity between humans and other biota. It is of concern that potential effects of pesticides and PCBs were eliminated from consideration in the ecological risk assessment. Is it realistic to expect that they will be confined to the subsurface or is absence from other media a reflection of inadequate sampling?

Page 7-3, ¶ 3 See comment for Page 2-2, ¶ 5 regarding treatment of non-detects.

Page 7-4, ¶ 5,7 The Connecticut Natural Heritage Program or a comparable state agency should have been consulted to determine whether or not there are any endangered, threatened, or special concern species on or in the vicinity of the base. U.S. Fish and Wildlife Service should be contacted to determine if there are additional trustee resources.

Page 7-4, ¶ 7 Field forms from the site visits should be provided in Appendix F.

Page 7-4, ¶ 8 The report does not state whether or not a formal wetlands delineation in accordance with the Federal Manual for Identifying and Delineating Jurisdictional Wetlands was

performed. Wetlands potentially impacted by contamination or remediation should be delineated during the remedial investigation.

Page 7-5, ¶ 5 The lists of species observed provided in Appendix F should be supplemented with a literature search to include species expected in the area, especially those that might be difficult to observe in the course of several site visits.

Page 7-5, ¶ 6 Partially based on the October 8th site visit in which the downstream ponds and watercourses appeared barren, in order to obtain a baseline on lower food web organisms to evaluate contaminant and potential remediation impact, benthic and invertebrate surveys should be undertaken at the downstream ponds and watercourses.

Page 7-9, ¶ 1 Amphibians and aquatic birds, mammals, and plants also will be exposed to potentially contaminated ground water discharge, surface water, sediment, and biota at lower trophic levels.

Page 7-9, ¶ 8 The report states: "Those carnivores whose diets are comprised largely of soil invertebrates will be at greatest risk." Higher order carnivores are likely to be at greater risk if contaminants that bioaccumulate (i.e., DDT) are involved.

Page 7-10, ¶ 2 It would be useful to know whether or not fish are actually present in the ponds in question. If they are not present, then a determination should be made as to whether their absence is a result of pond structure or site-related contamination.

Page 7-10, ¶ 5 Please provide a justification for not evaluating the effect of DDT contamination of surface soils/sediments on plants.

Page 7-11, ¶ 3 Extreme caution should be used in interpreting the result of comparing contaminant concentrations in ground water to AWQC to assess the effects of contaminants on soil invertebrates because AWQC were developed for aquatic species and soil invertebrates may have different uptake of and sensitivities to contaminants.

Page 7-11, ¶ 5 When reviewing the calculations, the method stated for determination of the toxicity quotient is in error. It should be stated that the toxicity quotient is calculated by dividing the soil/sediment concentration by the sediment quality criterion. The associated Appendix results are correct.

Page 7-12, ¶ 6 The final equation for concentration in the organism does not follow from the previous equations. For example, there are no exponents in any equations used in the

development of this equation.

If additional samples are taken, organic carbon content should be determined for site soils and sediments, so that actual values can be used in determining contaminant concentrations.

Page 7-12, last ¶ Potential ecological risk due to sediment/soil contact using the EP approach is based to a large extent on the organic carbon of the media. A 5% carbon content is stated as an assumption with no further explanation. In order to estimate associated risk as accurately as possible, actual organic carbon content must be determined through sampling and analyses along side chemical. These analyses should pertain to both lotic and lentic systems.

Page 7-13, ¶ 3 A habitat description should be provided for the Manomet Bird Observatory in Massachusetts to justify its use as a reference station. It would be preferable to select a reference station closer to the site.

Page 7-13, ¶ 3 (a) Is the reason for the lack of fish in the ponds of the downstream area an indication of a stressed system?

(b) It seems that the sample number totalling 6 frogs for the Area A wetlands and downstream areas shows a lack of representation of biota for the area in question. If possible, the samples should be taken at various locations throughout the area to adequately represent the area.

(c) There is no indication of bird sample locations on Plate 6-1 as stated in this paragraph.

Page 7-13, ¶ 4 If the problem of migration was a consideration, why wasn't a more likely non-migratory species chosen?

Page 7-13, ¶ 5 Further justification should be provided for not estimating bird and mammal body burdens for metals occurring above background levels. Heavy metals could be persistent in the environment and are toxic to vertebrates.

Page 7-13, ¶ 8 As stated in this report, fledgling catbirds are more likely to have fed in the study area than elsewhere; however, they have had less time to accumulate contaminants than adult birds, and may underestimate the magnitude of the contamination. Also, catbirds feed on low trophic levels, and thus are not the best choice for assessing affects of contaminants that bioaccumulate; predatory birds would be a better choice. Please provide a justification as to why body burdens of contaminants were not estimated for predatory birds.

Page 7-17, ¶ 4 See comment for Page 7-13,¶ 3 regarding selection of a reference area.

Page 7-17, ¶ 6 The uncertainty discussion as presented is weak. Typically, uncertainties associated with sampling methods and locations, assumptions used in models, selection of benchmarks, etc. should be discussed with respect to whether they are likely to under- or overestimate dose.

Page 7-20, ¶ 1 Biota (frog) and pond sediment samples were taken from different areas and showed different contaminant levels. Therefore, additional sampling of biota and pond sediments/water may be required to fully characterize and assess the effects of contamination at this site.

Page 7-21, ¶ 3 The general approach taken for calculating NOAELs from acute/chronic lowest observed effect levels was to multiply by 0.1. It may be appropriate to multiply these values by 0.01 to account for differences is sensitivity among species. While the primary interest is in evaluating population effects rather than individual effects, individual effects can lead to population effects. See comment for Page 7-33,¶ 4.

Page 7-25 Provide references for EPA, 1987 and US ACOE, 1984.

Page 7-27, Table 7-6 Arsenic, cadmium, copper and iron should be shaded as they do exceed AWQC chronic values.

Page 7-29 Provide the units for the concentrations given in this table.

Page 7-33, ¶ 4 The report states: " We assume that if effects are judged to be insignificant at the average individual level they are probably insignificant at the population level." This statement is not necessarily correct. If a particular sex or age class is more sensitive than the average individual, population effects will occur, even if the hypothetical average individual is unaffected.

Page 7-40, ¶ 5 Sediment concentrations of zinc could potentially have effects on organisms consuming contaminated plants. However, absence of zinc contamination in surface water was used to claim the risks from zinc contamination in sediments is low. It is inappropriate to use data from one media to evaluate risk in another media, as was done here and elsewhere in this report.

Page 7-47, ¶ 3 High acetone concentrations are attributed to the possibility of laboratory contamination. It should be stated whether acetone was found in blanks and at what concentration.

Page 7-47, ¶ 4 Further explanation should be provided as to why DDT detection limits were high.

Page 7-50, ¶ 5 It is inappropriate to conclude risks are slight from heavy metals when chronic risk quotients range up to 100.

Page 7-53 Although the theoretical presentation of the approach the Navy used to calculate doses of PAH and DDTR for small mammals and birds is reasonable, insufficient information was presented to allow independent verification of calculations.

Page 7-54, ¶ 3 It is inappropriate to eliminate the surface soil sample taken just west of the woodland (2WSD9) from consideration because it had higher contaminant levels than other samples; it may represent a local hot spot.

Page 7-54, ¶ 4 While mammals and birds feeding directly on invertebrates may be maximally exposed to soil contaminants that do not bioaccumulate, they are unlikely to be maximally exposed to contaminants that do bioaccumulate. Potential effects on these organisms cannot be properly evaluated based on risk calculations for other trophic levels. The effects of contaminants on aquatic birds that may be exposed to contaminants in a variety of media (surface water, sediments, and biota) also cannot be evaluated with the risk calculations provided.

Page 8-1 Section 8.0 The cover of Section 8.0 states "Summary and Conclusions" while the text inside states "Summary and Recommendations". The purpose of Section 8.0 should be clarified.

Page 8-1, Section 8.0 (a) The ARARs and TBC mentioned throughout this section are confusing. It is necessary to indicate the exact value and the exact standard or criterion the concentration of the contaminant of concern is compared with.

(b) It is necessary to state the exact risk based on the risk characterization. The term "de minimum risk" or "within one in one thousands risk" give a very vague description of the results of risk characterization.

Page 8-1, ¶ 1 The fact that analytical results from a particular site did not result in contaminant values that exceeded ARARs or risk-based criteria, is not a sufficient means for determining whether the site should undergo further investigations.

The CERCLA criteria for determining whether an RI/FS should be performed on a particular site does not consider ARARs or risk based values. Generally, the amount of sampling which is performed for a PA/SI (Step I investigation) is only sufficient to determine the presence of contamination, not the nature or extent. Furthermore, all media are not typically sampled in the PA/SI phase.

The PA/SI relies on "indicators" of a release to determine if further investigation is necessary. If evidence of a release is noted, and the Hazard Ranking Score is higher than a

predetermined threshold value, the site is listed on the National Priorities List and must undergo the RI/FS process. In the case of the three sites which the Navy proposes for No Further Action, evidence of a release was noted at all three sites, and therefore the sites should continue to be investigated.

The Navy recommends that all Step II Sites proceed to the Feasibility Study stage; however it is not clear that sufficient data have been collected for the three Step II sites.

Page 8-1, Section 8.1.1.1 Since, as the Navy indicates, "a small release may have occurred" at this site, additional investigation should be performed to determine the nature and extent of contamination, and to perform a quantitative risk assessment.

Only one soil analysis for inorganics was performed. Given that the sample contained concentrations of lead which may be related to waste stored at this site, additional soil samples should be collected.

Volatile organics and semivolatile organics were detected in composite surface soils at this site. Since compositing can dilute contaminated samples by adding uncontaminated sample to the composite, additional subsurface sampling should be performed for volatile and semivolatile organics. Ground water sampling should also be performed to assess concentrations of organics and inorganics. Analytical methodologies for both media should be chosen to provide detection limits below the ARARs/TBCs.

Page 8-3, ¶ 4 Additional ground water analysis for PCBs and pesticides should also be performed.

Page 8-5, ¶ 10 Soil sampling for dioxins and furans should be performed to assess potential contamination in incinerator ash.

Page 8-6, ¶ 2 Additional further investigations that should be performed include:

- borings and or wells placed at the location of soil gas hot spots;
- soil sampling below 10 feet near 8TB2 and 8TB3 due to the high levels of PAH detected;
- soil and ground water analysis for organics and inorganics.

During our previous site visit on October 8, 1991, booms were surrounding the three outfalls which discharge in the Goss Cove area. It was noted that on occasion, oil residues, both No. 2 and No. 6, flow from these drainage pipes. The source of this oil was said to be storage tanks underneath the baseball field.

The sediments along the shore in this area should also be examined.

Page 8-6, ¶ 6 Only one soil location was sampled for inorganics and two locations for organics. At least three samples should be collected and analyzed for full TCL/TAL prior to recommending this site for No Further Action.

Additionally, ground water should be analyzed for organic and inorganic constituents.

Page 8-7, ¶ 7 The Step I investigation did not include any soil borings advanced to the water table, although the most likely release mechanism and pathway at this site would be a UST leaking and infiltrating down into the ground water. EPA can not concur with the Navy's No Further Action recommendation for this site until such soil sampling is performed, and ground water samples are collected.

Page 8-10, ¶ 5 This paragraph implies that the origin of the VOCs detected in the dredge spoils is the Thames River. It is unclear how such contamination could be present in the river sediments. Regardless of the original source, the soils are now themselves a contaminant source.

Page 8-13, ¶ 2 The text discusses a plume at Area A in the bedrock. A figure showing the estimated extent of the plume should be presented.

Page 8-13, ¶ 5 A series of cross sections showing the flow field and the contaminant distributions should be presented in this discussion.

Page 8-14, ¶ 3 The text states that "...it is indeterminate if these [offbase residential] wells are upgradient or downgradient of the western portion of the Area A Landfill. From the ground water contour maps, it appears that these wells are "side gradient" from the landfill, an alternative possibility to consider.

Page 8-18, Landfill soils Landfill soils should also be sampled for chlorinated dioxins and furans to assess contamination from incinerator refuse.

Page 8-19, North Lake During our previously noted site visit, groundwater seepage at the east end of the Lake was evident. Sediments at this point as well as groundwater should be analyzed for the TAL and TCL.

An additional recommendation should be to cap or remove the eastern overflow pipe which may allow some of the drainage from the Area A to enter North Lake.

Page 8-19, Downstream Watercourses and Pond Two unnamed ponds to the Northeast of North Lake were visited and appeared to be lacking in wetland ecological activity. Some benthic surveys should be performed to evaluate benthic populations. In conjunction with this, toxicity testing should be performed on the sediments at depositional areas of downstream water courses and the two above mentioned ponds.

Additional sediment sampling and analysis for TCL and TAL is needed for the "lower" pond on the north side of downstream area "A". One sample is not sufficient to characterize the pond. On all sediment results, units should be indicated as being on a dry or wet weight basis.

With the possibility of wetland remediation, there is the need to properly delineate the wetlands on the Navy property as well as those that are affected by contamination whose source lies within naval property boundaries. This must be done as described using the Federal Manual For Identifying and Delineating Jurisdictional Wetlands.

Page 8-22, ¶ 8 Since the DRMO was reportedly used as a burning ground, the near surface soil should be sampled for the presence of chlorinated dioxins and furans.

The outflow labeled 2DSD12 on the DRMO had considerable output. There is a need for additional sampling along the shore line of the Thames River upstream, downstream, and outward. There is also a potential for periodic flooding of the river on to the DRMO causing further contamination which should be examined.

An additional recommendation should be to install monitoring wells in the areas where high "hits" were recorded, such as in the vicinity of 6TB4.

Appendix A The depths of the soil gas samples should be provided in the Appendix A tables.

Appendix D

(1) Page D-3, ¶ 4 The second sentence of this paragraph states, "The state has classified the water quality of this segment of the Thames River as SC/SB." It should be noted that the CTDEP is currently considering changing this SC/SB water quality classification to SA. For completeness, the Navy should provide an updated water quality discussion pertaining to this potential water quality classification.

(2) Page D-5 The second sentence of the sixth paragraph pertaining the applicability of the state Hazardous Waste Management Regulations states, "For all applications to chemical specific ARARs, Connecticut's regulations are identical to

EPA's." It should be noted that Section 22a-449(c)-106, "Standards for the management of specific wastes and specific types of hazardous waste management facilities" states that more stringent provisions may need to be addressed pertaining to spent lead-acid batteries. The final disposition of spent lead-acid batteries is currently unknown for the OBDA, therefore, these regulations may be considered potentially an ARAR if these materials ("spent batteries") are transported, stored, or collected for recycling or reclaiming.

(3) Page D-12 The seventh paragraph states, "See discussion on federal RCRA standards. There are no significant differences regarding location standards between federal and state regulations." While we agree with this statement, there are more stringent provisions for chemical-specific ARARs provided in Section 22a.-449(c)-106. See previous comment regarding spent lead-acid batteries corresponding to Page D-5.

(4) Page D-13 The second paragraph states, "The NSB-NLON property is presently an existing well field and to date has not been identified as a potential well field ARAR." The Aquifer Protection Areas (22a-354a through 356 CGS) should remain potentially an ARAR pending the final completion of these requirements.

(5) Page D-18 Subsections 4.1 and 4.2 provide discussions of federal and state requirements that will be considered in selection of a final remedy at NSB-NLON. The Navy should provide a limited discussion for each TBC similar to the discussion for ARARs. Also, two of the three state TBCs under the Department of Health Services and CTDEP should be included in Table 4-1.

Appendix E A justification should be provided for samples that were analyzed but not included in the risk assessment. For example, in Appendix E, the list of samples used for the scenario involving subase children exploring Area A streambeds and wetland (sediment) has only a partial list of sediment samples collected from Area A. Please justify the exclusion of samples 2WSD3 through 2WSD9. Justifications should be provided for samples excluded from other scenarios, as well.

Appendix F-1 There is no indication in the species list of any freshwater finfish. This shows inconsistency within the document. If fish were anticipated to inhabit ponds in the downstream areas, as indicated by a proposed fish survey in April 1990, they should be included. If they were omitted due to their absence in the ponds, then the possible reasons should be addressed, i.e., contamination, habitat requirements, etc.

Appendix F-2 Units should be indicated as part of the heading.

SECTION 1.0: PRELIMINARY REMEDIAL TECHNOLOGIES

The following comments are relative to the review of this section of the Feasibility Study:

Page 1, ¶ 5 Item 1 Development and Screening of Alternatives lists five (5) steps; however, these steps are not consistent with the CERCLA RI/FS Guidance (EPA 1988), Section 4.1.2.1 which lists six (6) general steps relative to the development/screening of alternatives. These steps identified in the RI/FS Guidance include:

1) development of remedial action objectives
2) development of general response actions
3) identify volumes are areas of media
4) identify and screen technologies
5) identify and evaluate process options
6) assemble remedial alternatives

Note that 3 of the 5 items listed in the FS document [identify treatment technologies..., screen technologies, and identify action-specific ARARs] all fall under Item 4) above. Thus, the list provided above is more comprehensive in outlining the components of the alternative development process.

Page 1,¶ 5 The upfront discussions regarding technology screening/alternative development should identify whether an operable unit approach is being utilized by the Navy to address discrete site areas and/or media. Such information needs to be included in the FS because each alternative must be designed such that it addresses all areas or media included within the specific operable unit designation.

For instance, if an entire site consisting of soil and ground water contamination is addressed as a single operable unit, then each alternative must incorporate technologies which affect treatment of soils and ground water. If soils and ground water are treated as separate operable units, then separate alternatives would be developed for each media. Thus, alternative development must proceed in concert with the operable unit approach being used (if any) by the Navy.

Note that the operable unit approach not only applies to site media, but can be used to separate discrete portions of a facility into separate areas (each subject to separate RI/FSs).

Page 2, ¶ 6 Section 1.2 Screening of Technologies is not developed in a manner consistent with the CERCLA RI/FS Guidance, Section 4.2.4 Identify and Screen Remedial Technologies and Process Options.

CERCLA Guidance specifies that the technology screening process includes the following two steps: 1) the universe of potentially applicable technology types are screened on the basis of

technical implementability, and 2) for technology types not screened during the first step, technology process options are evaluated based on effectiveness, implementability, and cost to select a representative process option for each technology. The representative process options are then combined to formulate remedial alternatives.

The Groton FS document presents only a single technology/process option screening step, and the criteria for conducting this initial screening effort are not clearly stated. No representative process option is selected for each technology, thus the Navy's efforts are incomplete.

It is recommended that the Navy adopt the two-step approach recommended in the CERCLA Guidance. The first screening step should evaluate technical implementability (including the ability of the technology to achieve preliminary remediation goals or ARARs).

The second step should evaluate each process option on the 3 criteria stated above.

Page 4 Table 1-1 Areas of Concern (a) This table does not present information or data which is substantial enough to support the technology screening effort. To properly assess the "implementability" of a technology at the site, it is important that the FS state the volume/areas of media requiring treatment, and a complete list of chemical compounds present in each medium.

Table 1-1 provides a qualitative discussion of health risks associated with the DRMO, Lowerbase, and Area A. These discussions give little insight into the nature of the contamination problem at each site. To properly support a technology screening effort, this table should present for each media at each site, a complete list of the chemical compounds which pose a carcinogenic risk or non-carcinogenic risk under baseline conditions, the current concentration of the compound, and the risk estimate. Next, the table should present a target risk range [acceptable risk range] and a target or clean-up concentration for each compound.

The above information would inform the FS personnel as to what contaminants need to be treated, and to what level, thus providing them with the information needed to select the appropriate technologies.

Note - the information discussed above (i.e., target clean-up levels) should actually be folded into the Remedial Action Objectives (RAOs) for the site. RAOs should be developed prior to technology screening, and should specify the contaminants of concern, exposure routes and receptors, and a quantitative target clean-up level or goal based on ARARs and the risk assessment.

(b) It is stated that there are no ecological risks at both the DRMO and Lowerbase. Additional sampling and information must be gathered before this conclusion can be drawn.

Page 7, Table 1-3 In the Screening Comments relative to the Fencing process option, it appears the last sentence is not complete.

Page 8 Table 1-3 Screening of Technologies for Soil/Sediment. Under the "biological" treatment category, aerobic degradation is cited as a potential technology. The screening comments indicate this technology is not applicable for metals, and may not degrade PCBs. This technology is then cited as a "Potential Option" for all three source areas (Area A, DRMO, LWR Base).

1. Table 1-1 indicates the DRMO is contaminated with PCBs, PAHs and metals; thus, considering the ineffectiveness of aerobic degradation in treating PCBs and metals, the use of this technology at this site is not warranted.

2. Table 1-1 indicates soils in the Lowerbase pose no risk. Thus, according to Table 1-1, remediation of soils is not warranted at this site.

3. Table 1-1 indicates that Area A soils are contaminated with PCBs, thus, the use of aerobic degradation at this is clearly not warranted based on the screening comment.

   As indicated above, there appears to be no rationale for the selection of aerobic degradation as a process option. The upfront information is inadequate to select a process option, and the screening and process option selections are inappropriate.

It is noted that the above problem is noted in numerous instances in Table 1-3. For instance, on p. 9, soil venting is selected as a process option for treating soils in all three areas. Soil venting is appropriate to the removal of VOCs; however, as indicated above, the contaminants of concern at the DRMO and Area A are PCBs and metals. Therefore, the use of soil venting at these sites does not appear to be a viable option.

As a final consideration, site-specific conditions must be considered in determining whether a technology is readily implementable at a site. For instance, grain-size distribution of site-soils will affect suitability of solidification/stabilization technologies, BTu Content of soils will affect efficiency of incineration technologies, etc. For this reason, a preliminary identification of technologies should be conducted to enable FS personnel to compile a list of site-specific data needed to select appropriate technologies during the screening process. This type of site-specific data should be

presented in up-front sections of the FS to support technology screening. If the data needed to support technology selection has not been collected, it may not appropriate to screen technologies until this type of data is collected.

It is thus recommended that, future sampling programs specify the collection of all data needed to support the technology screening effort. Note that this data collection effort must be suitable to support technology screening and alternative development, but need not be specific to the point were it support remedial designs.

Page 8 The screening comment for in situ anaerobic degradation states that this is a pilot stage technology therefore was not considered further. This rationale is also used in the screening of several other technologies in later sections. However, since the NCP indicates a preference for treatments which are innovative, technologies should not be screened exclusively because of their innovative nature.

Page 10 Anaerobic treatment of sludges has been performed for many years at industrial and municipal waste treatment facilities. It does not appear to warrant consideration as a pilot stage technology as stated in the screening comments for this entry.

Page 12 The screening comments for ground water control indicate that feasibility of this technology is questionable in areas adjacent to the Thames River due to large volumes of infiltration. However, infiltration can be minimized by use of sheet pilings, so the implementability of this technology should not be affected by infiltration from the river.

If you have any questions relative to these comments, please contact me at (617) 573-5793.

Sincerely yours,

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