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ATLANTIC
ENVIRONMENTAL SERVICES, INC.

engineers
geologists
scientists

MEMORANDUM

TO: TRC Members
(See Attached)

FROM: Paul Burgess, Project Manager

DATE: March 26, 1992

RE: Draft IR Report
Responses to USEPA's Risk Assessment Comments
Responses to CTDEP's Comments
Responses to NOAA's Comments
Responses to Town of Waterford's Comments
Responses to Mr. Fromer's Comments
U.S. Naval Submarine Base
Groton, Connecticut

On behalf of the U.S. Navy, Northern Division, attached are the referenced comments for your information. The responses to the comments on the risk assessment and the TRC comments will be forthcoming.

Barry Grover
for Paul Burgess, P.E.

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TECHNICAL REVIEW COMMITTEE (TRC MEMBERS)

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Mr. W. Haas - Town of Ledyard
Ms. Deborah Jones - Town of Groton
Mr. Norman Richards - City of Groton
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Ms. Adrienne Townsel - NORTHNAVFACENGCOM
Mr. Mark Leipert - NORTHNAVFACENGCOM

NAVY RESPONSES TO EPA'S COMMENTS (November 12, 1991) ON RISK ASSESSMENT FOR THE INSTALLATION RESTORATION STUDY (August 1991) NAVAL SUBMARINE BASE - NEW LONDON

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

   The guidance used was USEPA 1989 and 1991. The text will be corrected.

2. *Page 6-2, ¶7: Which EPAs guidance is the statement in the paragraph referring to?*

   The guidance referenced is USEPA 1989.

3. *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 the future use scenarios. The potential for contaminant plumes reaching residential areas off base and the likelihood of base closure should be evaluated and discussed in the risk assessment.

   For the step II sites, health risks associated with a trespasser scenario under future conditions were not calculated, but considered in our assessment. Exposure scenarios involving children living onsite and adults working onsite were given the highest priority and the onsite risks to these groups of individuals were calculated first. These two groups represent highly exposed and sensitive populations. The exposure scenarios involving these populations would more stringently evaluate the potential health risks associated with a step II site than a future trespasser scenario. For those step II areas which did exhibit potential health risks to these highly exposed populations, remediation alternatives are being evaluated (DRMO, Area A Downstream and Area A Landfill). Therefore, a trespasser scenario under future conditions would not be necessary for those step II sites which are presently scheduled for remediation. For other step II sites which did not demonstrate potential health risks for the highly exposed populations, a trespasser scenario under future conditions is not necessary. A trespasser would visit the area less frequently than the exposure scenario developed for onsite workers and children.

   We feel that comparison of ground water quality to MCLs is adequate to evaluate potential human health risks and that a quantitative risk assessment is not required.

4. *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.*

The criteria for selecting a compound of concern required that the compound be detected at least once on the site in any medium. Because of the nature of site activities, potentially exposed individuals could visit many areas of the site and participate in several activities thereby receiving multiple exposures. Therefore, the compounds of concern had to represent all areas of the site so that the total risk for a specific exposed population could be calculated. If a compound was not detected in a site area, then the compound was not included in the risk calculations.

Several other stringent criteria related to concentration levels and potential toxicity were also used to exclude some compounds from the risk calculations. Only a few organic compounds were excluded and the reasons for their exclusion are discussed in the report.

A few inorganics were excluded based on frequency of detection and/or detection at levels that are representative of natural background in soils or sediments. To assess whether concentrations of inorganics were compared to published background levels from several sources including USGS data for the Eastern United States and background data for New Jersey and Massachusetts. If an inorganic analyte was within these published background levels or was detected infrequently, it was excluded from further assessment. Carcinogenic inorganic analytes were not excluded from the risk calculations. As a result, only a few inorganics detected in site soils were excluded from the risk calculation. They are: barium, calcium, chromium, cobalt, potassium, silver, sodium, and vanadium. These screening criteria and the reasons each of these metals was excluded from further assessment will be explained in the text.

5. *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.*

Arithmetic mean is correct for purposes of estimating exposures. Exposure is based on random visits and events and averaged. A geometric mean is only a statistical parameter to describe the distribution.

6. *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.*

Fencing was suggested for the North Lake area because of our evaluation. The effect of the fencing on risk will be discussed as part of the evaluation of alternatives in the feasibility study.

7. *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.*

   In one of the onsite children scenarios, accessibility to the Overbank Disposal Area from Area A was assessed. From this assessment, Overbank Disposal Area is being evaluated for remediation; therefore, a trespasser scenario under future conditions is not necessary (refer to comment page 6-3 ¶6).

   Refer back to other Section 4 for summary of samples taken in CBU Drum Storage area.

8. *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.*

   The Rubble Fill site is a step I site. Specific scenarios were not developed for the step I sites. A trespasser scenario is not appropriate because Bunker A-86 has limited access as stated in the report. If this area becomes a step II site, other scenarios would be considered and a quantitative risk assessment performed.

9. *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.*

   We agree; exposure scenarios involving children exposed to surface soil and Thames river exposures will be considered in the Step II evaluation of this site.

10. *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).*

    The point is acknowledged. The soil ingestion rate used for a utility worker in this human health assessment was 100 mg/day (USEPA Region I Supplemental Risk Assessment Guidance for the Superfund Program, 1989). Federal EPA has most recently published a new soil ingestion rate of 480 mg/day for landscaping/construction activities. Using the new soil ingestion rate in the applicable exposure scenarios (involving excavation), we re-evaluated the risks for these scenarios. The risks increased, at most, by a factor of 4.8 because soil ingestion rates increase linearly. We will use this information in generating estimates of target levels for the Feasibility Study but do not propose to generate a new set of spreadsheets. The differences in results will be described in narrative fashion in the body of the risk assessment report.

11. *Page 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 non-carcinogens 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 hours 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.

(a) Although this data is not of interest to the EPA, its inclusion in the report is not incorrect and omitting it at this time serves no constructive purpose.

(b) We used actual exposure parameters like 250 days for worker exposures.

(c) The standard exposure frequency of 350 days was used for residential exposures to fugitive dust. For other exposure scenarios, site specific information was used to estimate exposure duration.

(d) The surface water ingestion rate for swimming is correct. The 1.2 l/day is adjusted in the risk calculation according to the amount of time swimming.

12. *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.*

EPA indicated they would look at this more closely. We explained the methodology that was used and it seemed clear at the meeting.

13. *Page 6-22: See comment for page 6-16 regarding soil ingestion.*

See response to comment for page 6-16 regarding soil ingestion.

14. *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.*

2.5 hr/day is a weighted average per day over the year.

15. *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.

Please see response to comment for Page 6-3, ¶6.

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

Exposure parameters were based on 6 to 9 year old age group because children of this age group are old enough to participate in unsupervised exploration. However, at the request of EPA, our risk calculations are based on six year exposure period not three years. We could adjust the identified age range to 6 to 12 years to avoid confusion.

17. *Page 6-35: The ingestion rate given (200 mg/day) is for children under six 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.

We used 200 mg/day for six year old age group (USEPA Region I Supplemental Risk Assessment Guidance for the Superfund Program, 1989). If we apply EPA suggested 100 mg/day for 6 to 12 year old age group, estimated risks are lowered by less than a factor of two. We do not propose to change the spreadsheets, but the effects of alternative assumptions can be discussed in the narrative for this section of the report.

A zonal approach was used. Subase children are assumed to be concurrently exploring many areas of the site all year round. Low exposure frequencies were used in the individual exposure scenarios which described a possible area of the exploration for the children. The rational was to avoid being overly conservative in the individual exposure scenarios. The total frequency of exposure due to exploration by sub-base children is the sum of the individual exposure frequencies provided in each exposure scenario. The fraction of body exposed (dermal exposure) for the sub-base children is relatively conservative and follows federal EPA guidance dictated in Exposure Factor Handbook.

18. *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.*

Dermal exposure to surface water is not considered a significant pathway because of the very low levels of contaminants detected in the surface water and the low intermittent flow conditions of the culvert ditches.

19. *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 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.*

Skin permeability rates (cm/hr) were provided by Sara Levinson, EPA Region I (written correspondence to Dr. Wendy Heiger) to calculate the dermal dose for exposure to surface water during swimming.

Benzene 0.11
Ethylbenzene 1.4
Toluene 1.0
Phenol 1.5E-4
All other compounds of concern were defaulted to 1E-3

20. *Page 6-44: See comment for page 6-16 regarding the soil ingestion rate.*

See response to comment for page 6-16.

21. *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.*

The DRMO site is presently fenced and risks have been evaluated by exposure scenarios involving frequent exposures to contaminated soils by construction, utility and Department of Defense workers. Risks to children resident on the subase inhaling fugitive dusts from DRMO and the Area A Landfill were also assessed. A child trespasser under future conditions would receive less exposure than any of these groups. Therefore, a child trespasser scenario under future conditions is not needed. The effects of contaminated ground water discharged to the Thames River are discussed in Section 4.0 and Section 7.0.

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

The point is acknowledged.

23. *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.*

All appropriate soil data were used according to depth where exposure is possible. Appendix E lists all samples used for exposure scenarios.

24. *Page 6-82: The title of Section 6.2.3: "Quantification of Exposure" is not appropriate for Step I sites.*

Since both Step I and II sites fall under this section, alternative section title is Evaluation of Exposure.

25. *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.*

Arithmetic mean is correct for purposes of estimating exposures. Exposure is based on random visits and events and then averaged.

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

This can be provided.

27. *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.

Methodology used was explained at the meeting with EPA on February 13, 1991. EPA said they would consult with personnel in their Air Division and would indicate whether or not this method is appropriate. No EPA feedback has been provided to date.

28. *Page 6-89, Section 6.2.4.2: Terms used should be consistent with EPAs Superfund guidance. "ADD" is not consistent with the term in the guidance.*

ADD will be replaced with average daily intake. However, in the risk assessment we define ADD as exposure dose or intake in Section 6.2.4.2 not absorbed dose.

29. *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.*

For non-carcinogens, exposure duration (days/year conducting a certain activity) should not match the yearly averaging period (days/year). The exposure durations (days/year conducting a certain activity) and average lifetime exposure (number of years exposed to the site) are based on site specific information. For instance, naval public works worker scenario had exposure duration of 250 days/year and yearly averaging period of 365 days/year. Average lifetime exposure and yearly averaging period varied for several scenarios depending if the exposed population were residents (30 years, 365 days/yr) or workers (maybe several years, 250 days/yr). Non-carcinogenic risks were not calculated over a one year period unless appropriate, but in most cases, the average lifetime exposures for many of the exposure scenarios were several years.

30. *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 9285.3-03. The statement in the sixth paragraph for long-term concentration and the way to assess non-carcinogens is inappropriate.*

Site-specific exposure data were collected. Therefore, no default values such as "30 year

exposure duration" were needed. Medium specific equations will be provided. Non-carcinogenic risks were calculated according to current federal EPA guidance when guidance was available. When RfDs were not available for compounds with known systemic adverse health effects, surrogate RfDs were estimated for these compounds using structure activity relationships based on comparison to other structurally similar compounds with verified RfD values. We believe this approach reduces some of the uncertainty associated with risk characterization. In other words, we believe it is more important to take the compounds into account in some way as part of the assessment rather than ignoring them. As it turns out, other than for lead, there are no systemic health risks posed by the site. The risks that have been identified are for selected compounds where cancer is the endpoint. By taking full account of all compounds, we feel we are in a more defensible position (i.e., uncertainty has been reduced) in reaching this conclusion.

31. *Page 6-91, ¶2: The text should provide the "standard chemical intake equations" used to calculate average daily doses.*

A general form of the ADD equation was provided on pages 6-91. Media specific equations will be provided if needed.

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

The uncertainty discussion will be elaborated on further.

33. *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 non-carcinogenic toxicity data, it is impossible to assess this compound's non-carcinogenic effect.*

We disagree. Why is it impossible to estimate RfD for a compound with known systemic effects? Usually, these systemic effects have been well documented in primary scientific literature, EPA reports and in other public health publications from various governmental agencies. A verifiable RfD may not be available yet for a particular compound, but is currently under review by EPA headquarters. An acceptable scientific methodology which is used to estimate RfDs and used by EPA scientific community is the use of structure activity relationships. We believe an effort should be made to take account of the potential non-carcinogenic risks associated with these compounds in this assessment we used. Known lowest observable adverse effect levels for structurally similar compounds are used to estimate a LOAEL/NOAEL for compound without a RfD and applied in RfD calculation. The non-carcinogenic risk calculations would be underestimated if compounds of interest were not included in the calculation because they did not have verifiable RfDs, but were known to produce adverse systemic effects. We recognize that uncertainty is a key issue for risk assessment. By taking into account all compounds (those with verified as well as those without verified RfDs) we believe that uncertainty associated with "ignoring chemicals" is reduced. In the present case, other than for lead, there were no systemic (non-carcinogenic) health risks identified. Because we have made the effort to consider all compounds, we feel that we can reach this

conclusion with greater certainty than if we had ignored those compounds for which there are no verified values.

34. *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 non-carcinogenic effects. For the non-carcinogenic PAHs, if there are no verified RfD available, the interim RfD for naphthalene should be used as the default value.*

The risk assessment was completed prior to EPA publishing its most recent policy on PAH compounds. There are probably hundreds of other risk assessments that are currently going through various levels of review. We propose to use the updated values to derive target levels for the Feasibility Study. In addition, we propose to modify the narrative of the report to discuss the implications of the new policy. We do not propose to generate a new set of spreadsheets and reports. This would take considerable effort for very little benefit. The current risk assessment clearly identifies the compounds, routes of exposure, and receptors that are most important to consider with regard to risk reduction. Carcinogenic risks associated with PAH are important for a number of these. These were calculated in our report by using the "old" CPF values for BaP and applying the EPA/Clement relative potency approach to other carcinogenic PAH. Based on the prevailing scientific understanding of PAHs at the time, this appeared to be the best approach. We have since recalculated the risks for the exposure scenarios where PAHs were of a concern. A cancer potency factor of 5.8 (mg/kg/d)-1 for benzo(a)pyrene was used as a default value for all carcinogenic PAHs for both ingestion and inhalation routes. The carcinogenic risks only changed slightly. If the original calculation did not indicate a carcinogenic risk for a particular exposure scenario than the recalculation also revealed no risk of cancer using both maximum and average concentrations of carcinogenic PAHs. This is due in part to the fact that we used the higher "old" CPF for BaP together with the relative potency approach. We understand that EPA still has not determined how to treat PAH compounds other than BaP. We recommend that until this is settled, the risks be calculated both ways (i.e., with and without the application of relative potency approach). Clearly, by treating all other PAHs as if they were BaP will overestimate the risk and lead to uncertain decisions concerning the need for and efficacy of remediation. With regard to the existing risk assessment, there will be no differences in the conclusions. We propose that this be discussed in the text of the report. The new CPF value for BaP will be used in the Feasibility Study.

We have estimated RfD values for those PAH compounds for which there are no values. We do not agree that naphthalene should be used as a surrogate for other PAH compounds and have gotten concurrence on this from EPA ECAO. The approach we have used is one that was developed as part of work we did in developing the Gas Research Institute (GRI) Guidance Document on PAHs and considers several sources of data. Again, the main objective was to take all PAHs (including those that are B2 carcinogens) into account when estimating the potential for systemic health risks. Simply because a compound is a B2 carcinogen does not mean that it has no systemic health effects. We selected surrogate values which we felt were conservative and generally

representative of the PAH group as a whole.

35. *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 (USEPA 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 blood lead levels and ALA-D activity, Vitamin D and prymidine 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 may 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 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 threshold exist for may lead exposure scenarios, significant concern is associated with 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 (USEPA, 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 associate 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 couple with predictive biokinetic models, however, provide a powerful tool for developing an alternative and more useful alternative risk assessment strategy for lead.

We agree, the use of IUBK model is more appropriate. In the Feasibility Study, this model will be used to estimate lead target clean up levels in soil for areas with exposure scenarios where lead is an issue.

36. *Page 6-99: Toxicity data should be based on IRIS. If the compound does not have toxicity value on IRIS, the HEAST should be referenced. A FY-1991 HEAST is now available.*

We may have used HEAST 1990, but for our compounds of interest, none of RfDs or carcinogenic slope factors have changed in most recent HEAST Fy-1991. We will change the reference citation in the table.

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

The reason for not investigating the possibility of contaminant vapors entering the museum is because this area is step I site. We acknowledge that vapors could enter the museum; however, this has not been assessed as part of Step I but will be considered under Step II.

38. *Page 6-104, Section 6.4.2.1: 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.*

We disagree. The ADD(life) calculation is correct. The exposure durations (days/year conducting a certain activity) and average lifetime exposure (number of years exposed to the site) are based on site-specific information, but average lifetime was kept constant at 70 years following Superfund guidance.

39. *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.*

We agree. The zonal approach was used throughout the site for all potentially exposed populations. Because of the nature of site activities, potentially exposed individuals could visit many areas of the site and participate in several activities, therefore having multiple site exposures. In preliminary screening, the compounds of concern initially had to represent all areas of the site so that the total site risk for a specific exposed population could be calculated. If a site compound of concern was not detected in a certain site area, then the compound was not included in the risk calculations for those exposure scenarios developed for that particular site area.

40. *Page 6-117, ¶4: See comment for Page 6-91, ¶8 regarding the uncertainty decision.*

See response to comment for page 6-91, ¶8.

41. *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.*

The correct citations will be added.

42. *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 the 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.*

Paragraph 5 does not state that there are no ecological risks from these sites. It states that we did not assess risks due to these sites because of the low concentrations of compounds of concern. The text will be expanded to discuss qualitatively the concentrations of compounds detected in these areas and why they are unlikely to pose an ecological risk.

43. *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?*

The compounds of concern were the same for both the ecological and human health risk assessments. Because of the stringent criteria for selecting compounds and the desire to work with a master list for the site as a whole, they included almost all compounds detected in any medium. Refer to response to comment 4 for further discussion of selection of compounds of interest. For the ecological risk assessment, compounds were also eliminated from consideration if they were not detected in a medium to which ecological receptors might be exposed. The media that do not represent ecological exposures are subsurface soil below a depth of four feet and ground water outside of areas where ground water is likely to discharge to the ground surface (outside of the Area A Wetlands). The PCBs and pesticides "eliminated from consideration in the ecological risk assessment" were those that were detected only in media to which an ecological receptor would not be exposed. We will clarify this section by adding sentences that explain that certain contaminants in the subsurface are expected to remain in the subsurface and no exposure of ecological receptors to these contaminants is anticipated.

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

The treatment of non-detects for the ecological risk assessment was the same as for the human health risk assessment. Compounds that were not detected in any exposure

medium were assumed to have a concentration of zero. For compounds that were detected in an exposure medium, but not in an individual sample, the concentration in that sample was assumed to be one half the Contract Required Quantitation Limit as given on Table 2-1. This will be clarified in the text.

45. *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 Services should be contact to determine if there are additional trustee resources.*

In preparing a draft environmental impact statement for the Thames River Dredging Project, both the CTDEP and the United States Fish and Wildlife Service were contacted regarding the existence of threatened or endangered species in the vicinity of the proposed dredging project. This area includes all the investigation sites under this study. No known threatened or endangered species are known to exist in the project area. Furthermore, the ecological survey for the risk assessment did not detect the presence of any endangered species at NSB-NLON.

However, the Connecticut Natural Heritage Program and the U.S. Fish and Wildlife Service will be contacted regarding endangered, threatened, or special concern species in the vicinity of the base. This information will be added to this section.

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

"Field forms" as such were not used during site visits performed to characterize the ecological receptors at the site. However, a video tape of one of the site visits is available and mention of this will be made in the text. Notes, which consist of a drawing and species list, provided by the ornithologist that performed this site visit, Trevor Lloyd Evans of Manomet Bird Observatory, were included in Appendix F-1. This could be clarified on Page 7-5, Paragraph 5.

47. *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.*

A formal wetlands delineation in accordance with the Federal Manual for Identifying and Delineating Jurisdictional Wetlands was not performed as part of this program.

We are aware that wetlands exist in Area A, and the general boundaries are known. The wetlands regulations will be considered as an ARAR. Following the Feasibility Study, and as part of any remedial design, specific wetlands procedures will be established at that time.

48. *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.*

The species list in the Appendix is fairly inclusive. However, the Connecticut Natural Heritage program, or other sources might be able to provide more information on possible visiting species.

49. 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.*

A benthic invertebrate survey of the downstream ponds and water courses is being considered for the supplemental sampling work plan.

50. 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.*

The statement provided by EPA will be included in this section. Work under consideration for the additional sampling work plan includes an assessment of ecological receptors in the Thames River.

51. 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.*

This paragraph should include a sentence referring to potential bioaccumulation and risks to higher trophic level carnivores. However, risks to higher level carnivores may not be greater than risks to consumers of soil invertebrates because the higher trophic level fauna may have a greater feeding area, and therefore, be exposed to less contamination overall.

52. 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.*

It is likely that fish are not present in the ponds due to their structure and hydrology. This will be stated in the text. Additional assessment of the presence of fish and other ecological receptors in the Area A Downstream ponds will be considered for the additional sampling work plan.

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

This section will be expanded to explain the reasons why DDT in surface soils and sediments is unlikely to pose a risk to plants.

54. 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 an sensitivities to contaminants.

We discussed this later in the toxicity section. We will add a few sentences about it here.

55. *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.*

The sentence should be changed to read: "The toxicity quotient was then calculated as the measured soil concentration divided by the sediment criterion."

56. *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 an 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.

There is a typographical error in the text. The "m" should be an exponent. The relationship between K_{oc} and K_{ow} on page 7-11 should read:

$$K_{oc} = xK_{ow}^{m}.$$

The equation for C_s on page 7-1 should be changed accordingly. We agree that organic carbon content should be measured in additional soil or sediment samples that may be collected.

57. *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.*

Measurements of organic carbon content should be used, if available, to assess risks as accurately as possible using the EP Method. We will qualify our statement about assuming a 5% organic carbon content and compare it to measurements made elsewhere. We will also add a section discussing the effect the uncertainty in the estimate has on the results.

58. *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.*

We could provide more justification for using Manomet Bird Observatory as a reference location.

59. 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 six 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.

(a) The assessment of the downstream ponds for fish and other ecological receptors will be considered in the additional sampling work plan.

(b) We do not claim that six frogs are representative of the site. They do give some indication as to conditions in portions of the site. Assessment of ecological receptors in the Area A ponds is being considered for the additional sampling work plan.

(c) Bird sample locations will be added to Plate 6-1.

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

The catbird was chosen for analysis because it is abundant at the site, and, therefore is representative of invertebrate-eating birds at the site. Since catbirds nest at the site, the collection of fledglings allowed us to circumvent the "problem" of migration.

61. 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.*

We will provide additional explanation regarding metals levels at the site and whether they are likely to pose risks to birds and mammals.

62. 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.*

We consulted the U.S. Fish and Wildlife Service prior to collecting birds for analysis regarding methods of collection and appropriateness of species. They agreed that contaminants detected in fledgling catbird tissue would be representative of site-related risks. Predatory birds have a large migratory range, and it would be impossible to relate contaminants detected in their tissues to exposures at the site.

The risk assessment did estimate risks to predatory birds due to DDTR in Section 7.5.3.3. These estimates were based on estimated body burdens in small birds and mammals and

measured concentrations in fledgling catbirds.

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

We will add a section discussing the selection of a reference area for birds.

64. *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.*

The uncertainty section will be augmented to discuss uncertainties associated with sampling locations, model assumptions, dose estimates, benchmarks used, etc.

65. *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 require to fully characterize and assess the effects of contamination at this site.*

Assessment of ecological receptors in the Area A ponds is being considered for the additional sampling work plan.

66. *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 in 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.*

Wherever possible we took NOAEL and LOAEL data from Ambient Water Quality Criteria documents, where appropriate. NOAELs and LOAELs published in these documents are chosen to represent the most sensitive species tested. Where we referred to the literature for NOAEL and LOAEL data, we chose the most sensitive representative species for which data were available. Since most of the NOAEL data we had represented sensitive species, we used a factor of 0.1 rather than 0.01 to calculate NOAELs from LOAELs. We believe this represents a conservative approach.

67. *Page 7-25: Provide references for EPA, 1987 and USACOE, 1984.*

EPA, 1987 is EPA, 1986 updated May 1, 1987. This will be changed in the table and reference section. The other reference is:

U.S. Army Corps of Engineers, 1984. Review: The Effects and Occurrence of Phthalate Esters in Aquatic Organisms and Sediments, Grays Harbor Navigation Project Operations and Maintenance.

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

Shading will be added to the table. Maximum concentrations of lead and zinc should also be shaded.

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

Units (ug/l) are in Note 1 on the second page of the table (on Page 7-30).

70. *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 state 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.*

We will clarify our statement. There are insufficient data to characterize risks to all site biota at all life stages. Our assessment used available data to assess ecological risks. We will add EPA's statement to this section, but the data are not available to assess these potential hypothetical effects.

71. *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 as 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.*

We mentioned the zinc surface water concentrations to emphasize the fact that zinc sediment concentrations were not contributing to elevated surface water concentrations. The intention was to put the magnitude or the elevated zinc concentrations into perspective. We will clarify this in the text.

72. *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.*

Many samples were blank-corrected for acetone as part of data validation. This could only be done when associated blanks contained acetone. Those samples which were reported as containing acetone did not have contaminated associated blanks. The fact that acetone was found in several field and system blanks coupled with the fact that it is a recognized potential laboratory contaminant, led to the conclusion that acetone detections can be attributable to laboratory contamination.

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

DDT detection limits were not high relative to Contract Required Detection Limits. Pesticide detection limits were calculated based on the percent moisture of a sample on an individual basis as required. The text refers to the fact that DDT detection limits were high relative to toxicity standards and, therefore, using 1/2 the detection limit as the value for non-detected sample results in a conservative estimate of ecological risk.

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

The toxicity quotients for risks to soil invertebrates due to metals in ground water were calculated by dividing the ground water concentrations by the chronic Ambient Water Quality Criteria. Paragraph 5 discusses the great uncertainty involved in this method and, therefore, why these toxicity quotients for metals may not be indicative of great risk. This will be clarified further in the text.

75. 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.*

We will add text that will explain the calculations in detail.

76. 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.*

One surficial soil sample collected from outside the wetland (2WSD9) had PAH concentrations at least two orders of magnitude greater than the remaining samples from within the wetland. We calculated risks to small carnivorous birds and mammals due to ingestion of contaminated soil invertebrates including and excluding this sample from the average soil concentration. We presented risks based on both calculated averages to express the range of risks to these organisms. This will be clarified in the text.

77. 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.*

We restricted our calculation of risk to certain trophic levels exposed via certain routes. Risk to small birds and mammals were calculated based on ingestion of contaminants in soil invertebrates. We acknowledge that some birds and mammals will be exposed to site contaminants through different exposure routes. However, we did not calculate risk for every exposure route as there is no method of doing so at this time. Also, our goal was to assess ecological risks, generally, rather than calculate a likelihood of risk for every species and every exposure route.

NAVY RESPONSES TO THE CTDEP'S COMMENTS (NOVEMBER 12, 1991) ON DRAFT IR REPORT (AUGUST 1991)

General Comments

1. *Radiation surveys were performed by Radiation Safety Associates, Inc. (RSA) of Hebron, Connecticut for the Area A Landfill, Goss Cove Landfill and DRMO. It is noted that the surveys are contained in a separately bound report. A copy of this report is required by the State for our records.*

   This report has previously been provided.

2. *Please supply the report on the geophysical work performed by Weston Geophysical of Westboro, Massachusetts. The RI report noted that the complete geophysical report is contained in a separately bound report.*

   This report will be provided.

3. *Background concentrations for inorganics at the Groton Subase were based on the data supplied by the US Geological Survey for the Eastern United States. This data was used as the standard in determining whether site-related inorganic sampling results were exceeded. This is not an acceptable practice because of site-specific variations in geology and soil type. Background samples should be obtained for each site in determining whether site-related activities have had an impact on the site.*

   These values were used for illustrative and comparative purposes. Even if we complied with this request, it would not affect the conclusions of the study with respect to human health or environmental impact. Actual metals concentrations were used in these assessments and in the calculation of risk. We would propose to add a discussion to indicate that actual background concentrations at this site are less than the USGS published values.

4. *<u>Section 1.2.3.1, Page 1-5</u>: In 1991, the CTDEP issued a report containing revisions to the 1987 "Connecticut Water Quality Standards and Criteria". This section should be changed to reflect those changes. In addition, the last sentence in the second paragraph noted the following for the ground water classification of GB/GA: "The immediate goal, where appropriate, is to maintain the water at Class GB condition; the long term goal is to restore the water to drinking water quality (GA)". The State's goal is to restore the ground water to drinking water quality for this classification. It is inaccurate to state that there is an immediate goal to maintain the water at a Class GB condition.*

   These requested changes to the text will be made.

5. *Section 3.7.2, Page 3-20: The ground water flow velocity should be 1.4 feet/day, not 1.7 feet/day as stated in the text.*

This change will be made.

6. *Section 3.7.5, Page 3-27: There is a monitoring well identified as 2LMW13D listed in the text of this section. This monitoring well does not appear on Figure 3-16. Please identify where this monitoring well is located.*

Well 2LMW13S on Figure 3-16 is incorrect. It will be relabelled 2LMW13D.

7. *Section 3.7.5, Page 3-35: In constructing the ground water elevation contour map for Area A, offsite wells east of RT12 were pumped for twenty minutes before water level elevations were measured. The rationale for this procedure needs to be explained.*

The residential wells were pumped for twenty minutes to allow any drawdown to occur, thereby, the lowest well elevation was measured. The lowest well measurement (lowest elevation) was used because this represents a worst case condition with respect to ground water gradient from offbase wells to on-base wells (e.g., does well drawdown create a condition where on-base ground water contamination could migrate to offsite wells). This explanation will be added to the text.

8. *Plate 3-3: Ground water contours shown on this plate indicate that some of the water table elevations are plotted higher than the land surface. Please make appropriate corrections.*

This plate will be reviewed.

9. *Section 3.8, Page 3-48: Please indicated what source was used within the Town of New London to establish temperatures, variant ranges in temperatures and precipitation for southeastern Connecticut.*

The source was the Subase Master Plan. The Master Plan did not specify the specific source of the data.

10. *Table 4-1A, Page 4-3: Under the column labeled ARAR for the State of Connecticut, Pesticide Control should be labeled as Pesticide/PCB.*

This change with be made.

11. *Section 1.2.5.1, Page 4-18: It was noted in the 1983 Initial Assessment Study (IAS) that some of the 55-gallon drums were found leaking. Please note if the soil samples acquired during the remedial investigation were taken from where the observed releases occurred.*

There is no specific documentation to indicate exactly where leaking drums were located in this area. However, based on the small size of the area, the three samples provided adequate screening of the site for potential contamination.

12. <u>Section 4.5, Page 4-25</u>: *It is noted that the concentration of delta-BHC and methoxychlor from the surface soil composite sample 4SS3C (Rubble Fill at Bunker A-86) is likely associated with past Area A pesticide applications and not from discrete disposal activities associated with this site. These compounds were not identified in any of the sampling results obtained from the Area A (landfill, wetlands and downstream watercourses) site. Explain the rationale for the conclusion stated.*

The text will be revised to reflect both application or disposal as possibilities. We have recommended that this site proceed to Step II evaluation and in full extent of onsite contamination will be investigated.

13. <u>Section 4.6.1, Page 4-25</u>: *It is noted that the highest concentration of an unknown VOC (possibly toluene) was detected at location SG-21 during the soil gas survey. Future investigations of the northern septic system (which formerly served the Torpedo Shops site) need to identify and quantify what the unknown VOCs are in this area.*

This area could not be sampled because accessibility was difficult with a drill rig. Well 7MW2 was downgradient of this location, and significant concentrations of solvents were not detected in the ground water. A soil sample collected by hand auger will be considered for future investigation.

14. <u>Section 4.6.2, Page 4-31</u>: *An odor was encountered during the drilling of monitor well 7MW1 and was described as that similar to "Simple Green". Identify the components of Simple Green and if the soil sampling results obtained from monitor well 7MW1 correlate with this product.*

Requests to the company which produces "Simple Green" during the preparation of the IR report were unsuccessful in determining the components of this product.

15. <u>Section 4.8, Page 4-47</u>: *It was found that field measured organic vapor readings for surface soil location 14SS1D were detected above background levels for the Obdane site. This surface soil sample came up non-detect under lab analysis for VOCs. Please identify what the background reading was on the PID and what may be the cause or source of the higher background levels.*

The PID reading was 50 ppm at 14SS1D, the background reading was 1 ppm. The cause of the reading is unknown but PIDs do give false positive readings at times.

16. <u>Section 4.11.1.1, Page 4-58</u>: *Identify if any background readings were taken during the performance of the radiation survey at the Area A Landfill. In addition, explain why gamma readings equal to or greater than 20 μR/hr for each surveyed point was used as a benchmark for further investigation as to the origin of the radiation. it is noted that location 8.5E showed 21 μR/hr at waist level and 19 μR/hr in contact with the ground. Explain how the radiation level can be higher at the waist than in contact with the ground.*

In response to this comment, the following paragraphs have been excerpted from the Radiological Assessment Report.

"Location 8.5-E showed 21 μR/hr at waist level and 19 μR/hr in contact with the ground. These levels were traced to a natural rock outcropping in that area. Most rock in New England contain some traces of naturally-occurring uranium, radium, and thorium; finding individual rocks or rock fragments with detectable amounts of radiation is not at all unusual and is not indicative of any radioactive contamination.

Measurements of background radiation were taken outside the perimeter of each area surveyed as well as in several random locations around the base, such as on the golf course (at the corner of Shark Avenue and Wahoo Avenue), at the corner of Thresher Avenue and Corsair Avenue, and at the corner of Crystal Lake Road and the Military highway. Background gamma radiation measured between 12 and 15 μR/hr in all these locations. Background beta radiation in all locations measured 60-80 counts per minute. Background alpha readings were 1-2 counts per minute. These levels are well within what is considered "normal" for this region. Any gamma reading of 20 μR/hr or more in the survey areas was investigated further.

A gamma radiation reading of 20 μR/hr or more was used as a trigger point at which further surveys and evaluations were performed."

17. *Section 4.11.1.4, Page 4-74: It is noted that PCBs were detected in two surface soil samples (2LSS1 & 2LSS2) that are located adjacent to the concrete storage pad where drums, PCB transformers and electric switches were once stored. Figure 4-16 and Plate 4-1 identify where the samples are located, but do not depict where the pad is located. The location of the pad should be depicted in the figure and plate.*

    This request will be complied with.

18. *Table 4-32, Page 4-103: This table lists the ground water ARAR for benzene at 5 ppb. Table 4-14 (page 4-45) notes that the To Be Considered (TBC) level for benzene is 1 ppb for ground water at the Goss Cove Landfill. Please explain why a different standard is used at each location for the same constituent in the ground water.*

    Table 4-14 will be revised to reflect the benzene ARAR as 5 ppb.

19. *Section 4.11.6, Page 4-118: Information on page 6-82 noted that surface water sampling locations (2DSW12 & 2DSW13) are approximately ten feet away from the outfalls of the Area A Downstream Watercourses. This information should be included on page 4-118 when discussing surface water sampling results.*

    This request will be complied with.

20. *Section 4.11.6, Page 4-122: It is unclear where an upgradient sample designated as 2LWSD1 is located.*

    This sample was incorrectly referenced in the text as 2LWSD1; it will be changed to 2WSW1. It's location is shown on Figure 4-16 and Plate 4-1.

21. *Plate 4-1, End of Report: Monitoring well 2DMW15S is not displayed on Plate 4-1. However, it is shown on Figure 4-22 on page 4-89. Please revise Plate 4-1 to show the monitoring well location.*

The location of 2DMW15S will be added to Plates 4-1 and 6-1. Please note, as indicated on Figure 4-22, that this was only a boring because ground water was not encountered in the overburden.

22. *Section 6.2.3, Page 6-82: Title of this section should be "Qualification of Exposure" for Step I sites.*

This heading pertains to both Step I and II sites. For the Step I site, the text is clear that the exposure is based on a qualitative basis. Therefore, this change is not believed to be required.

23. *Section 6.2.3.1, Page 6-82: It was noted that the pesticides identified at the Rubble Fill at Bunker A-86 might be indicative of localized contamination because they were different from the pesticides detected at the NSB-NLON. This statement is contrary to the conclusion reached in Section 4.5 on page 4-25. The text on page 4-25 indicates that the pesticides were likely associated with historic Area A applications and not as a result of disposal activities identified with the Rubble Fill at Bunker A-86.*

The text in Section 4.0 will be revised to be consistent with Section 6.0.

24. *Section 8.1.1.2, Page 8-1: Although no further action was recommended for the CBU Drum Storage Area, further investigation is warranted for the following reasons: 1) total petroleum hydrocarbons (TPH) were found at each surface soil sample location at concentrations ranging up to 9800 ppm; 2) except for sample 1SS1, TPH concentrations at the other two sample locations (1SS2 & 1SS3 increased with depth); and 3) the composite sample (1SS4C) indicated the presence of two PAHs. Further sampling of soils is required to characterize the depth and lateral extent of contamination. The potential exists that ground water in this area may have been impacted from the documented leakage of drums which contained waste oil, lube oil, and paint materials.*

We feel the site has been adequately investigated and assessed to support the no further action recommendation. We will discuss it further with the CTDEP and the USEPA.

25. *Section 8.1.3.2, Page 8-3: The report has recommended that the Torpedo Shops proceed to the Step II phase of the Installation Restoration (IR) program. It is recommended that an inventory of compounds that are or have been used at the Torpedo Shops be compile to assist in a review of this site.*

Comment is so noted.

26. *Section 8.1.4.2, Page 8-5: Any future subgrade construction projects planned for the Goss Cove Landfill, on which the Nautilus Museum is located, should be noted in this section or that the information exists in Appendix E. In addition, it is noted that worker health and*

safety will be assessed for any future construction activities proposed at this site. Potential public exposure to VOCs and/or fugitive dust should also be addressed in this assessment.

The text will be revised to note that some utility reconstruction is being designed. We concur that exposure to VOCs and\or fugitive dust should be addressed in the construction plans/specifications.

27. *Section 8.1.6.2, Page 8-7: If any future construction activity is required at the Spent Acid Storage and Disposal Area, health and safety considerations should include the public.*

We concur.

28. *Section 8.2.1.2, Landfill Soils, Page 8-18: It was recommended that further soil sampling should be accomplished around the Area A concrete pad to define the full extent of contamination. In addition, a sampling plan to address PCB contamination of the concrete pad should be conducted. this plan should include areal wipe samples and chip and/or core samples to determine the depth of potential contamination. This action appears appropriate due to the storage of drums and transformers on the pad and the subsequent discovery of PCBs in the soils adjacent to the pad.*

This request will be considered in the development of the supplemental field investigation work plan for this site.

29. *Area A Downstream, Page 8-11: Further characterization of the area around sample location 2DMW15S may be necessary due to an unconfirmed report stating that past disposal may have occurred in this general vicinity. It is possible that the TCE and PCE detected in the subsurface soils may be related to this activity.*

Further review of this claim with Subase personnel and an examination of aerial photographs did not substantiate this claim.

NAVY RESPONSES TO NOAA'S LETTER (SEPTEMBER 27, 1991) ON DRAFT IR REPORT (AUGUST 1991)

The comments from the National Oceanic and Atmospheric Administration (NOAA) were reviewed. They principally included a summarization of the information included in the report. Most comments regarding additional investigation are already included in the site specific recommendations in Section 8.0. Therefore, no specific response to NOAA's letter is provided.

NAVY'S RESPONSES TO THE FISH AND WILDLIFE SERVICE COMMENTS (DECEMBER 6, 1991) ON THE DRAFT IR REPORT (AUGUST, 1991)

1. General

Several of the "To Be Considered" (TBC) values and background concentrations used for the NSB-NLON investigation appear high. The soil or sediment TBC values for PCB (10 ppm), DDT (500 ppb) and the background concentrations for several inorganics exceed the tenth percentile effect range (ER-L) concentrations presented by Long and Morgan (1990). The effect ranges, ER-L for the tenth percentile and ER-M for the 50th percentile, suggest the potential for adverse biological effects. Though the effect ranges have varying degrees of confidence for different contaminants, and were developed primarily for marine sediments, the concentrations provide some guidelines for assessing freshwater sediments.

Many of the inorganic contaminant concentrations detected at the site may fall within the 95% background range of variation developed from Shacklette and Boerngen (1984), but it should be made clear that some of these levels may be potentially hazardous to biota. My concern is that soil or sediment samples with concentrations at or slightly above these upper-range background levels would be considered "safe". It may be prudent to collect soil samples in undisturbed areas of the site or in the general area to determine if the values derived from the U.S. Geological Survey paper are similar to site-specific background levels.

These values were used for illustrative comparative purposes. Even if we complied with this request, it would not affect the conclusions of the study with respect to human health or environmental impact. Actual metals concentrations were used in these assessments and in the calculation of risk. We would propose to add a discussion to indicate that actual background concentrations at this site are less than the USGS published values.

2. Rubble Fill Site Near Bunker A-86

At the site, an elevated concentration of arsenic (127 ppm) was detected in surface soil

sample 4SS3C. I could not locate this sampling station on Figure 4-2 (pg. 4-22); only 4SS1 and 4SS2 are marked. This concentration suggests a need for additional soil sampling to fully delineate the area requiring remediation.

As indicated in the text on pages 4-18, sample 4SS3C is a composite sample from location 4SS1 and 4SS2. Additional sampling has been recommended in Section 8.0.

3. **Torpedo Shop**

There is a small drainage ditch along the west site of Building 450, the Torpedo Shop. A small pipe under the building's asphalt apron connects the ditch to the catch basin that empties down to SW/SD-1. A soil/sediment sample should be considered for the small ditch beside the building. During the site visit, the cover for this ditch's catch basin appeared to be stained with paint residue. It should be noted for this site that since the swale at SW/SD 1 has been recently disturbed by land-moving activities, new sampling at this station may reveal lower contaminant levels.

Although there is considerable human activity at the Torpedo Shop and much of the area is built-up land, exposure to ecological receptors remains a possibility. The small grassy bank between Buildings 450 and 325, the drainage swale, and the nearby leach field/lagoon are areas likely to be utilized by several species of birds along with species of amphibians and reptiles.

These comments will be considered in the development of Step II work plan.

4. **Goss Cove Landfill**

The field investigation for the Goss Cove Landfill did not include sediment sampling in the adjacent Thames River. Elevated levels of several inorganics were detected in soils at the site and sampling of nearby river sediments appears appropriate. During the landfill operations, site contaminants may have entered the river through runoff or erosion. On the site visit, the oil containment booms below the large outfalls at the USS Nautilus, beside the former landfill, were noteworthy. The sewer drainage of the tank farm may not be part of the CERCLA investigation, but has there been any sampling in the sediments below the outfalls to determine SVOC levels or the impacts of oil discharges to benthic organisms? If small discharges occur on a regular basis, this area should be investigated.

Investigation of surface water and sediment quality within the adjacent Thames River has been recommended in Section 8.0 of the IR report.

5. **Area A Wetland**

It appears in Figure 4-16 (page 4-66) that SW-1 exists in a drainage between the Perimeter Security Road and Route 12. Plate 4-1 does not show the Perimeter Road, so the station may be within the wetland boundaries. Is SW-1 the upgradient location? If SW-1 exists in an upgradient drainage, a description of the drainage within the NSB-NLON boundaries and east of Route 12 would be useful. We did not visit this station during the site visit. It would be useful to know if this drainage contains the same heavy iron floc or orange

precipitate found downstream of the Area A wetland in the adjacent OBDA drainage. A comparison with upgradient sites may indicate that the wetland or Area A landfill are the sources of the floc.

In previous sediment sampling, DDT was detected in the range of 17 ppm within and upgradient from the Area A wetland. These levels are potentially harmful to fish and wildlife. Cadmium, chromium, copper, lead, mercury, and zinc were also detected above the ER-L concentration. A more comprehensive sampling plan, particularly to determine the extent of DDT contamination, appears warranted to identify portions of the wetland and Area A for remediation.

Sample 2WSW1 is located east of Perimeter Road and is an upgradient location with respect to the wetland and landfill. These sample points did not contain the "iron floc". The watershed is residential/undeveloped and wooded.

Regarding DDT contamination in the wetland, Section 8.0, page 8-18 includes a recommendation for additional sampling in the wetland.

6. **Area A Wetland**

A more intensive effort should be made to identify the fish species in the open water areas of the wetland. The habitat of the area and the reported sighting of otter further down the drainage suggests that semi-aquatic species may be exposed to site contaminants. Due to the presence of piscivorous birds and mammals in the area, this potential exposure route should be investigated more thoroughly.

Catbird fledglings were used to quantify exposure in the terrestrial food web near the Area A wetland and Downstream watercourses. I have not obtained the paper by Menzie et al. (1991), but I would echo the comment by the oversight contractor that the habitats and prey items at the NSB-NLON and the Manomet Bird Observatory may not be similar. I have requested a copy of the paper from Atlantic; perhaps Menzie describes the differences in the two sites in his paper. I do not view this issue as a problem, only as a point requiring clarification.

These comments will be discussed with the USEPA relative to the ecological assessments.

7. **Downstream Watercourses and OBDA**

In the drainage between the upper pond and the Area A wetland, SW/WD samples were not collected. This drainage contains the same iron floc or orange precipitate described above. SW/SD samples should be collected from this drainage, and an assessment of the fisheries or benthic fauna, if any, in the drainage should be provided. If a depauperate macroinvertabrete community is found, toxicity testing may be the next step for these drainages. Even is laboratory bioassays indicate that the waters or sediment are not toxic to the test organisms, the impact of the floc or precipitate on the quality of the habitat for fish and macroinvertabretes in the stream should be discussed. During our visits, the depth

of the floc layer on the bottom substrate and on the rocks and woody debris in the streams was striking.

Fish species in the two small ponds below Area A should be identified for the exposure assessment. The report states that fish were not observed in these ponds, but it is unclear if any fish collection was attempted. The upper pond appears more suitable fish than the lower pond. If fish are not present in the lower pond, I would expect a variety of amphibians to utilize the area. During the site visit, this pond looked like a good mole salamander breeding pool.

These comments will be discussed with the USEPA relative to the ecological assessments.

8. **DRMO**

As discussed during the October 8th visit, the Thames River sediments directly adjacent to the DRMO should be samples due to the likelihood of transformer oil and other contaminants entering the river through erosion, surface water runoff and periodic flooding. Station SW/SD-12 may not detect PCBs from the DRMO and higher concentrations may be found in sediments closer to the site.

Refer to Section 8.0, page 8-25, which provided recommendations for Thames River sediment sampling.

9. **Miscellaneous**

Since it is likely the wetlands at the site will require remediation, a wetlands delineation along with a function and value analysis should be conducted.

We are aware that wetlands exist in Area A, and the general boundaries are known. The wetlands regulations will be considered as an ARAR. Following the Feasibility Study, and as part of any remedial design, specific wetlands boundaries will be established at that time.

NAVY RESPONSES TO TRC COMMENTS ON DRAFT IR REPORT (AUGUST 1991)

Town of Waterford (October 16, 1991)

1. *The recommendations contained in Section 8 summary and conclusions relative to moving forward with Step II investigations and feasibility studies for remediation are supported. We are particularly interested and supportive of the additional testing to be conducted in the Thames River. These investigations should include ground and surface water quality monitoring on a regular interval.*

   Additional ground water and surface water sampling and analysis will be conducted in future investigations.

2. *Sediment testing and sampling of fish and shellfish adjacent to the base should be done. I have attached a report from John Volk, Director of the Agriculture Division of the State Department of Agriculture. This report on the status of shellfishing in the Thames River indicates that due to chemical and sewage discharges from the base (page 3) a prohibited area was established 1000' into the River.*

   The provided information will be considered in designing future field investigations.

3. *In your consideration of ARAR, the degree of remediation to be undertaken, particularly as it relates to compliance with state surface and ground water quality classification goals, it is recommended that all reasonable efforts be taken to identify and control discharges to the river. It is recommended that you contact Mr. Volk for any guidance he may be able to provide to you in studying the shellfish resources adjacent to the base. I have also attached the maps showing the location of shellfish beds leased by the Town of Waterford in the Thames River.*

   Comment so noted.

4. *In reviewing the information for the Goss Cove Landfill, there appears to be some uncertainty regarding levels of radioactivity in samples taken. I raised the question at the last TRC meeting, whether or not the Navy had verified the disposal of all low level radwaste generated on the site. The answer is no. Will the Navy be reviewing its records of disposal of low level and other nuclear wastes generated onsite?*

   In 1966, 1972, and again in 1989, the EPA conducted independent environmental monitoring for radioactivity associated with nuclear powered warships at SUBASE NLON. EPA monitoring included analysis of samples taken from SUBASE NLON and direct radiation level measurements using sensitive detection equipment. The results

of the EPA monitoring confirm the absence of a threat to human health or the environment from radionuclides associated with the operation and maintenance of naval nuclear propulsion plant, and confirm those of separate Navy monitoring, reported annually. (See Naval Nuclear Propulsion Program Report NT-91-1). The EPA Results also verify that the Naval Nuclear Propulsion Program's practices (e.g., prohibiting intentional discharge of liquids containing low-level radioactivity to the harbor environment, reuse of radioactive liquids to the maximum practical extent and solidification of those liquids that cannot be reused), and disposal facilities (radioactive waste associated with naval nuclear propulsion plants has never been buried at SUBASE NLON) have been successful in ensuring that there is no radioactivity associated with the Naval Nuclear Propulsion Program at or near SUBASE NLON that requires remediation.

5. *Sewage discharge was assumed to have been resolved with the connection of the base to public sewers. Mr. Volks letter indicates that sewage discharges are one of the reasons for the prohibited shellfish designation. Have all buildings been connected and are there any tests of surface and ground waters for fecal chloroform that have been conducted to determine if in fact sewage discharges are still occurring?*

   Testing done for our National Pollution Discharge Elimination System permit application did indicate the presence of fecal coliform in some storm sewer discharges. We have requested funding to do a survey of the lower base storm and sanitary sewer systems to determine sources of any cross-connections. We intend to proceed as soon as funding is available.

6. *In my review of the study, there was not any discussion of efforts to institute a set of best management practices to insure that spills and discharges of chemicals are prevented in the future. What actions have been taken to comprehensively address the handling of materials and should these efforts be documented in this study.*

   The intent of the remedial investigation was to characterize contamination that exists from past releases. Information on current management practices are not included in the report as they are not part of the focus of the study. The Submarine Base controls petroleum and hazardous materials through a number of structural and operational practices. We have recently completed a tank replacement program, where we replaced, abandoned or removed from service and emptied all oil storage tanks over 20 years old. Above ground tanks storing oil and chemical products have secondary containment systems. Our Spill Prevention, Control and Counter Measure Plan is currently being updated and all improvements recommended will be instituted. Hazardous material storage, use, and disposal are controlled by the SUBASE NLON Hazardous Material Management and Hazardous Waste Management Plans. Additionally, we have a Spill Contingency Plan with highly trained and well equipped personnel ready to response to any release.

ROBERT FROMER LETTER (October 13, 1991)

1. *Section 8.1.4.1, Health and Ecological Risk Assessment, ¶ 3, page 8-5: The report claims that contaminant concentrations in the ground water at Goss Cover are expected to be below water quality criteria after further dilution in ground water, attenuation due to adsorption to soils, and dilution in the Thames River estuary. Further study is essential to determine the leachate rate as a function of time. Experience in Connecticut with the pesticide EDB indicates that the porosity of sand particles serves as a reservoir for long-term leaching. The previous philosophy that, "dilution is the solution to pollution" seems still prevalent in this report. Consideration should be given to removal of contaminated soils as a remediation method. While the contaminants discharged into the Thames River may be relatively small, the Navy must take into consideration the cumulative pollution in the river. This is especially important considering the State of Connecticut, Department of Environmental Protection's policy of "no net loss of attainment in water classification".*

   Recommendation 4 on page 8-6 states that a quantitative health and environmental risk assessment of the potential impacts of the site on the Thames River should be conducted to verify the quantitative assessment. The Navy intends to proceed with this assessment.

2. *Section 8.2, Area A Downstream Watercourses, ¶ 2, page 8-9: Since the stream flows under the golf course, consideration should be given to any correlations between pollutant levels and any pesticide applications on the course.*

   The source areas of pesticides have been determined to be upgradient of the golf course based on the analytical data.

3. *Section 8.2, Ecological Risk Assessment, pages 8-17 to 8-18: The study investigated the impact on terrestrial and aquatic species; however, since there is ground water contamination, an expansion of the study is essential to include subterranean species to a specified depth. Ground water is not so pure as to be devoid of fauna and flora.*

   The assessment in inadequate, speculative and inconclusive. There is no correlation that the wildlife sampled in the study are representative of the ecological impacts. For example, to deduce that based on a few samples of catbirds, the risks to birds feeding on soil invertebrates appears to be low is preposterous. This presumes that all birds in the area feeding on the same menu have and identical biochemistry. In the absence of hard evidence to the contrary, I claim that the presumption is mythical and mystical.

   Further, the assessments are not statistically based creating serious questions as to their conclusive legitimacy. There is too much presumption in the analysis. For example, because the shrew is maximally exposed by diet, the investigators conclude that it would have the greatest exposure to DDTR. There is no objective study clearly demonstrating the level of exposure by shrews in the area. Even if the exposure is greatest, the shrews body chemistry may metabolize the DDTR without harmful effects.

The methods employed in the ecological risk assessment were either developed by the EPA for use in similar situations such as the equilibrium partitioning (EP) method or are currently widely used for the same purpose as they were used in this assessment such as the simple bioaccumulation models. They are, therefore, appropriate for use in ecological risk assessment.

Because of the large number of species present at the site and the complexity of the their interrelationships (which is true of many sites), certain species were selected for assessment based on their feeding and migratory patterns and their abundance on the site. The intent of the assessment was not to assess risks to all species. The EPA and U.S. Fish and Wildlife Service were consulted as to the appropriateness of species selected for assessment.

There is additional sampling planned for the site with regard to ecological receptors. This plan will be reviewed by the TRC and EPA. This will provide further opportunity to have direct input.

4. *Section 8.2.3, Lower Subase, pages 8-23 to 8-25: Because of nuclear activities at the lower base, this area requires study and monitoring of radioactivity. Such expansion of the study would secure the public's confidence in its integrity. In fact, all Step I and II areas should be monitored for radioactivity.*

In 1966, 1972, and again in 1989, the EPA conducted independent environmental monitoring for radioactivity associated with nuclear powered warships at SUBASE NLON. EPA monitoring included analysis of samples taken from SUBASE NLON and direct radiation level measurements using sensitive detection equipment. The results of the EPA monitoring confirm the absence of a threat to human health or the environment from radionuclides associated with the operation and maintenance of naval nuclear propulsion plants, and confirm those of separate Navy monitoring, reported annually. (See Naval Nuclear Propulsion Program Report NT-91-1). The EPA Results also verify that the Naval Nuclear Propulsion Program's practices (e.g., prohibiting intentional discharge of liquids containing low-level radioactivity to the harbor environment, reuse of radioactive liquids to the maximum practical extent and solidification of those liquids that cannot be reused), and disposal facilities (radioactive waste associated with naval nuclear propulsion plants has never been buried at SUBASE NLON) have been successful in ensuring that there is no radioactivity associated with the Naval Nuclear Propulsion Program at or near SUBASE NLON that requires remediation.