September 6, 1995

Mark Evans, Remedial Project Manager
U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

Re: Review of Navy Responses to EPA Comments on the *Draft Phase II Remedial Investigation Report for the Naval Submarine Base in Groton, CT*

Dear Mr. Evans:

I am writing in response to your request for EPA to review the responses to EPA comments on the *Draft Phase II Remedial Investigation ("RI") Report for the Naval Submarine Base ("NSB") in Groton, CT* dated July 27, 1995. I reviewed the responses in light of their responsiveness to our letter dated April 7, 1995 and the meetings held on June 1 and June 29, 1995.

In general, EPA is pleased that the majority of our comments will be incorporated into the Draft Final Phase II RI. The major outstanding issues regarding data gaps include 1) the need to further investigate the nature and extent of soil and groundwater contamination at the Defense Reutilization and Marketing Office ("DRMO"); and 2) the need to further investigate the extent of lead contamination in the Overbank Disposal Area Northeast ("OBDANE"). Since many of the responses state that text changes in the revised RI will address the comment, I request that all changes made to the RI be indicated in the text (*e.g.*, redline/strikeout method). Attachment A further clarifies a few of the comments sent to you on April 7, 1995.

Human Health Risk Assessment

As discussed briefly in my letter to you dated September 5, 1995, the discussion on the concentrations to be used in the Residential Reasonable Maximum Exposure ("RME") scenario and the Central Tendency scenario is not consistent with current EPA Region I guidance. For groundwater exposure scenarios, the RME scenario should be based on the maximum concentrations detected and the Central Tendency scenario should be based on the arithmetic average concentrations detected. For all other media, EPA requires that the RME and Central Tendency scenarios both use the 95% UCL of the arithmetic mean as the concentration value. I trust that the Draft Final Phase II RI will reflect these requirements.

Ecological Risk Assessments

Many of the ecological issues of concern are proposed to be addressed through the development of an outline for a Basewide Ecological Risk Assessment ("BERA") that was presented at a June 29, 1995 scoping meeting. This BERA will consider all data/areas not previously evaluated for ecological risk and assessment endpoints will be agreed upon prior to the risk assessment development. I also understand that a problem formulation and conceptual model will be developed for each site. After our review of the BERA, EPA anticipates further communication among parties to discuss the need for ecological soil screening values, additional data needs, and the identification of receptor species at each site.

Data Presentations

The second paragraph of the response states that a limited number of isoconcentration maps will be developed to correlate potential source areas with the analytical results. Is it possible to post all the analytical results on a simple site map for each site? Isoconcentration maps may be beneficial at some sites where there is a predominate site contaminant. However, for most of the sites, it would be more useful to illustrate the analytical results on a site map.

Radiological Data

In addition to the data results, EPA is still awaiting a list of the wells sampled and the radiological parameter list used for analysis of the Phase II samples. Will these data will be included in the Draft Final Phase II RI Report?

I hope this letter serves to clarify issues where needed. I look forward to working with you on moving sites into the cleanup stage. Please do not hesitate to contact me at (617) 573-5777 should you have any questions or wish to arrange a meeting.

Sincerely,

Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

Attachment

cc: Mark Lewis, CTDEP, Hartford, CT
Andy Stackpole, NSBNL, Groton, CT
Daniel Winograd, USEPA, Boston, MA
Patti Lynne Tyler, USEPA, Boston, MA
Dale Weiss, TRC, Lowell, MA
Ken Finkelstein, NOAA, Boston, MA

ATTACHMENT A

Page	Comment
p. 3-1, ¶1, #4	The response states that a section will be added to the report which discusses general information regarding precision and accuracy objectives. The section should discuss any inadequacies in meeting these objectives and their impact on the quality of the sample result and the overall quality of the program. The response states that the accuracy objective is between 75 and 100% recovery. Since it seems unlikely that this recovery range was applicable to all analytes, it should be reviewed for accuracy. The response also indicates that the Draft Final Phase II RI will include a comprehensive database of all results, including non-detected and detected results. The database should also include the detection limit objectives to facilitate determining if the detection limit objectives were achieved.
p. 3-70, ¶3, #16	EPA's dermal risk assessment guidance (January 1992) should be used to assess risks as a result of dermal contact. While I recognize that a certain degree of uncertainty is associated with the approach presented in this guidance, it should be used because it provides the most recent EPA, peer-reviewed guidance available.
p. 3-76, ¶2, #17	The Phase II RI Report should clearly indicate that there are a number of constituents present in site media that cannot be quantitatively evaluated because of the absence of toxicity data and that these constituents may pose additional risk (*see also* EPA letter dated September 5, 1995).
p. 5-19, ¶2, #29	The discussion of pesticide distribution at the CBU drum storage area should be added to the text of the Draft Final Phase II RI.
p. 10-10, #64	Although the Navy has agreed to add chrysene to the list of contaminants of concern ("COC"), Table 10-3 indicates that fluoranthene and pyrene should also be added to the list as maximum concentrations are 38 and 43 mg/Kg, respectively and each has a 90% frequency of detection.
p. 11-34, ¶2, #65	See response to comment 66 below.

p. 11-42, ¶2, #66 EPA maintains that there is a clear need to further characterize the nature and extent of contamination in the soils and the impact to groundwater at the DRMO. EPA has expressed this on numerous occasions throughout the planning and implementation of the Interim Measure for the DRMO. There is evidence that the saturated soils at the DRMO are a continuing source of groundwater contamination.

As you know, the lead cleanup standard (500 ppm) selected for the DRMO Interim Action was predicated on groundwater protection. Yet there are several areas in the subsurface that were not excavated during the Interim Action, where lead is present at concentrations above 500 ppm (6TB5, 811 ppm; 6TB22, 1640 ppm; 6TB17, 1460 ppm). Since these soils are saturated, and the cleanup value of 500 ppm was set for unsaturated soils, EPA anticipated that a protective lead concentration would be lower than 500 ppm. It seems inconsistent to implement an Interim Action on the unsaturated soils to prevent groundwater contamination, and then conclude that the saturated soils pose no risk.

I note that the elevated sample results from 6TB17 and 6TB22 were omitted from Figure 11-5, as were many other results. Figure 2-1 contained in the Action Memorandum for the DRMO and Spent Acid Storage Area (March 1995) contains several data points not included in Figure 11-5 of the RI. The missing data should be added to the RI figure.

EPA disagrees that the VOCs and lead detected in groundwater only slightly exceeded the MCLs for the respective compounds. These exceedances ranged from two to four times the regulatory limit, and therefore cannot be considered *slight*. Has a risk assessment been performed to conclude that such exceedances are slight?

Calculations regarding the dilution effect of groundwater discharging from the DRMO in comparison with the ultimate concentration of surface water entering Long Island Sound are not relevant in evaluating the need for further study at the DRMO. The chemical concentrations observed in groundwater at the DRMO indicate that the DRMO is a source of groundwater contamination. It is likely that the observed concentrations are already diluted many times because of tidal induced groundwater flow through the subsurface. The Draft Final Phase II RI should be revised to include recommendations for further subsurface characterization at the DRMO.

p. 12-18, ¶4, #69 EPA's original comment was intended to seek clarification on how field duplicate results were used in cases where the duplicate results did not meet the EPA Region I data validation criteria for field duplicates. In cases where the field duplicate samples were not comparable, the conservative approach would be to use the higher chemical concentration value of the field sample and the duplicate. This is particularly important for soil matrices, where it is difficult to obtain a true field duplicate owing to sample heterogeneity. Averaging the sample results is practically the same as compositing the sample in the field, which is a practice generally not favored by EPA. If the field duplicate results agree (as defined by EPA data validation procedures), however, it would be appropriate to average the results.

p. 12-42, ¶2, #71 This discussion should be included in the revised RI where the risk assessment for this site is presented (*see also* EPA letter dated September 5, 1995).

p. 14-57, §14.7, #84 The information presented in this response regarding the estimation of PAH concentrations using TPH data during Phase I and the subsequent risk evaluation should be presented in the text of the risk assessment (*see also* EPA letter dated September 5, 1995).

p. 15-14, ¶5, #88 There was one down gradient soil sample that contained 403 ppm of lead. This indicates a release of lead to the environment, which requires delineation of the extent and magnitude of the release. Use of risk-screening based on the results of only one sample in the impacted area is not sufficient to conclude that further investigation at this site is not warranted. Lead is a known contaminant at the base that has been observed at several sites at levels requiring remedial activity. Although lead levels observed in two soil samples from within the designated site boundary were not elevated, the OBDANE appears to be a source of lead. An X-ray fluorescence survey should be performed on a 25 foot grid in the area surrounding the OBDANE to determine the extent and significance of this elevated lead result. In addition, if the extent of contamination is more extensive, EPA recommends further evaluation of ecological risk. The IUBK model is only relevant to human health exposure.

The parameters used for the IUBK modeling need to be presented in the RI Report.

Drawing 4, #93	If a shallow overburden groundwater elevation map is prepared, then the map must indicate the areas where the overburden is unsaturated. This information is fundamental to providing an understanding of the true overburden flow patterns. Such information will not obscure the map because contours or water level elevations in the areas of unsaturated overburden will not be present.
p. 90, #115	The issue of ecological risk should not be solely be based on comparison to other areas that are distant from NSB, as those areas may be endangered. Examination of deployed mussels in Volume II, Table 6, identifies 27% frequency of detects in tissue from deployed mussels along the base while a frequency of detects of 4% is seen in tissue from mussels upstream and downstream. Alpha-BHC, gamma-BHC, aldrin, DDE, endrin aldehyde and gamma-chlordane were found in the tissue of mussels deployed adjacent to the base but was absent from upstream and downstream location. EPA recommends that these additional points be added to the discussion.

September 5, 1995

Mark Evans, Remedial Project Manager
U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

Re: Human Health Risk Assessment exposure scenarios for the Naval Submarine Base in Groton, CT

Dear Mr. Evans:

Thank you for the opportunity to review the human health risk assessment ("HHRA") exposure scenarios. I have reviewed Section 3.0 of the Draft Phase II RI summarizing proposed risk assessment exposure scenarios and input parameters. The enclosed comments are offered in an attempt to curtail the risk assessment currently proposed by the Halliburton NUS ("HNUS"). However, the current proposal, albeit excessive, will provide an evaluation of the potential threat to human health and the environment.

I understand that the HHRA for the NSB assumes that existing base operations will continue such that future land uses will remain unchanged. Although this appears to be a reasonable approach, a recent OSWER Directive (*see* 9355.7-04 "Land Use in the CERCLA Remedy Selection Process") emphasizes community input on decisions regarding potential future land use. We should consider this as a possible agenda item at upcoming Restoration Advisory Board meetings as it directly affects risk assessments and remedy selection.

Current on-base land uses include industrial, commercial, hospital, residential, and recreational. As such, inclusion of a residential exposure scenario is not *hypothetical* as the proposed risk assessment indicates (*see also* page 3-61). As we have discussed, however, not all areas of the base need evaluate a residential exposure scenario. Proposed exposure scenarios should be tailored to each area of the base on a site-by-site basis considering current land use, uses of neighboring parcels of land, and if appropriate, the potential future uses of each site and surrounding parcels of land.

It may be appropriate to consider qualitative and possibly phased approaches to the risk assessment in order to more efficiently use resources and focus the assessment on the truly meaningful pathways of exposure. For example, qualitative assessments of exposure can be used for complete exposure pathways that may result in either a lesser exposure than another pathway being quantitatively evaluated, an insignificant exposure altogether, or where a

quantitative assessment may be too uncertain (*i.e.*, inhalation of VOCs from domestic water use). A phased approach to the risk assessment may be warranted to handle exposures scenarios falling into the first category identified (*e.g.*, if the quantitated exposure scenario presumed to be of greater magnitude than another exposure scenario only qualitatively evaluated, and if the exposure scenario quantitated turns out to be highly significant, then the exposure scenario qualitatively evaluated may warrant quantitation).

I look forward to working with you on this issue. Please do not hesitate to contact me at (617) 573-5777 should you have any questions or wish to arrange a meeting.

Sincerely,

Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

Attachment

cc: Mark Lewis, CTDEP, Hartford, CT
Andy Stackpole, NSBNL, Groton, CT
Daniel Winograd, USEPA, Boston, MA
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Sarah Levinson, USEPA, Boston, MA
Jayne Michaud, USEPA, Boston, MA
Dale Weiss, TRC, Lowell, MA
Matthew Cochran, HNUS, Pittsburgh, PA

Section 3.3.3.3 Potential Routes of Exposure

Air. The discussion of the air pathway analysis in this section is biased towards the inhalation of volatiles (with the exception of the first sentence). Wind entrainment of particulate matter for surficial soil contamination is also a potential route of exposure. Consequently, this exposure pathway should not only address inhalation of volatiles, but must also consider inhalation of particulates that may contain both volatile and inorganic contamination. Maximum concentrations of *all constituents* detected in surficial soils should be compared to EPA's Soil Screening Levels (that incorporate exposure via inhalation of volatiles and particulates). Lastly, EPA Region III is not the best reference for the National EPA Soil Screening Values. A better reference is the December 1994 OSWER Proposed Soil Screening Guidance (*see* Directive 9355.4-1 and Technical Background Document EPA 540/R-94/101).

Although it appears to be subsurface (p. 3-58), the HHRA should specify the depth of the soil samples used in comparison to EPA's Screening Levels. Use of subsurface soil data may lead to unrealistic estimates of current exposure and possibly unrealistic estimates of future exposure if no excavations take place. Upon resolution of the future land uses, it may not be appropriate to use soil samples below the surface to predict potential exposure via the air pathway.

Direct Contact with Soils. Experience could be used in this potential exposure scenario to identify a pathway suitable for qualitative assessment only. Owing to the limited availability of reliable estimates of exposure via dermal contact with soils (except for dioxin, PCBs, and cadmium which can be quantitatively evaluated if present at the site), EPA recommends that this exposure pathway be qualitatively evaluated.

Direct Contact with Groundwater. Experience could be used in this potential exposure scenario to identify pathways suitable for qualitative assessment only. Owing to the relatively low level of exposure anticipated for the occupational exposure to groundwater via dermal contact in comparison to a residential receptor, EPA recommends that this pathway of exposure initially be qualitatively assessed for the construction worker scenario while quantitatively assessed for the residential receptor. For the residential receptor, EPA recommends that you perform a qualitative assessment for the inhalation of volatiles while showering (inhalation risks posed by volatiles are presumed to approximate risk from direct groundwater ingestion). Consequently, qualitative assessment of the exposure pathway for the residential receptor may be warranted.

Direct Contact with Surface Water. Although dermal contact and incidental ingestion of surface water potentially represent complete exposure pathways for a residential/recreational receptor, the net effect is presumed to be less than that attributed to the dermal contact and ingestion of groundwater under the residential scenario. Also, since exposure concentrations in surface water can be much lower than corresponding concentrations in groundwater, it

may be warranted to perform a qualitative evaluation of the direct contact with surface water pathways in light of quantitative findings for dermal contact and ingestion of groundwater.

Ingestion of Shellfish. The exposure pathway should not be limited to the ingestion of shellfish, as fishing occurs in the Thames River. Since the residential receptor is likely to have the greatest magnitude of exposure via the residential pathway, other scenarios do not need to be evaluated.

Section 3.3.3.4 Potential Receptors

Ten potential receptor populations have been identified in the proposed risk assessment to provide consistency between sites. It should be possible to narrow the selection of appropriate receptor populations such that only those with the greatest magnitude of exposure are evaluated. Certain receptor populations may be eliminated because their potential for exposure is less than that of a future residential user. These populations include local adult residents on and off-site, recreational users (adult and child), and occasional visitors. Likewise, the utility worker's exposure may be of lesser magnitude than the construction worker. Thus the utility worker scenario could be eliminated. Elimination of the above leaves a total of three exposure scenarios (full-time employees (generally low exposure and chronic in duration); a construction worker (generally high exposure but short-term in duration); and a residential exposure scenario incorporating both adult and child receptors populations in one analysis (also includes recreational exposure pathways)). However, there may be cause to evaluate receptor populations having lesser exposure. For example, if the future land use is not consistent with receptor populations having higher exposures (*i.e.*, residential) or if there are specific receptor types for which risk estimates need to be evaluated.

As previously noted, reference to a residential exposure scenario should not be characterized as *hypothetical* given current base use. Additionally, the reasonable maximum exposure ("RME") scenario should not be equated with a *worst-case* analysis as the two are not equivalent. Worst case is typically used to describe extreme exposures such that all other exposures would be less than the stated value. In contrast, the RME aims to represent the *majority* of individuals, but *not all*. Consequently, the RME is *less* conservative than a worst-case evaluation.

Section 3.3.3.5 Potentially Complete Exposure Pathways

Complete exposure pathways do not necessarily require a quantitative risk evaluation. If the above comments are followed, Table 3-11 summarizing the exposure pathways to be quantitated might look as follows:

Construction Workers:

- Ingestion of soil (surface and subsurface combined)
- Dermal contact with soil (TCDD, PCBs, Cd only; surface and subsurface combined)

- Inhalation of soil particulates and VOCs (surface and subsurface combined)

Full-time Employees:

- Ingestion of soil (surface only)
- Dermal contact with soil (TCDD, PCBs, Cd only; surface only)
- Inhalation of soil particulates and VOCs (surface only)
- Ingestion of groundwater

Residential Receptors:

- Soil Ingestion (surface and separate analysis for subsurface)
- Dermal contact with soil (surface and separate analysis for subsurface)
- Inhalation of soil particulates and VOCs (surface and separate analysis for subsurface)
- Ingestion of groundwater
- Dermal contact with groundwater while bathing
- Inhalation of VOCs while showering (qualitative)
- Ingestion of shellfish/finfish

Section 3.3.3.6 Quantification of Exposure

Air Exposure via Inhalation (Soils). The described approach only provides an estimate of the exposure via inhalation of particulates. No approach is presented for characterizing inhalation exposure of VOCs emitted from soil. Further, it is not clear whether ambient air monitoring data for VOCs (*see* page 3-59) will be used or whether a model is warranted (such as that contained in EPA's Risk Assessment Guidance for Superfund [RAGS Part B (9285.7-01B Dec. 1991)].

Specific Exposure Parameters for Soil Inhalation Pathways:

For the residential exposure scenario, the assessment may be limited to the adult exposure parameters (assuming a 30 year exposure period). A separate evaluation for a child is not required. Additionally, for both the RME and CTE, employ an inhalation rate of 20 m^3/day rather than the 19.4 m^3/day proposed.

Ingestion of Soil/Sediment. As presently written, the cite for EPA 1989 incorrectly indicates that EPA is only concerned about children's exposure between the ages of 1 and 6 years. EPA refers to this age group as having heightened exposure (meaning other ages should also be considered but are of a lesser magnitude). As a result, EPA advocates that an age adjusted soil ingestion rate be used for the residential exposure scenario (OSWER Directive 9285.6-03, March 1991, Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors).

Specific exposure parameters for the soil ingestion pathway:

In order to conform to existing EPA guidance, an age adjusted soil ingestion rate for the residential exposure should be evaluated. For the RME scenario, this exposure is based on 6 years of ingestion of 200 mg/day, body weight of 15 kg (child) and 24 years of ingestion at 100 mg/day, body weight 70 kg

(older child/adult). For the central tendency, it should be based on 2 years of ingestion of 100 mg/day, body weight of 15 kg (child) and 7 years of ingestion of 50 mg/day, body weight of 70 kg (older child/adult).

For a construction worker, 480 mg/day is appropriate for the RME. Although limited data exists to support a central tendency value for this receptor population, it is reasonable to assume half this value (240 mg/day rather than 480 as proposed) to be consistent with the ratio noted for the RME to the CTE for the residential ingestion rate.

For the RME in the general exposure equation, it is appropriate to select 1.0 for the fraction ingested from the contaminated source. Lesser values could be selected for the CTE.

Dermal Contact with Soil/Sediment. As mentioned above, dermal contact only needs to be quantitated for the three compounds where soil specific permeability coefficients are available (EPA 600/8-91/011B Jan. 1992 Dermal Exposure Assessment: Principles and Applications). These compounds are TCDD, PCB, and Cd. For the residential exposure scenario, an age adjusted dermal contact rate can be developed using the exposure parameters in Table 3-13 (except exposure duration) and the methodology described above for soil ingestion. The residential exposure duration should represent a 30 year period for the RME based on 6 years as a child and 24 years as an older child/adult and a 9 year period for the CTE based on 2 years as a child and 7 years as an older child/adult.

If a parameter is included in the soil ingestion exposure scenarios to estimate the fraction ingested from the contaminated source, then it should also be included for the dermal pathway.

Dermal Contact with Groundwater. As previously indicated, this exposure pathway should be initially quantitated only for the residential receptor and not the other receptor populations. Age adjusted exposure as described above is recommended.

Ingestion of Groundwater. Ingestion of groundwater should be evaluated for the residential scenario for only the adult receptor population (and not the child as proposed). Also, quantitatively evaluate the ingestion of groundwater scenario for facility employees recognizing that any potential risks will be smaller than that presented for the residential exposure scenario. The CTE for ingestion of groundwater should use the arithmetic average plume concentration as the concentration term rather that the 95% UCL (*see* page 3-67).

Ingestion of Surface Water/ Dermal Contact with Surface Water. This pathway does not need to be quantitatively evaluated initially. Instead, exposure point concentration comparisons between surface water and groundwater could be made and a qualitative assessment could proceed (assuming that surface water is used for drinking and bathing). If the potential exposures appear significant, then further quantitative analysis may be warranted.

Inhalation of VOCs in Groundwater. This pathway of exposure should be qualitatively evaluated for the residential exposure (VOCs only) assuming the risks could be comparable to the risk posed by direct ingestion.

Ingestion of Shellfish/Finfish. Although not specified, analysis of shellfish tissue will be performed. Accordingly, the exposure equation in this section is correct. As noted previously, however, the exposure pathway should be expanded to include finfish.

Section 3.3.5.1: Uncertainty in Selection of Chemicals of Concern

In the last paragraph on page 3-80, the choice of compounds for which there are reportedly "no available health criteria" is inaccurate as both dibenzofuran and cobalt have reported health criteria in the Region III Risk Based Concentration Tables and could be included in an assessment. Additionally, as noted previously, the text incorrectly attributes EPA's National Soil Screening Levels to Region III.

Section 3.3.5.5: Uncertainty in the Exposure Assessment

Determination of Land Use. See above discussion regarding a role for community involvement in future site use. Although future residential use of the base in areas currently supporting industrial land use may not be likely, certain areas of the base currently support residential land use and therefore future residential land use in these areas is appropriate. As a result, residential exposure scenarios should be evaluated.

Exposure Routes and Receptor Identification. The recommendations herein should reduce the number of receptor groups.

Another source of uncertainty in the exposure analysis is the presence of the hospital at the base. Sick or ailing individuals may have a greater susceptibility to toxic effects from site-related contaminants than the general population. Any such effect has not been addressed in the risk assessment and should be discussed in the uncertainty section.