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

IN REPLY REFER TO
5090
Ser 2622\1823\ME
OCT 19 1995

Ms. Kymberlee Keckler
Remedial Project Manager
U.S. Environmental Protection Agency
J.F.K. Federal Building (HAN-CAN1)
Boston, MA 02203-2211

Mr. Mark Lewis
Connecticut Department of Environmental Protection
Bureau of Water Management
79 Elm Street
Hartford, CT 06106

RE: OCTOBER 25, 1995 PHASE II REMEDIAL INVESTIGATION (RI) SCOPING MEETING TOPICS FOR THE NAVAL SUBMARINE BASE - NEW LONDON, GROTON, CT

Dear Ms. Keckler and Mr. Lewis:

A RI scoping meeting is planned for October 25, 1995 at the EPA Building in Boston (90 Canal Street) from 8:00 A.M. to 5:00 P.M. A meeting agenda is enclosed as Attachment 1. Topics of discussion during the meeting will include the Basewide Ecological Risk Assessment (BERA), Human Health Risk Assessment (HHRA), and any remaining RI report outstanding issues. The BERA will be discussed in the morning and the HHRA and RI report issues will be discussed in the afternoon.

Your attendance to this meeting is requested, as well the attendance of any technical staff who will be needed to discuss these topics and resolve outstanding issues. A brief synopsis of activities performed since our last meeting conducted on June 29, 1995; is included in the following paragraphs.

BASEWIDE ECOLOGICAL RISK ASSESSMENT (BERA)

During the scoping meeting conducted on June 29, 1995, it was decided that the Navy would prepare a Draft Problem Formulation / Conceptual Model development Report for the BERA. That document, dated September 15, 1995, was submitted to the EPA and CTDEP for review and comment. Comments have yet to be received on this document. A Supplement to the Problem Formulation / Conceptual Model Report has also been prepared for the BERA and is included as Attachment 2 for your review and comment. Both the Draft Problem Formulation / Conceptual Model Development Report and the supplement will be discussed during the upcoming meeting, as well as any comments that you may have on these items. Other BERA

issues which will be discussed during the meeting will include; additional Investigations / data needs, Identification of Receptor Species, and BERA report format.

HUMAN HEALTH RISK ASSESSMENT (HHRA)

During the scoping meeting conducted on June 29, 1995, it was decided that the Navy would prepare proposed Phase II RI risk assessment scenarios for submittal to the EPA and CTDEP for review and comment. In addition, the EPA was to investigate new regulations / guidance which propose using more realistic exposure scenarios to be used in risk assessments.

The proposed risk assessment scenarios were prepared and submitted by the Navy in a letter dated August 3, 1995 The evaluation of future residents was included in the letter. EPA submitted a review letter dated September 5, 1995 and CTDEP submitted a letter indicating no comment dated August 11, 1995. The Navy has reviewed the EPA September 5, 1995 letter and has provided a response for your review and comment which is included in Attachment 3. The Navy anticipates development and concurrence of risk assessment scenarios including identification of receptors for each site, during the upcoming meeting. Any new regulations / guidance that may exist on this subject will be kept in mind while developing these scenarios.

RI REPORT ISSUES

The Navy submitted a response to EPA comment letter on the Draft Phase RI Report on July 27, 1995. An EPA review letter dated September 6, 1995 was submitted to the Navy to provide further clarification on the HHRA, BERA, data presentations, radiological data, and selected specific comments. The Navy has reviewed the EPA September 6, 1995 letter and has provided a response which is included as Attachment 4. These issues, as well as the Draft Final RI Report format and schedule will be discussed during the meeting.

Please review this letter and the associated attachments prior to the meeting. If you have any questions or comments regarding either the meeting agenda or the other attachments, please do not hesitate to contact me at (610) 595-0567 ext. 162.

Sincerely,

Mark Evans

Mark Evans
Remedial Project Manager
By direction of the
Commanding Officer

Copy to: Ms. Patti Tyler, EPA
Mr. Andy Stackpole, NSB-NLON
Mr. Matt Cochran, B&R - Pittsburgh
Mr. Corey Rich, B&R - Pittsburgh
Ms. Karen Smecker, B&R - Pittsburgh
Ms. Kathy Trapp, Sciences International

Internal copy to:
1831\DM
1823

ATTACHMENT 1

MEETING AGENDA

AGENDA FOR PHASE II RI SCOPING MEETING
NAVAL SUBMARINE BASE - NEW LONDON
EPA BOSTON, MA
OCTOBER 25, 1995
8:00 AM - 5:00 PM

1. BASEWIDE ECOLOGICAL RISK ASSESSMENT (8:00 - 11:30)

- PROBLEM FORMULATION AND CONCEPTUAL MODEL REPORT
- SUPPLEMENT TO PROBLEM FORMULATION/CONCEPTUAL MODEL REPORT
- BERA REPORT FORMAT

2. LUNCH BREAK (11:30 - 12:30)

3. HUMAN HEALTH RISK ASSESSMENT (12:30 - 3:30)

- DISCUSSION OF HHRA SCENARIOS
  NAVY LETTER WITH PROPOSED HHRA SCENARIOS (8/3/95)
  EPA REVIEW LETTER (9/5/95)
  NAVY POSITION PAPER IN RESPONSE TO EPA REVIEW LETTER (10/16/95)
  CTDEP LETTER (8/11/95)
- SUMMARY OF RECEPTORS BY SITE

4. REMAINING RI REPORT OUTSTANDING ISSUES (3:30 - 4:30)

- RI REPORT COMMENTS
  NAVY RESPONSE TO EPA COMMENT LETTER (7/27/95)
  EPA REVIEW LETTER (9/6/95)
  NAVY RESPONSE TO EPA REVIEW LETTER (10/16/95)
  CTDEP COMMENT LETTER (6/23/95)
  NAVY RESPONSE TO CTDEP REVIEW LETTER (9/11/95)
- DATABASE COMPONENTS
- DRAFT FINAL REPORT FORMAT AND SCHEDULE

5. SUMMARIZE ACTION ITEMS (4:30 - 5:00)

ATTACHMENT 2

SUPPLEMENT TO PROBLEM FORMULATION/CONCEPTUAL MODEL REPORT

MEMORANDUM

TO: Corey Rich and Matt Cochran

FROM: Kathy Trapp

C: Mark Evans

DATE: October 17, 1995

RE: Supplement to Problem Formulation/Conceptual Model Document; Topics to review with EPA Region I representatives 25 October, 1995

This memo serves to supplement information contained in the Problem Formulation Document (Brown & Root Environmental, 1995) prepared for NSB-NLON and summarizes proposed methods to address the following topics:

- Orphan Sites
- Data Summary
- Assessment/Measurement Endpoints
- Benchmark Values
- Screening Methodology
- Representative Species
- Sediment Triad

Each of these topics is discussed in greater detail below. Hopefully these issues can be discussed at the October 25 meeting so that consensus regarding the approach to be taken for the BERA can be achieved.

ORPHAN SITES:

Review of various documents and comment/responses letters has determined that potential ecological risks have yet to be evaluated at the following sites:

- CBU Drum Storage Area
- Torpedo Shops
- OBDANE
- Rubble Fill Area at Bunker A86

At a minimum, these sites will be evaluated following an ecological, risk-based soil screening process. The screening process to be used is described below.

DATA SUMMARY

As noted in the EPA comment letter dated April 7, 1995, Phase I ecological COPCs were determined by using the USEPA Region III Human Health Soil Screening Levels. In essence, potential ecological impacts were not fully considered when selecting the COPCs evaluated in the Phase I RI report. To rectify this oversight, it is proposed that both Phase I and Phase II environmental data be "pooled" to form a comprehensive data set for the NSB-NLON. The arithmetic average and the maximum contaminant concentration would be determined from this comprehensive data set. Non-detects would be treated by using one-half the detection limit to perform these calculations. The human health risk assessment will be handling these data in this fashion.

The advantages to handling the data in this manner include the fact that all data are incorporated and that the human health and ecological risk assessments will handle data in a similar fashion. Potential draw backs include the fact that any trends with regard to contaminant are lost (increases or decreases over time) and that contaminant data collected in 1991 cannot be compared to ecological data (e.g., macroinvertebrate community data) collected in 1995. An alternative approach to handling summarizing these data would be to evaluate Phase I data separately from data collected during Phase II.

ASSESSMENT/MEASUREMENT ENDPOINTS

As discussed in EPA (1994a), one of the major tasks in the preliminary Problem Formulation step of an BERA is to identify assessment and measurement endpoints. An assessment endpoint is defined as "an explicit expression of actual environmental values that are to be protected". Measurement endpoints are "measurable responses to a stressor that are related to the valued characteristics chosen as the assessment endpoints" (Suter, 1990). The conceptual models described in the Problem Formulation document (Brown & Root Environmental, 1995a) provides an indication of how chemicals associated with activities at NSB-NLON might come in contact with ecological receptors. The models also provide an indication of the relationship between assessment and measurement endpoints that will be identified for this site.

Initially, the maintenance of receptor populations will serve as the assessment endpoint for this BERA. Therefore, one of the specific objectives of this assessment will be to determine if concentrations of contaminants present in soil, surface water, and sediments are likely to result in declines in plant and wildlife receptor populations. Declines in populations could result in a shift in the demographic structure of the community, effectively resulting in a shift in community structure and possible elimination of resident populations.

Measurement endpoints selected to determine whether or not these populations may be adversely impacted will include values indicative of potential adverse reproductive impacts. For terrestrial vertebrate species that may come in contact with these soil contaminants, "No-observed-adverse-effect-levels" (NOAEL) for chronic exposures to a given chemical will be utilized to evaluate potential impacts of these contaminants. Because few studies have been conducted to determine NOAEL values

for the proposed wildlife receptor species, most NOAEL values will be estimated from other species of wildlife as well as domestic and laboratory organisms. Justification of the data set selected and a summary of the data used to derive a given NOAEL will be provided. To reduce uncertainty in estimating NOAELs, benchmarks for mammalian wildlife species will be derived from studies performed on laboratory rodents (unless more applicable data are available) and benchmarks for avian receptors (if appropriate) will be based on results of tests performed on domestic and wild birds. Endpoints such as reproductive toxicity and reduced survival will be used whenever possible. Potential risks will be determined for both birds and mammals when appropriate toxicological endpoints can be identified both groups of organisms. However, because of the limited availability of toxicological data, it is probable that potential risks will only be predicted for mammals, or birds, but not for both. Development of these values is discussed in greater detail in the section entitled "Benchmark Values".

The macroinvertebrate community studies and the sediment toxicity tests also serve as measurement endpoints indicative of the assessment endpoint.

For aquatic receptors, terrestrial invertebrates, and terrestrial plants, screening-level ecotoxicological values obtained from the literature will be used to measure potential adverse impacts. Values indicative of adverse reproductive effects will be preferentially selected. When toxicity-based benchmarks are available but not necessarily associated with reproductive effects (e.g., values indicative of acute toxicity), the most conservative benchmark will be identified. Chronic aquatic water quality criteria or toxicity data will be used to access potential impacts to aquatic receptors while soil screening values will be used to determine if soil invertebrates or vegetation may be adversely impacted. The selection of these

values is discussed in greater detail in the section entitled "Benchmark Values".

BENCHMARK VALUES

WATER

For this BERA, the benchmark values preferentially used to identify final surface water COPCs will be chronic ambient water quality criteria (CAWQC). Exposures of NSB-NLON aquatic receptors to COPCs are assumed to be primarily chronic (long-term) exposures, usually at sublethal concentrations. CAWQCs are developed to protect sensitive aquatic species from exposures to chronic, sublethal contaminant concentrations. These CAWQCs therefore serve as conservative and appropriate screening values.

Arithmetic mean, study area-specific, surface water hardness values (mg $CaCO_3$/L) will be used to calculate chronic benchmark values for those metals whose toxicity is hardness-dependent. Average site-specific hardness values will be calculated for each body of water using the equation provided in Method 314A of Standard Methods (APHA, 1985). All calcium and magnesium values reported in the RI database for a given body of water were used to determine site-specific concentrations of calcium and magnesium.

Since water quality standards are not uniformly available for all potential COPCs, in some instances it may be necessary to estimate surrogate chronic benchmark values from acute toxicity data. Acute toxicity is generally expressed as the "LC_{50}" or the aqueous concentration of the contaminant lethal to 50 percent of the test population. For this BERA, chronic benchmark values will be derived by dividing available LC_{50} values by 100. In a number of instances, "LOEC" values (lowest observable effect

concentration) generated during chronic toxicity testing, rather than LC_{50} values, may be available. These values will be converted to surrogate chronic benchmark values by dividing by a factor of 10.

The use of $LC_{50}/100$ is based on the assumption that this ratio provides a reasonable and adequate level of protection for sensitive, untested species. This ratio has been employed by the Office of Pesticide Programs of the EPA to protect sensitive wildlife species (Urban and Cook, 1986). In the process of developing water quality criteria in 1972, the National Research Council suggested that the LC_{50} value be divided by factors of 10 or 100, depending on persistence and potential to bioaccumulate (National Research Council, 1972). More recently, examination of the results of acute and chronic toxicity tests performed on National Pollutant Elimination System (NPDES) effluents has indicated that the ratios of acute to chronic toxicity values seldom exceed 10 (i.e., $LC_{50}/10$ = chronic value) and ratios above 20 ($LC_{50}/20$) have not been observed (EPA, 1991). The use of the $LC_{50}/100$ value, therefore, provides a conservative estimate of chronic benchmark values.

The use of LOEC/10 to derive chronic benchmark values has been extensively examined in aquatic toxicology (e.g., derivation of no observable effects values from chronic toxicity test data) and provides a conservative estimate of concentrations protective of sensitive aquatic species (Calabrese and Baldwin, 1993).

Sediment

For this BERA, several methods will be used to identify benchmark values protective of benthic organisms present in the Downstream Area water bodies and the Thames River.

Equilibrium partitioning (EP) models been developed to predict

biologically available concentrations of non-polar organic sediment contaminants. As described in detail in EPA (1993a), biological availability of non-polar organic chemicals in sediments is correlated not to the total sediment chemical concentration (bulk sediment concentration) but with the concentration of chemical present in the sediment pore water. It has also been observed that the bioavailability of non-polar organic chemicals is equally correlated with the concentration of organic carbon present in a given sediment. EP modeling therefore revolves around the interrelationship between pore water concentrations, octanol/water (K_{ow}) and sediment organic partitioning coefficients (K_{oc}), and bulk sediment concentrations of non-polar organics. Based on these interrelationships, the organic carbon normalized benchmark criterion can be determined for a specific chemical having a specific organic carbon partitioning coefficient, independent of sediment properties (EPA 1993a).

EP modeling will be used to determine organic carbon normalized chronic benchmark values for non-polar organics. Using K_{ow} values, the following regression formula will be used to predict K_{oc}:

$$\log_{10}K_{oc} = 0.00028 + 0.983 \log_{10}K_{ow}$$

The predicted K_{oc} value is then used to predict chronic benchmark sediment values from chronic benchmark surface water values using the following formula:

sediment benchmark $\text{value}_{oc}(\mu g/g_{oc}) = K_{oc} \bullet$ surface water benchmark value (mg/L)

To account for differences in total organic carbon (TOC) concentrations present in sediments collected from various locations on the NSB-NLON, the organic carbon-normalized sediment

benchmark value is "converted" to dry weight-normalized sediment benchmark values using the following formula:

sediment benchmark value ($\mu g/g$) = sediment benchmark value$_{oc}$ ($\mu g/g_{oc}$) • (%TOC/100)

Bulk sediment concentrations of non-polar organic contaminants present at a location are then compared to sediment benchmark criteria adjusted for the percent TOC present in those specific sediments.

No widely recognized models have been developed to predict the concentration of polar organic contaminants present in interstitial water. Therefore, for the purposes of this BERA, it will be assumed that these contaminants are completely dissolved in the interstitial water (i.e., $\mu g/Kg = \mu g/L$) and compared to chronic benchmark values.

The sediment benchmark values for several divalent metals (Cu, Pb, Ni, Zn, Cd) will be also be derived following EP methodology. This methodology estimates the quantity of metal which will react with amorphous sulfides (i.e., acid volatile sulfide or AVS) or adsorb to sediment organic carbon (EPA, 1994b). This formula for sediment benchmarks for divalent metals is:

$$\text{Sediment benchmark} = AVS + CAWQC * f_{oc} * K_{oc}$$

where,

AVS = acid volatile sulfide
f_{oc} = fraction organic carbon
K_{oc} = organic carbon partition coefficient

However, this equation is invalid for sediments which contain significant quantities of more than one metal which will react

with AVS. It is recognized that the five cationic metals (copper, lead, cadmium, nickel and zinc) have differing affinities for AVS; the presence of two or more of these metals in sediments therefore alters the amount of AVS available for binding the various cations (EPA, 1994b). However, using the equations listed below, it is possible to account for the presence of other divalent metals and generate sediment benchmarks for divalent metals.

The equilibrium models developed by EPA (1994b) indicate that metals act in an additive fashion when binding to AVS, "That is, each of the five metals: Cu, Pb, Cd, Zn, and Ni will bind to the AVS and be converted to CuS, PbS, CdS, ZnS, and NiS in this sequence; i.e., in the order of increasing solubility" (EPA, 1994b). The term $\Delta[SEM_i]$ is the excess SEM for each of the ith metals. The least soluble metal sulfide considered in EPA (1994b) is copper sulfide. If the copper SEM is less than the AVS ($SEM_{Cu} < AVS$), then all of the copper SEM is present as copper sulfide and no additional SEM is present so the $\Delta[SEM_{Cu}] = 0$. The remaining AVS is $\Delta[AVS] = [AVS] - [SEM_{cu}]$. This computation is repeated for the next least soluble metal (Pb). In essence, AVS is "assigned" to the metals in the sequence of their solubility products from the lowest to the highest: $SEM_{Cu} < SEM_{Pb} < SEM_{Cd} < SEM_{Zn} < SEM_{Ni}$. That is, AVS would be complexed first to copper, followed by lead, etc. until AVS is exhausted. Once AVS is depleted, the remaining metals exist as excess SEM.

In accordance with EPA guidance (EPA, 1994b), the following equation takes into account a) the presence of multiple metals and their affinity for AVS and b) and the effect of sediment organic carbon on divalent metals (e.g., cadmium) availability in those instances when all AVS has been bound:

$$\text{Sediment Benchmark}_{Cd}\ (mg/kg) = (AVS - SEM_{Cu} - SEM_{Pb}) + (CAWQC_{Cd} * Kd,OC,i * foc)$$

In the event that the available AVS has been exhausted by SEM_{Cu} and SEM_{Pb} (i.e., AVS - SEM_{Cu} - $SEM_{Pb} \leq 0$), this equation is simplified such that only the impact of sediment organic carbon on determining the availability of cadmium is considered (EPA, 1994b):

$$\text{Sediment Benchmark}_{Cd} = (CAWQC_{Cd} * Kd,OC,i * f_{oc})$$

Site-specific AVS and SEM data for all divalent metals (Cu, Ni, Cd, Zn, Pb) are available. These data and one of the two equations listed above (depending on whether or not excess AVS exists after accounting for SEM_{metals}), will be used to calculate sediment benchmarks for divalent metals.

While the methods described above reflect the most recent information published by EPA on this topic, it should be borne in mind that there are a number of limitations associated with the methodology. Most notably, K_dOC values have only been developed for copper, cadmium and lead. Therefore, the role of TOC in controlling the availability of other heavy metals can not be determined.

SEM concentrations of copper, cadmium, lead, nickel, zinc, and mercury were measured in sediment samples collected from the river (Brown & Root Environmental, 1995b). Of these metals, mercury is the only one not addressed in EPA (1994b). It is proposed that the sulfide solubility constant for mercury be determined and that this value be incorporated in the equations listed above to account for the potential contribution of this heavy metal to toxicity of sediments collected from the Thames River.

For the remaining inorganic contaminants, values developed by Long and Morgan (1991) and updated in Long et al. (1995) will serve as benchmark values that will be used to identify

contaminants that represented a potential risk to aquatic receptors. Long and Morgan developed "apparent effects" data sets for various sediment toxicants by compiling biological effects data (e.g., reductions in benthic populations associated with the presence of a contaminant in sediments) for a specific toxicant. These data were then place in ascending order (toxicant concentrations producing no effect to toxicant concentrations producing the greatest effect) and the 10th and 50th percentile of the ordered data identified. Long and Morgan defined the 10th and 50th percentiles as the "Effects-Range Low" (ER-L) and the "Effects Range-Median" (ER-M), respectively, for each chemical contaminant considered. The ER-L value will be used to provide a conservative indication of those contaminants that may represent a potential risk to aquatic macroinvertebrates inhabiting these various bodies of water associated with the NSB-NLON.

In those instances where ER-L values are lacking, surrogate values will be selected. Sources of these surrogate values include sediment quality data established by various government agencies (e.g., Washington State).

Soil

Benchmark phytotoxicity values developed by Will and Suter (1994) will be used to access potential adverse impacts to terrestrial plants. As described in Will and Suter (1994), data used to derive these 34 phytotoxic values were obtained from searches of bibliographic data bases, a numeric data base, review articles, and conventional literature. Plant growth and yield parameters were selected as endpoints for identifying potential adverse impacts; a 20% reduction in growth or yield was selected as the threshold for significant adverse effects (e.g., a 20% reduction in growth or yield represented the lowest observable effects concentration [LOEC]). The chemical benchmarks were

derived by rank ordering of the LOEC values and identifying the tenth percentile from these ordered data. If there were 10 or fewer LOECs for a chemical, the lowest was used.

Although the majority of benchmark values were developed as described above, a number of the benchmarks presented in Will and Suter (1994) were based on values recommended in published reviews of phytotoxicity literature. It should also be noted that the benchmark values listed in Will and Suter (1994) are conservative and do not consider site-specific soil characteristics which may affect plant toxicity.

Evaluating potential impacts to soil invertebrates will be based by comparing soil contaminants concentrations to values listed in Beyer (1991) that are indicative of levels that may adversely impact earthworms. These data are limited and will have to be supplemented by values from other sources, including:

- Those established by the Quebec Ministry of the Environment for soil (Direction des Substances Dangereuses, 1988)

- Maximum allowable concentrations established by various regulatory agencies for amending farm soil with sewage sludge

- "Interim Canadian Environmental Quality Criteria for Contaminated Sites (CCME, 1991).

These documents and many others are also summarized in Beyer (1991). Although these references have identified "safe" soil contaminant levels from a human health perspective, only a few have developed soil benchmark values that have protection of ecological receptors as a goal. When possible, the BERA will preferentially select those soil benchmark values that consider impacts to ecological receptors. However, in many instances,

surface soil benchmarks developed to be protective of human health may have to be used.

Vertebrate Benchmarks

Information on the toxicity of environmental contaminants to terrestrial wildlife is generally limited. Most information generated to date involves impacts of agricultural contaminants on non-target wildlife species; little information exists on the impact of industrial chemicals and contaminants on ecological receptors (Opresko et al., 1994). Furthermore, much of the data that are available reflect acute effects (e.g., mortality), and interpretation of the potential effects that long-term, chronic exposure to a contaminant might have on wildlife populations is difficult. Because of these and other data limitations, species-specific NOAELs (no-observed-adverse-effects levels) for chronic exposures to a given chemical must be derived from the results of toxicity tests performed on different species of wildlife or, more frequently, on laboratory animals.

When possible, NOAELs and LOAELs (lowest-observed-adverse-effects levels) for domestic and wild mammals and birds (e.g., surrogate species) will be obtained from the primary literature, EPA review documents, and secondary sources such as the Registry of Toxic Effects of Chemical Substances, the Integrated Risk Information System (IRIS) and Opresko et al. (1994). NOAELs and LOAELs represent daily contaminant dose levels normalized to the body weight of the test animals. To reduce the need to extrapolate between data and to limit the uncertainty associated with deriving NOAEL values, emphasis will be placed on those studies in which reproductive and developmental endpoints were considered (e.g., toxicity test endpoints indicative of potential population-level effects).

Although toxicity test data that reflected potential long-term

(chronic) impacts to test organisms will be preferentially sought, these types of data are not uniformly available. In order to derive reproductive NOAEL values for each of the representative ecological receptors considered in this BERA, a series of "Uncertainty Factors" (UFs) amy have to be applied to the available toxicity data. UFs are designed to account for the uncertainty associated with extrapolating from toxicity data experimentally obtained from one organism in order to estimate the potential toxic impact on another receptor organism.

When necessary, uncertainty factors will be applied to convert NOAEL values to reference doses (RfDs). The following represent circumstances where the application of uncertainty factors may be appropriate:

- Study duration of less than one full life cycle
- Study results that reflect less sensitive toxicity endpoints (e.g., acute toxicity)
- Interspecies extrapolations between taxonomically distant species
- Available studies are deficient or insufficiently documented, resulting in uncertainty in test results
- Study duration insufficient to produce toxic response

Although no clear guidance has been developed to define what constitutes a subchronic exposure, both EPA (1993) and Opresko et al. (1994) consider exposure periods of less than 50% of a species' life span to represent a subchronic exposure period for mammalian species. This same definition of subchronic exposure will be used in this BERA. As outlined in Opresko et al. (1994), information defining chronic/subchronic exposure periods for avian toxicity tests is even more limited and these tests are not well standardized. Therefore, an exposure period of 10 weeks or less will be defined as a subchronic exposure period for avian species (Opresko et al., 1994).

The derivation of reference doses (RfDs) for each chemical of concern and each receptor species considered in this BERA will be summarized in tabular form. These tables will list the chemicals of concern, surrogate species used in each toxicity test, the endpoint used to quantify the toxic response of the surrogate organisms, and the laboratory test result [expressed as a dose (mg/kg/day)]. The UF values applied to these test results will also listed, as will the weights of both the surrogate and receptor species (included for informational purposes only). Using the following formula, a "scaling factor", defined as the product of the reciprocals of all applicable UFs will be calculated:

~~Scaling Factor (SF)~~ = $(1/UF_a*1/UF_b*1/UF_c*....1/UF_x)$

(Uncertainty Factor)

Receptor-specific RfD values will then be derived by multiplying the laboratory test result by the chemical-specific scaling factor:

Receptor-Specific RfD (mg/kg/day) = SF*Laboratory Test Result (mg/kg/day).

SCREENING TO ID COPCS

Water

The inorganic chemicals detected in surface water samples will be compared to background values; all organic chemicals and those inorganic chemicals that exceeded background concentrations will be compared to chronic benchmark values and final surface water COPCs identified.

For the Area A Downstream water bodies, the off-site reference areas will serve as background locations for this screening process. Determining a background location for the Thames River, because of its estuarine nature near the NSB-NLON (e.g., tidally

influenced) is more difficult. Previously, mean values for inorganics reported in seawater (Hem, 1985) served as a preliminary screen to select COPCs for this river (Brown & Root Environmental, 1995c). It is proposed that this method be retained for the BERA.

Sediment

The inorganic chemicals detected in sediment samples will be compared to background values; all organic chemicals and those inorganic chemicals that exceeded background concentrations will be compared to sediment benchmark values and final sediment COPCs identified.

For the Area A Downstream water bodies, the off-site reference areas will serve as background locations for this screening process. Like surface water, determining a background location for the Thames River is difficult. Previously, mean values for contaminants present in a NOAA data base served as a preliminary screen to select sediment COPCs for this river (Brown & Root Environmental, 1995c). It is proposed that this method be discussed October 25, 1995 to determine if it should be retained for the BERA.

Soil

Final surface soil inorganic COPCs will be identified by comparing inorganic contaminant concentrations to concentrations present in background soil. A revised report on background data, Background Concentrations of Inorganics in Soil (Atlantic, 1995) has been submitted by the Navy to CTDEP and EPA for approval. Information in this document will serve as the source of background surface soil data for determining soil COPCs. Those inorganic chemicals that exceeded background concentrations and all organic chemicals will then be compared to soil threshold

values (concentrations considered to be protective of receptors). Those contaminants exceeding these values will be considered final surface soil COPCs.

Both the average and maximum contaminant concentrations will be calculated for all media considered. Those contaminants detected with a frequency of detection $\geq$ 5% will be considered in this evaluation. Average concentrations of inorganic contaminants will be compared to the background concentration; if the average concentration of the contaminant exceeds the background value, risks associated with both the average and maximum contaminant concentration will be considered. If the average value is less than the background value but the maximum contaminant concentration exceeds background values, then only potential risks associated with exposure to the maximum contaminant concentration will be considered. If both the average and the maximum reported contaminant values are less than the background value, then the contaminant will be dropped from further consideration.

RECEPTOR ORGANISMS

Representative species should be selected from those ecological guilds that may potentially be maximally exposed to and/or impacted by contaminants associated with the NSB-NLON. Additional criteria for selection include sensitivity of the representative species, availability of data for the representative species, the relationship of the representative species to the species or functional group being evaluated, consistency of exposure scenarios with the species or functional groups being evaluated, and the availability of suitable test protocols should testing be necessary as part of a validation study.

Based on these considerations and the conceptual models developed

in the Problem Formulation document (Brown & Root Environmental, 1995a), the following organisms have been proposed as representative species for this BERA:

Area Landfill and Wetlands
- Raccoon
- Mallard Duck
- Red-tailed Hawk
- Aquatic Receptors
- Terrestrial Plants

ADD Small Mammal receptor

Area A Downstream Watercourses
- Raccoon
- Mallard Duck
- Aquatic Receptors
- Terrestrial Plants

Thames River
- Waterfowl (herring gull)
- Aquatic Receptors

ADD Kingfisher ? or Morganser

Selection of these receptors should be reviewed during the meeting October 25 to verify that they represent appropriate representative species for these various areas.

FOOD CHAIN MODELS

Food chain models will be used to evaluate exposure of terrestrial vertebrates to contaminants via various pathways. Exposure point concentrations associated with these various exposure pathways will be used to calculate potential contaminant intake (dose) by each receptor. These calculated intake concentrations will be used in to characterize potential risks. Individual chemical intakes for each receptor/exposure route

combination will be presented in tabular form.

For the purposes of this BERA, it will be conservatively assumed that all receptor species foraged exclusively in the impacted areas (e.g., fractional intake = 100%).

Based on the conceptual models developed in the Problem Formulation Document (Brown & Root Environmental, 1995a), the following exposure pathways are believed complete for terrestrial vertebrate receptors;
ingestion of surface water
ingestion of contaminated prey items
incidental ingestion of soil

The equations to be used to estimate contaminant intake from ingestion of contaminated food items are as follows:

$$PD_{\text{ingestion of prey}} = (PC_{prey} * F * FA * FI * AF)/(WR * CF)$$
$$PD_{\text{ingestion of vegetation}} = (PC_{vegetation} * F * FV * FI * AF)/(WR * CF)$$

where:
PD = Predicted Dose from Ingestion of Food Items (prey or vegetation; mg/kg/day)
PC = Predicted Contaminant Concentration (vegetation or prey; mg/kg)
F = Food Consumed (mg/day)
FA = Animals as a Percentage of Diet
FV = Vegetation as a Percentage of Diet
FI = Fractional Intake (% of home range that overlaps impacted area; assumed to equal 100%)
AF = Absorption Fraction (unitless)
WR = Weight of Receptor (kg)
CF = Conversion Factor (kg to mg)

The estimation of intake of contaminants in soil (both

intentional and incidental) will be determined using the soil concentration of a given contaminant. Intestinal absorption (AF) will conservatively be assumed to equal 100%. Daily intake of contaminants as a result of ingestion of soil will be determined using the following equation:

$$PD_{\text{ingestion of soil}} = (PC_{soil} * FI * SA * AF * F)/(WR * CF)$$

where:
PD = Predicted Dose from Ingestion of Soil (mg/kg/day)
PC = Predicted Contaminant Concentration in Soil (mg/kg)
FI = Fractional Intake (% of home range that overlaps impacted area; assumed to equal 100%)
SA = Percent of Diet that Equals Soil
AF = Absorption Fraction (unitless)
F = Food Consumed (mg/kg)
WR = Body Weight (kg)
CF = Conversion Factor (kg to mg)

Consumption of surface water contaminated with NSB-NLON - related contaminants is only applicable to terrestrial vertebrate receptors inhabiting the Area A Downstream Watercourses; it is assumed that the Thames River is too brackish to represent a viable source of drinking water. Absorption of contaminants present in water is also assumed to equal 1.0. The equation for drinking water ingestion is as follows:

$$PD_{\text{water ingestion}} = (PC_{water} * FI * AF * WI)/(WR * CF)$$

where:
PD = Predicted Dose from Drinking Water Ingestion (mg/kg/day)
PC = Concentration of a Contaminant in Water (mg/L = mg/kg)
FI = Fractional Intake (% of home range that overlaps impacted area; assumed to equal 100%)
WI = Water Intake (L/day = mg/day)

AF = Absorption Fraction (unitless)
WR = Weight of Receptor (kg)
CF = Conversion Factor (kg to mg)

SEDIMENT TRIAD

Macroinvertebrate community data, the results of macroinvertebrate toxicity tests, and the results of sediment chemical analyses for samples collected in April, 1995 will be used to evaluate potential impacts of activities at the NSB-NLON on the aquatic system associated with the Area A Downstream Watercourses. The "ratio-to-reference" RTR) approach, described in Chapman et al. (1991) will be used to summarize the three types of data.

The RTR approach is an expression of the relative degree of difference in various parameters as compared to the reference area. An RTR value is calculated by dividing the value of the parameter at each station by the average of the same parameter observed at the reference station.

Calculating RTRs for the macroinvertebrate community parameters and the macroinvertebrate sediment toxicity tests will be relatively straight forward. However, applying this methodology to the sediment analytical results may be complicated if a large number of COPCs is identified for the various water bodies. Typically, this method is applies when there are a limited number of contaminants to address (e.g., heavy metals only; limited organic contaminants, etc.). At present, the number of contaminants that will be identified as COPCs is unknown and a method to select contaminants to be included in the Sediment Triad evaluation can not be proposed. Potential methods that could be considered include evaluating organic and inorganic COPCs separately, evaluating only those heavy metals present in excess of AVS and TOC concentrations, etc.

REFERENCES

Atlantic Environmental Services, Inc. April 1995. Background Concentrations of Inorganics in Soil. Colchester, Connecticut.

Beyer, W. N. 1990. Evaluating Soil Contamination. Biological Report 90 (2). United States Fish and Wildlife Service.

Brown & Root Environmental. 1995a. Ecological Risk Assessment: Problem Formulation and Conceptual Models for Naval Submarine Base New London. Wayne, Pennsylvania.

Brown & Root Environmental. 1995b. Work Plan for Thames River Ecological Sampling for Naval Submarine Base New London, Groton, Connecticut. Wayne, Pennsylvania.

Brown & Root Environmental. 1995c. Phase II Remedial Investigation Report for Naval Submarine Base -New London Groton, Connecticut. Volume I - IV. Wayne, Pennsylvania.

Calabrese, E. J. and L. A. Baldwin. 1993. Performing Ecological Risk Assessments. Lewis Publishers. Chelsea, MI.

Chapman, P.M., E. A. Power, R.N. Dexter, and H. B. Andersen. 1991. Evaluation of effects associated with an oil platform, using the sediment quality triad. Environmental Toxicology and Chemistry; 10:407 - 424.

Canadian Council of Ministers of the Environment Subcommittee on Environmental Quality Criteria for Contaminated Soils. 1991. Interim Canadian Environmental Quality Criteria for Contaminated Sites. CCME EPC-CS34.

Direction des Substances Dangereuses. 1988. Contaminated Sites

Rehabilitation Policy. Gouvernement du Quebec, Ministere de L'Environment, Sainte-Foy, Quebec, Canada.

EPA. 1991. Technical Support Document for Water Quality-based Toxics Control. Office of Water, Washington, DC. EPA/505/2-90-001.

EPA. 1993a. "Sediment Quality Criteria for the Protection of Benthic Organisms: Phenanthrene." EPA-822-R-93-014. Office of Science and Technology. Washington, DC.

EPA. 1993b. Wildlife Exposure Factors Handbook: Volumes I and II. EPA/600/R-93/187. U.S. EPA Office of Research and Development, Washington, DC.

EPA, 1994a. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Review Draft.

EPA, 1994b. Briefing Report to the EPA Science Advisory Board on the Equilibrium Partitioning Approach to Predicting Metal Bioavailability in Sediments and the Derivation of Sediment Quality Criteria. EPA-822-D-94-002. Office of Water and Office of Research and Development.

Hem, J.D. 1985. Study and Interpretation of Chemical Characteristics of Natural Water. U.S. G. S. Water-Supply Paper 2254.

Long, E. R. and L. G. Morgan. 1991. "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program." NOAA Technical Memorandum NOS OMA 52. National Oceanic and Atmospheric Administration. Seattle, WA.

National Research Council. 1972. "Water Quality Criteria 1972."

EPA-R3-73-033. U.S. Environmental Protection Agency. Washington, DC.

Opresko, D.M., B.E. Sample, and G.W. Suter. 1994. Toxicological Benchmarks for Wildlife: 1994 Revision. ES/ER/TM-86/R1. Oak Ridge National Laboratory, Oak Ridge, TN.

Will, M.E. and G. W. Suter. 1994. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants:1994 Revision. ES/ER/TM-85/R1. Oak Ridge National Laboratory, Oak Ridge, TN

Urban, D. J. and N. J. Cook. 1986. "Hazard Evaluation, Standard Evaluation Procedure, Ecological Risk Assessment." EPA-540/9-85-001. U.S. Environmental Protection Agency. Washington, DC.

ATTACHMENT 3

NAVY POSITION PAPER IN RESPONSE TO EPA HHRA REVIEW LETTER DATED 9/5/95

POSITION PAPER

NSB-NLON, GROTON, CONNECTICUT

RESPONSE TO EPA COMMENTS DATED SEPTEMBER 6, 1995

Potential Routes of Exposure - Air

As stated in Section 3.3.3.3, both inhalation of fugitive dust and volatile emissions are considered to be potential exposure pathways. A qualitative evaluation of exposure to volatile emissions from soil (surface and subsurface) was provided on pages 3-58 and 3-59 to justify the exclusion of this exposure route as a significant exposure pathway. Exposure to fugitive dust was quantitatively addressed in the baseline risk assessment. An indepth discussion of the evaluation of this exposure pathway is presented in Section 3.3.3.6 Quantification of Exposure, pages 3-63 and 3-71. Text on pages 3-58 and 3-59 will be revised to clarify the approaches used in the risk assessment.

The December 1994 OSWER Proposed Soil Screening Guidance presents Soil Screening Levels (SSLs) for a limited number of chemicals only (66 substances for inhalation). Inhalation SSLs, which were developed using the same methodology proposed in the OSWER guidance, are available for a number of additional chemicals in the Region III guidance. Consequently, the Region III guidance is a more comprehensive source for Soil Screening Levels (SSLs) for the inhalation pathway.

Potential Exposure Routes - Direct Contact With Soils

Because of the limited guidance concerning this issue, a quantitative evaluation of the dermal risks associated with cadmium, PCBs, and dioxins only will be performed using information presented in the current dermal guidance. The dermal

risks associated with all other detected soil constituents will be addressed qualitatively.

Potential Exposure Routes - Direct Contact With Groundwater

It is considered appropriate that this exposure route be assessed quantitatively for selected sites under the current land use scenario. The rationale is based on the fact that groundwater for sites located near the Thames River cannot be developed for potable purposes without substantial treatment (saline conditions). Since a residential groundwater use scenario will not be considered for these sites and for others based on current site conditions (e.g., the Area A Wetland as a result of habitat concerns; the Area A Landfill because of post-closure care, deed recordations, etc.; the overbank disposal areas as a result of topography, etc.), it is important that this route be considered.

Potential Exposure Routes - Direct Contact with Surface Water

This is an important potential exposure route since residential groundwater use will not bracket the risks for all sites, as discussed in the previous response. Furthermore, this exposure route is particularly germane to the assessment for North Lake and the downstream water courses.

Potential Exposure Routes - Ingestion of Shellfish

Ingestion of finfish, as well as shellfish, will be performed. Although actual finfish tissue samples were not available, estimated chemical concentrations in Thames River finfish were calculated using chemical-specific bioconcentration factors and detected surface water concentrations. The revised text will indicate the methodology used. Ingestion of shellfish is considered to be a significant exposure pathway as shellfish are relatively sedentary and body burdens in such organisms

(attributable to NSB-NLON or proximate sources) are expected to be greater than those for anadromous or migratory species.

Potential Receptors

The receptor groups were selected to provide risk estimates for realistic potential receptors and were identified based on review of the EPA-approved work plan prepared by Atlantic. It is considered appropriate that the groups be retained from a public relations perspective.

Residential land use is considered hypothetical under current land use conditions. Although enlisted and officer personnel reside at the base, the residential scenario is not truly applicable to such receptors since 1) they do not reside in contaminated areas and 2) they are assigned to the base for relatively short time periods (e.g., 3 years).

The need to evaluate residential exposure under the future land use scenario may be warranted at select sites. Based on the nature and location of several sites (i.e., wetlands, landfills, sites located in floodplains, or those characterized with steep topography, etc.), residential development may not be a suitable future land use, thereby eliminating a need for evaluation of a residential exposure scenario. Further discussions are necessary to reach a resolution on this issue.

Potentially Complete Exposure Pathways

As stated previously, based on review of the EPA-approved work plan prepared by Atlantic, the receptors groups identified for risk evaluation were selected to provide risk estimates for realistic potential receptors. Discussions on those exposure pathways requiring a quantitative or qualitative risk evaluation are provided in various responses throughout this paper.

Quantification of Exposure - Air Exposure via Inhalation

Exposure resulting from inhalation of VOCs emitted from soil was addressed qualitatively in Section 3.3.3.3 Potential Routes of Exposure, pages 3-58 and 3-59. Exposure to VOCs via inhalation was quantitatively evaluated at Site 8 (Goss Cove Landfill) only. Air samples were collected from locations inside the Nautilus museum and the resulting analytical data were used to calculate human health risks.

For those sites where residential development is deemed suitable under potential future land use, the quantitative evaluation of exposure to fugitive dust will be limited to a 30-year adult residential exposure scenario. Exposure for child residents will be evaluated qualitatively. Inhalation of VOCs will be qualitatively addressed, as indicated in prior responses. The recommended inhalation rate for the CTE and RME was used in the risk assessment by converting 20 m^3/day to 0.8 m^3/hr. The difference noted (between 20 m^3/day and 19.4 m^3/day) is merely a result of rounding the converted value.

Quantification of Exposure - Ingestion of Soil/Sediment

The text on page 3-71 will be revised to clarify that according to EPA guidance (December 1989) children represent a critical subpopulation of concern for exposure to these media. Age adjusted soil ingestion rates (for a RME 30-year and CTE 9-year exposure) will be employed for those sites where residential development is considered to be a potential future land use. The exposure parameters presented in existing EPA Region I guidance, as cited in the comment, will be used to derive the age adjusted ingestion rates.

The ingestion rate of 240 mg/day, recommended by the EPA, will be used to estimate soil ingestion risks for the construction worker

under the CTE.

A value of 1.0 was used for the fraction of soil ingested from the contaminated source (Fi) under the RME and CTE because of lack of available guidance. A value of 0.5 could be used for the CTE Fi term. This value will be used in the revised RI Report, unless further guidance is provided by the EPA.

Quantification of Exposure - Dermal Contact with Soil/Sediment

A quantitative evaluation of dermal risks will be provided for cadmium, PCBs, and dioxins; dermal risks associated with other detected chemicals will be addressed qualitatively. For those sites where an evaluation of the residential exposure scenario is deemed appropriate, age adjusted dermal contact rates will be developed for a RME 30-year and CTE 9-year exposure.

As recommended by the EPA, a similar exposure parameter used to estimate the fraction ingested from the contaminated source under CTE conditions will be incorporated into the evaluation of the dermal exposure pathway for future residents. The new parameter, which will be identified as Fd (fraction of soil from the contaminated source available for dermal contact), will need to be introduced into the intake equation presented on page 3-73. It should be noted that the revised equation will be a deviation from the methodology presented in RAGS, Part A (EPA, December 1989).

Quantification of Exposure - Dermal Contact with Groundwater

As stated previously, it is considered appropriate that this exposure route be assessed quantitatively for selected sites under the current land use scenario. For those sites where an evaluation of future residents is warranted, age adjusted exposures will be evaluated.

Quantification of Exposure - Ingestion of Groundwater

Ingestion of groundwater by future adult residents will be quantitatively evaluated at selected sites (i.e., those sites where residential development is a potential future land use). A qualitative evaluation of the risks associated with groundwater (comparison of detected concentrations to drinking water standards) will be performed for the remaining sites which are not considered to be suitable for residential development.

The need to quantitatively address ingestion of groundwater for employees is not evident. Because groundwater is not used as a potable water supply under current land use, exposure could occur under potential future land use only. It is suggested that a qualitative assessment for employees would lead to a sufficient evaluation of the ingestion risks associated with this medium, especially since a quantitative evaluation of risk will be performed for future residents at selected sites.

As recommended by the EPA, for ingestion of groundwater, the arithmetic average plume concentration, rather than the 95% UCL, will be used as the exposure point concentration for the CTE.

Quantification of Exposure - Ingestion of Surface Water/Dermal Contact with Surface Water

As stated previously, these are important potential exposure routes since residential groundwater use will not bracket the risks for all sites and because these exposure routes are particularly relevant to the assessment for North Lake and the downstream water courses.

Quantification of Exposure - Inhalation of VOCs in Groundwater

This exposure route will be qualitatively addressed by assuming

that the risks associated with VOCs are equal to the risks posed by direct ingestion. For VOCs only, the risks calculated for ingestion of groundwater will be multiplied by a factor of 2 to account for direct ingestion and inhalation.

Quantification of Exposure - Ingestion of Shellfish/Finfish

Ingestion of shellfish and finfish will be performed for the Thames River. The methodology used to estimate chemical concentrations in fish tissue from detected surface water concentrations will be incorporated accordingly.

Uncertainty in Selection of Chemicals of Concern

Text on page 3-80 will be revised to indicate that risk-based screening levels are not calculable for various chemicals (e.g., phenanthrene, benzo(g,h,i)perylene) because of the absence of published dose-response parameters. Therefore, these compounds were not included as chemicals of concern. (It is recognized that ECAO provisional health criteria are currently available for dibenzofuran and cobalt.)

Since the paragraph on page 3-80 discusses uncertainties in the Chemical of Concern (COC) selection process, the reference to Region III guidance is in regards to risk-based concentrations (RBCs), not SSLs. The RBCs used to identify COCs for the risk assessment were developed using Region III guidance. Therefore, it is appropriate to cite the Region guidance.

Uncertainty in the Exposure Assessment - Determination of Land Use

As previously indicated, further discussions are necessary to reach a resolution on which sites may be suitable for residential development under potential future land use.

Uncertainty in the Exposure Assessment - Exposure Routes and Receptor Identification

As suggested, the uncertainty regarding the presence of the hospital at the base will be addressed in the revised risk assessment.

ATTACHMENT 4

NAVY RESPONSE TO EPA REVIEW LETTER DATED 9/6/95

RESPONSES TO EPA'S SEPTEMBER 6, 1995 COMMENTS ON THE DRAFT PHASE II REMEDIAL INVESTIGATION RESPONSE TO COMMENT LETTER

NSB-NLON, GROTON CONNECTICUT

1.0 RESPONSES TO GENERAL COMMENTS

DRAFT FINAL PHASE II RI REPORT FORMAT

Comment

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).

Response

It is understood that by redlining or striking out revisions to the draft Phase II RI Report, the review of the draft final Phase II RI Report would be easier for the EPA; however, due to the extensive revisions (almost complete re-write) which will be made to the draft Phase II RI Report to address EPA's comments, it will be impractical to indicate all of the changes to the text (e.g., redline/strikeout). If all changes were to be made in this manner it is likely that the volume of text would double and the level of effort required to revise the text would also increase. Therefore, the Navy proposes to not indicate changes by redlining or striking out in the draft final Phase II RI.

HUMAN HEALTH RISK ASSESSMENT

Comment

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.

Response

Current Region I methodology for estimating concentrations to be used in the Residential Reasonable Maximum Exposure scenario and the Central Tendency scenario will be used in the draft final Phase II RI.

ECOLOGICAL RISK ASSESSMENT

Comment

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.

Response

The Navy intends on keeping a line of communication open with EPA in regards to issues concerning the Ecological Risk Assessment. It is hopeful, though, that issues such as ecological soil screening values, additional data needs, and the identification of receptor species at each site can be addressed in the series of scoping meetings that the Navy has been initiating with the EPA. Also, the Navy has submitted to the EPA a draft document summarizing the Problem Formulation/Conceptual Model Development portion of the BERA for their review and comment. If any of EPA's concerns can be reconciled prior to submittal of the BERA, by the scoping meetings and/or the submittal of the draft scoping document, then the Navy would anticipate only minor revisions will be required for the BERA.

DATA PRESENTATIONS

Comment

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.

Response

Tag maps of specific analytical results were presented in the draft

Phase II RI. To present all analytical results (Phase I, Phase II, and supplemental investigations) for a site will require many maps due to the various media which were sampled and total number of samples. The Navy and its contractor will review the data which is available and determine the most appropriate manner to present it, keeping in mind the EPA's request for more tag maps.

RADIOLOGICAL DATA

Comment

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?

Response

A list of wells, the radiological parameters and the analytical results will be provided in the draft final Phase II RI.

2.0 RESPONSES TO SPECIFIC COMMENTS

p. 3-1, ¶1, Comment on Response #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.

Response

Inadequacies in meeting these objectives and their impact on the quality of the sample result and the overall quality of the program are discussed in the data validation letters. The Navy offered to submit the data validation letters in a previous response to comment letter, but the EPA indicated that they did not want them to do so. Discussion of all of these results would require an additional volume of the Phase II RI and is not typically done. Therefore, if the EPA wishes to see this information the Navy will provide them with the data validation letters.

Samples not meeting this accuracy objective (between 75 and 100% recovery) were qualified as estimated (J) during the validation process. The 75 - 100% accuracy objective was specified in

Atlantic's Approved QAPP and does not necessarily coincide with CLP criteria.

Detections limits will be provided in the revised data base to facilitate determining if detection limit objectives were achieved.

p. 3-70, ¶3, Comment on Response #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.

Response

EPA's dermal risk assessment guidance (January 1992) has many problems and as was stated in the original response may be overly conservative. Once agreement is reached on the appropriate risk assessment exposure routes and exposure scenarios an appropriate evaluation of dermal contact with groundwater will be provided in the revised scenarios. EPA and CTDEP will be involved in the selection process and can provide further information on the appropriate guidance.

p. 3-76, ¶2, Comment on Response #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).

Response

Text will be added to the report which addresses this Comment.

p. 5-19, ¶2, Comment on Response #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.

Response

Text will be added to the report which addresses this Comment.

p. 10-10, Comment on Response #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.

Response

Fluoranthene and pyrene are not considered to be COCs since the maximum concentrations of these compounds are less than residential RBCs, which are based on a THQ of 0.1 (See Table Below).

Chemical	max. (mg/kg)	Res. RBC (mg/kg)
fluoranthene	38	310
pyrene	43	230

Therefore, no action is considered necessary in response to this comment.

p. 11-34, ¶2, Comment on Response #65

See response to comment 66 below.

Response

See response to Comment on Response 66 below.

p. 11-42, ¶2, Comment on Response #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.

Response

The Navy is aware of the EPA's concerns about further characterization of the nature and extent of contamination in the soils and the impact to groundwater at the DRMO. The EPA has expressed this on numerous occasions throughout the planning and implementation of the Interim Measure for the DRMO. The data from the Interim Action conducted at the DRMO was not evaluated in the draft Phase II RI because it was out of the scope of the Phase II RI and the data was not available at the time of the submission. However, due to the probability that the complete objectives of the Interim Action at the DRMO were not met (i.e., high concentrations of lead are still present in the soil), the data from the Interim

Action will be used in the draft final Phase II RI Human Health and Ecological Risk Assessments. Based on the findings of the new health and ecological risk assessments, the necessity for further investigation and remedial action at the DRMO will be evaluated and discussed in the recommendation section for the DRMO.

Regarding the discussion of MCLs (4th paragraph), the word "slight" will be eliminated from the text.

p. 12-18, ¶4, Comment on Response #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.

Response

Since no written guidance is available from the EPA (in either RAGs, Reg I risk updates, etc.), field duplicate results were averaged for use in the risk assessment for all instances. If a particular set of field duplicate results did not meet Reg I validation criteria, the corresponding results were qualified "J". The results were averaged for use in assessing risk because each analytical result for the field duplicate samples was considered to

be a true result. It is recognized that some uncertainty is associated with this approach. However, if duplicate sample results do not agree well (particularly for soils) this is considered indicative of matrix heterogeneity and averaging reflects the concentrations which a receptor can be exposed.

p. 12-42, ¶2, Comment on Response #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).

Response

Text will be added to the report which addresses this Comment.

p. 14-57, §14.7, Comment on Response #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).

Response

Text will be added to the report which addresses this Comment.

p. 15-14, ¶5, Comment on Response #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.

Response

As stated in the original response to EPA comment, a reevaluation of the lead detection and recommendations for further investigations for the site will be made in the draft final Phase II RI Report. Recommendations will be based on both the human health and ecological risk assessments for the site. A Base-wide Ecological Risk Assessment will be included in the Phase II RI which will evaluate the impact of the lead concentrations at the OBDANE on ecological receptors.

Default and site-specific parameters used for the IUBK model, along with the probability density curves, were presented in the site-specific appendices, where the risk spreadsheets are contained. Another subsection , entitled "Exposure to Lead," will be added to the end of Section 3.3.3.6 Quantification of Exposure to discuss, in general, the method/parameters used for the IUBK modeling.

Drawing 4, Comment on Response #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.

Response

Revised potentiometric surface maps will be provided in the draft final Phase II RI. The maps presenting the potentiometric surface in the overburden will indicate areas of unsaturated overburden.

p. 90, Comment on Response #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.

Response

Substantial revisions will be made, at the request of the EPA, to the draft Ecological Risk Assessment presented in the draft Phase II RI to create a Base-wide Ecological Risk Assessment (BERA). The

additional points discussed in the comment above will be added to the text of the BERA.