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NSB NEW LONDON
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

March 30, 2001

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: BASEWIDE GROUNDWATER OPERABLE UNIT REMEDIAL INVESTIGATION REPORT FOR THE NAVAL SUBMARINE BASE NEW LONDON IN GROTON, CT

Dear Mr. Evans:

Thank you for the opportunity to review the *Draft Final Remedial Investigation Report* dated February 2001. EPA reviewed the document for technical sufficiency, and compliance with the work plan, applicable regulations, EPA guidance, and generally accepted practice. Detailed comments are provided in Attachment A.

EPA believes that the base wide groundwater RI should holistically evaluate the groundwater on a base wide basis. Dividing the operable unit into specific sites - as was done in this RI - subverts this purpose and may underestimate site risks. EPA and the Navy had a long standing agreement to first evaluate source areas and then to separately evaluate groundwater on a base wide basis with the exception of several sites adjacent to the Thames River. Since there is a groundwater divide at the base, two separate assessments may needed - but certainly not the ten included in the present version of the draft RI.

Although the general method to evaluate groundwater with all the possible exposure pathways and potential receptors in the HHRA procedures was provided, each of ten sites was evaluated separately with site-specific exposure pathways and potential receptors. By evaluating each site separately, it is possible to find risks contributed by different contaminants at different sites. Depending on whether the risk levels found are within or above the EPA's risk range, the remedy for each site could be different. Although this may be a cost-effective method for evaluating groundwater, it is unusual to look at groundwater in different segments as if groundwater for these sites was not all connected. Moreover, dividing the RI into ten separate assessments could lead to erroneous conclusions about the source of any groundwater contamination. This issue was discussed for the Area A Downstream when several upgradient sources of pollutants to groundwater, in addition to on-site sources, were identified

The alternative approach is to evaluate groundwater for the entire base as was originally planned. By doing this, the evaluation will result in total risk from all contaminants of all the sites. However, whichever approach is used, the results of risk assessment should still be the same.

Although ingestion of groundwater and surface water is not a complete exposure pathway, other exposure pathways with groundwater and surface water such as dermal contact, ingestion of fish from nearby water body, inhalation (volatilization), and incidental ingestion should be addressed. Otherwise, the report should justify not considering them.

According to EPA Region I's Risk Update # 3 (August 1995), the risk-based screening level is a residential-exposure based concentration associated with 10^{-6} risk level or a hazard quotient (HQ) of 0.1. Since the federal and state criteria provided for screening noncarcinogenic compounds in the HHRA (*i.e.,* EPA Region IX PRGs Table, EPA Region III RBCs Table, Connecticut Direct Exposure Criteria for Soil and Groundwater, USEPA Generic Soil Screening Levels for Transfers from soil to air and migration to groundwater) are based on an HQ of 1 for each chemical, it is necessary to divide the values used for screening noncarcinogens by ten. For the HHRA, this approach was done when using Region IX and Region III values but not for the Connecticut criteria. Thus, the Connecticut criteria used to screen noncarcinogens must be divided by ten before entered into the tables. Please explain this approach in the text of the HHRA procedures.

For soil and groundwater, the approach inconsistently eliminates chemicals that have maximum detected concentrations higher than the federal risk-based screening levels (*i.e.,* EPA Region IX values) but lower than the state's potential applicable or relevant and appropriate requirements (ARARs) (*i.e.,* Connecticut's residential soil and water criteria). Some chemicals under this situation were eliminated as COCs while others were retained. Chemicals should be retained as COCs if their maximum concentrations exceed the federal risk-based levels.

Several chemicals were not retained as COPCs for the human health risk assessment based on a comparison to background. As you know, EPA Region 1 guidance (EPA, August 1995) does not allow for elimination of chemicals during the screening process based on comparison to background. EPA's national guidance regarding the use of background data in a risk assessment will be issued shortly. The background comparison step should be used in the risk management process *after* the risk evaluation has been completed. All chemicals currently not retained with a rationale of background should be retained as COPCs and evaluated in the human health risk assessment. It is important to characterize all risks at the site for the community, including those risks from background. Sections 1.1 (b), 2.6, and 6.1 of the Federal Facilities Agreement require that remedial investigations under CERCLA are conducted in accordance with EPA regulations, policy, and guidance.

According to Region I's Risk Update # 3 (August 1995), chemicals present below background concentrations may contribute significantly to total site risk and therefore should be retained to conduct a complete characterization of site risks. Also based on Risk Update #3, chemicals in a

medium will be eliminated if the maximum concentrations exceed the risk-based concentrations for that medium or exceed the ARARs (*e.g.,* the state's criteria). The risks attributable to background levels should be discussed as part of the risk characterization/uncertainty section of the HHRA. Therefore, chemicals that were eliminated because the maximum concentrations were below background concentrations, but higher than risk-based screening concentrations, must be retained as COCs. Further evaluation of any of these chemicals can be based on their frequency of detection. According to RAGS Part A, any detection frequency limit to be used should be approved by the EPA's remedial project manager before using this screen. For this HHRA, I recommend a five percent frequency of detection used for screening, with at least 20 samples for a data set per medium.

Based on EPA Region I's Risk Update #2 (August 1994) and Risk Update #5 (September 1999), the maximum detected concentration of each contaminant in any well, or the highest average concentration of each contaminant across several rounds in the same well, must be used to calculate the reasonable maximum exposure (RME). In other words, the RME groundwater concentration is based on the highest of the temporal average concentrations of each contaminant in each well provided that a sufficient number of sampling events have been obtained over a sufficient period of time so as to characterize a temporal average exposure concentration for a given well. The average plume concentration is used in calculating the central tendency exposure (CTE). In the case where insufficient data exist to generate a temporal average concentration, the maximum and arithmetic mean concentrations should be used to calculate RME and CTE.

Since groundwater data were collected in June, July, and August of 2000, there is not a representative temporal characterization of groundwater at the area. Therefore, using the groundwater maximum detected concentrations and arithmetic means for RME and CTE calculations is appropriate. RME and CTE should both be considered as exposure point concentrations but generally, the RME is used to estimate risk for making decisions.

Table 3-13, Figure 3-2, and Figure 3-3 of the HHRA procedures must be consistent, detailed, and thorough. Some pathways presented in Table 3-13 were not presented in Figures 3-2 or 3-3 and vice versa. Please include the following potential receptors and exposure pathways to Table 3-13 and Figures 3-2 and 3-3:

Full-time worker: Inhalation of vapor intrusion into indoor air (subsurface)

Older child trespasser: 1) Direct ingestion of surface water; 2) Dermal contact with surface water; 3) Inhalation of surface water; 4) Ingestion of fish collected from nearby water body; 5) Direct ingestion of sediment (surface soil leaching); and 6) Dermal contact with sediment (surface soil leaching)

Future resident (both adult and child): Considering that future land use may be characterized as residential, exposure pathways for these receptors should be considered complete and therefore

quantified. The following exposure pathways should be added to these receptors: 1) inhalation of groundwater; 2) direct ingestion of surface water; 3) dermal contact with surface water; 4) inhalation of surface water; 5) ingestion of fish collected from that water body; 6) direct ingestion of sediment (surface soil leaching); and 7) dermal contact with sediment (surface soil leaching)

EPA does not agree with the approach that exposures to a child resident are less than those for an adult resident. Exposures to a child resident must be quantified, using all the applicable default parameters.

According to the Introduction, the NSB *currently* provides housing for Navy personnel and their families and supports submarine training facilities, military offices, medical facilities, and facilities for submarine maintenance, repair, and overhaul. However, residents are considered as potential receptors only in the future with the assumption that the facility is closed and developed for residential purposes. Please include the residential scenario with all possible exposure pathways.

Please accurately cite all USEPA references throughout the report.

Although most of the required steps in the HHRA were presented in the report, the HHRA did not strictly follow the format presented in the EPA guidance (RAGS Part A), leading to an unclear presentation of information.

The baseline HHRA section for each site was reviewed in the same light as for the HHRA procedures. RAGS Part D tables were also reviewed for each site for accuracy. The general comments for the HHRA sections of each site are:

- Although the maximum detected concentrations of some chemicals (*e.g.,* chromium, manganese, copper) were within background levels, they were above their respective risk-based screening levels (*i.e.,* Region IX PRGs table). Based on Region I's policy, these contaminants must be retained as COCs. Thus, please add all chemicals that have maximum detected concentrations exceeding their risk-based screening levels as the COCs for direct contact exposure scenarios and migration pathways.

- The migration pathways (*i.e.,* migration from soil to groundwater, migration from groundwater to surface water, migration of volatiles from soil and groundwater through building foundations into indoor air) must be quantified. EPA disagrees with the statement that these pathways are not considered to be significant contributors to the direct contact exposure pathways identified for potential human receptors, and therefore, there is no need to quantify these migration pathways. Considering that groundwater and surface water are classified as GB, exposures to groundwater and surface through inhalation of volatiles should be quantified.

- For all the sites, please correct the text in the HHRA sections to correspond to the tables after adjusting the tables.

For several of the sites studied in this RI, several metals were selected as chemicals of potential concern in groundwater. These metals were later eliminated from the dermal pathway evaluation for groundwater based on RAGS, Part E, Appendix B.4. Elimination of these chemicals from the dermal pathway is appropriate. However, no explanation is provided in the text for elimination of these metals from the dermal pathway. Please include discussion regarding the elimination of these metals and the rationale for eliminating these metals from the risk in the Risk Characterization and Uncertainty Sections of the human health risk assessment sections and chapters.

EPA Region 1 Risk Update Number 3, August 1995, defines surface soil as that from 0 to 1 foot below ground surface. Subsurface soil is then defined as soil from 1 to 10 feet bgs. The definition provided in this RI conflicts with the surface soil definition by defining surface soil as that from 1 to 2 feet bgs. Please verify that appropriately defined soil parameters were utilized in these risk assessments.

The Uncertainty Sections for each risk assessment include discussions concerning the elimination of specific chemicals as COPCs on the basis of a background comparison. With the exception of Chapter 5, the uncertainty discussions include a qualitative and/or semi-quantitative evaluation of the impacts to the risk assessments resulting from elimination of these chemicals and the potential risk from these background levels. Information from these discussions which may impact the conclusions and recommendations for these sites should also be provided in the Summary of Human Health Risk Assessment section for each human health risk assessment chapter.

The BGOURI descriptions of fate and transport of contaminants are thorough and valuable in assessing groundwater quality for the site. The collaboration between broad principles and the site-specific data acquired in the RI and previous investigations is particularly helpful. The compilation and mapping of data bearing on the redox state of base-wide groundwater is valuable, and provides critical insight into the fate and transport of both organic contaminants (*e.g.*, conditions favorable or unfavorable for biodegradation of chlorinated solvents) and inorganic contaminants (*e.g.*, conditions that might lead to high mobility of metals).

The BGOURI is generally appropriately conservative in its conclusions and recommendations. For example, a Feasibility Study is recommended for Site 7 (Torpedo Shops) and Site 20 (Area A Weapons Center), even though the contaminant levels detected in soils and groundwater are not exceptionally high, and the associated risks are found to be relatively low. However, there are a number of open issues that bear on the completeness of the BGOURI in delineating the "nature and extent" of groundwater contamination detected. These areas include, in particular: 1) the newly discovered disposal area in Site 3 (north of Stream 5) and its potential relationship to downgradient chlorinated solvents; 2) the TCE detection in the single downgradient monitoring

well at Site 15 (SASDA); 3) increasing PCE at a downgradient well at Site 2 (Goss Cove Landfill) and a lack of strong evidence to link it to the dry cleaner source. Please see related Specific Comments for details.

I look forward to working with you and the Connecticut Department of Environmental Protection to protect the groundwater resources of the base. Please do not hesitate to contact me at (617) 918-1385 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
Dick Conant, NSBNL, Groton, CT
Jennifer Stump, Gannett Fleming, Harrisburg, PA

ATTACHMENT A

Page	Comment
p. ES-3, §ES.2	The text states that the detection of DDTR in groundwater at Sites 3 and 14 "... is associated with high levels of dissolved solids ... versus dissolved pesticides." Is the intended reference to *suspended* solids, rather than dissolved solids? Please check.
p. ES-4, §ES.3	The text states that connection of Site 7 buildings to a wastewater system has cut off the "potential migration pathway" previously provided by the leach fields. While this has certainly eliminated the addition of further contamination from wastewater to the local soils and groundwater, the wording tends to downplay the possibility of continued release of contaminants from the soils in the historic leachfields.
p. ES-4, §ES.3	The report states that groundwater at Site 7 shows "... no discernible contaminant plumes of any size." The investigation demonstrated, however, the presence of a small plume of chlorobenzenes extending westward from Building 325. While this plume appears to be of limited extent, it should be acknowledged here.
p. 1-13, § 1.4	The first sentence of this section reads: "Thirteen sites were identified as requiring further investigation during the BGOURI." However, only ten sites were evaluated in the BGOURI. Please correct this text.
p. 1-17, §1.4.1.3	The text states that it is not known where a sump in Building 325 drains, but speculates that it leads to the south leach field. Given the historic use of the building (*e.g.*, handling of fuels, solvents, etc.), this "knowledge gap" is potentially significant. A concerted effort should be made to review as-built drawings for the building, or to employ other means to trace the drain lines, in the event that, for example, a dry well is being overlooked. Such systems are often a pathway directly to groundwater.
p. 1-23, §1.4.3.2	The text refers to Figure 1-15 for "historical sampling locations" for Site 15 (SASDA). However, the historical sampling locations are not evident on this figure. Please check text and figure for consistency.
p. 1-25, §1.4.3.4	The text refers to Figure 1-17 for "historical sampling locations" for Site 23 (Tank Farm). However, the historical sampling locations are not evident on this figure. Please check text and figure for consistency.

p. 2-1, § 2.1

The example given for the groundwater sample nomenclature was S32DMW29S02. According to the text, the trailing "02" would indicate that this was the second sample collected from the well during the sampling event. It is unclear what circumstances would result in the collection of more than one sample from the same monitoring well during a specific sampling event. Please provide clarification.

p. 2-3, § 2.2.1

The third sentence of the second paragraph states "....one soil sample was collected from across the water table-unsaturated soil interface." It is unclear whether the samples were collected above or below the water table-unsaturated soil interface. Please provide clarification.

p. 3-14, §3.2.1.2

The RI establishes "basewide background" concentrations of inorganics based on selected "background" wells (*see* Fig. 3-1). The fate-and-transport characterization of the basewide groundwater performed as part of this RI shows that there are portions of the base (*e.g.*, the filled valleys) where more reducing conditions prevail due to slow-moving groundwater, high organic content in soils and aquifer materials, etc. The report also makes a strong case that the solubilities of various inorganics are quite sensitive to redox conditions. In view of these observations, is the definition of a single, "basewide" background value for redox-sensitive inorganics meaningful? Should the basewide groundwater system(s) be subdivided into two or more subdomains (*e.g.*, upland recharge areas, valley-fill areas, *etc.*), and more local "background" conditions be defined?

p. 3-36, §3.4.1

For soil data evaluation, surface soil was considered 0 to 2 feet below ground surface (bgs) and subsurface soil was considered 0 to 10 feet bgs. However, Region I's Risk Update #3 (August 1995) defines surface soil as 0 to 1 ft bgs and subsurface soil as 1 to 10 ft bgs. Please use this definition of soil depths in future soil sampling and data evaluation.

USEPA Region IX Preliminary Remediation Goals (PRGs) table, USEPA Region III Risk-Based Concentration (RBC) table, Connecticut Direct Exposure Criteria (Residential and Industrial), and USEPA Generic Soil Screening Levels (SSLs) for Transfers from soil to air (inhalation) and migration to groundwater were used for screening contaminants of concern (COCs). These criteria were based on a 1×10^{-6} target incremental lifetime cancer risk (ILCR) and the values used for COC screening of noncarcinogenic chemicals were based on a hazard quotient (HQ) of 1. However, it is the Region I's approach that the values used for screening noncarcinogens need to be based on an HQ of 0.1 (Risk Update #3, August 1995). Thus, all values used for screening noncarcinogens need to be divided by 10 to obtain an HQ of 0.1. Although some criteria

used for screening noncarcinogens were divided by 10 in the report, it is not performed for the Connecticut criteria.

p. 3-37, ¶2

It is stated that the Region III COC screening levels for residential soil ingestion for noncarcinogenic chemicals will be based on a target HQ of 0.1, which is one-tenth of the suggested cumulative target noncarcinogenic risk for a potential receptor, and on exposure defaults for small children. This is not correct, the values for screening noncarcinogens in Region III table were based on an HQ of 1 instead of 0.1.

Background concentrations cannot be used to eliminate compounds (Risk Update #3, August 1995). Therefore, all chemicals that were eliminated because their maximum concentrations were below background levels but higher than the risk-based screening levels must be retained as COCs for further evaluation.

For groundwater, it is necessary to divide all values used to screen noncarcinogens by 10 to obtain an HQ of 0.1.

§3.4.2

According to Risk Assessment Guidance for Superfund (RAGS), Volume I - Human Health Evaluation Manual, Part A, 1989, Exposure Assessment is done in three steps: 1) characterize exposure setting, 2) identify exposure pathways, and 3) quantify exposure. Please discuss these steps.

§3.4.2.1

Exposure Setting is the first step of Exposure Assessment. This step should include site characteristics such as climate, meteorology, geologic setting, vegetation, soil type, groundwater hydrology, location and description of surface water. Both current and future uses and different classifications such as residential, commercial, industrial or recreational should to be discussed.

§3.4.2.2

The Conceptual Site Model is part of step 2 of Exposure Assessment, which is Exposure Pathways. Please address figures 3-2 and 3-3 for consistency with table 3-13. Other parts in this section such as Sources of Contamination, Contaminant Release and Migration Mechanisms should also be included in this step 2.

§3.4.2.3

Potential Routes of Exposure should be included in step 2, Exposure Pathways.

p. 3-47, ¶2

Three routes of exposure to groundwater through household use include ingestion of groundwater, inhalation of VOCs, and direct dermal contact with groundwater. However, the second paragraph only mentions

quantification of ingestion and inhalation exposures. Please also mention that dermal contact with groundwater will be quantified according to RAGS Part E.

§3.4.2.4 Potential Receptors is part of Exposure Setting. Families of the Navy personnel who currently reside on the site must be listed as potential receptors. Please include them in this section.

§3.4.2.5 According to RAGS Part A, the exposure pathways part has five steps: 1) identify sources and receiving media, 2) evaluate fate and transport in release media, 3) identify exposure points and exposure routes, 4) integrate all this information into exposure pathways, and 5) summarize information on all complete exposure pathways. However, the report misses step 3. Please explain how potential receptors can be exposed to these contaminants in various media.

§3.4.2.6 Quantification of Exposure is step 3 of Exposure Assessment. For each route of exposure, please refer to the exposure assumptions summarized in Table 3-14.

Please use an ingestion rate of 200 mg/day for construction workers instead of 480 mg/day to calculate RME (suggested by the lead technical review workgroup). The ingestion rate to calculate CTE is 100 mg/day.

Please check the accuracy of references used in this section. For example, in the Dermal Contact with Groundwater section, references for the equations are EPA 2000e, not EPA 2000a or d. The section of Exposure to Lead should be considered as a part of this section. The reference for the IEUBK Model is EPA 1994a, not EPA 1994c.

§3.4.2.8,¶1, line 4 Please correct as "The exposure point concentration is **generally based on** the 95 percent UCL **on the arithmetic mean** and was calculated using the latest USEPA risk assessment guidance (USEPA, 1992a)."

Page 3-56, last ¶ Please be more specific and follow EPA's approach to calculate RME for groundwater concentrations. According to EPA Region I's guidance, two methods can be used to calculate RME and CTE for groundwater based on the types of data available. For data with many rounds of sampling that represent a good confidence in temporal characterization of groundwater, the highest average concentrations over time from any given well should be used to calculate RME and CTE. For data that do not represent any temporal characterization of groundwater, the maximum and arithmetic mean should be used to calculate RME and CTE. This latter approach

	should be used for the base wide groundwater because the groundwater data for the area do not represent any temporal characterization.
p. 3-63, §3.4.51, line 7	Please correct as **HQ** less than 0.1, not HI. HI is hazard index or the sum of all the hazard quotients from different chemicals. If HI exceeds 1, there may be concern for potential health effects (RAGS part A).
p. 3-64,§3.4.5.2	Please include families of Navy personnel for current and future scenarios as potential receptors.
p. 3-65, §3.4.5.3, last¶	It is not correct that the carcinogenicity of arsenic via ingestion is not confirmed by the available data. Arsenic is classified as a Class A human carcinogen, based on sufficient evidence from human data.Please delete the statement from the last paragraph.
§3.4.5.4	Please discuss any chemicals with concentrations below background concentrations but still contribute to the total site risk to conduct a complete characterization of site risks (Risk Update #3, August 1995).
Table 3-9	Eliminate Background as a screening criteria used for selecting COC.
Table 3-13	Please include additional potential receptors and exposure pathways.
Table 3-14	*Soil ingestion:* Please use 200 mg/day and 100 mg/day as soil ingestion rates for construction worker to calculate RME and CTE, respectively. Although Region I and other regions use these values for soil ingestion rates that were based on guidance document from national EPA Lead Technical Review Workgroup, it has not been considered a policy or guidance. *Soil dermal contact:* For future residents, use 5,700 cm^3 and 2,800 cm^3 for skin surface area, for both RME and CTE, respectively for adult and child; 30 and 9 years for exposure duration for adult RME and CTE, respectively; and 0.04 mg/cm^2 for adherence factor for child (RAGS Part E). For full-time employee, use 9 years for CTE exposure duration (RAGS Part E). *Inhalation of Air/Dust:* Please explain the basis for using the value of 9×10^{-8} UCL (for construction worker) and 1.8×10^{-8} (for full-time employee and older child trespasser) for exposure concentration. Use 9 years for exposure duration for full-time employee, for CTE.

Groundwater Ingestion: For future residents, use 350 years for exposure frequency for adult CTE (exposure parameters were developed by a national EPA workgroup).

Groundwater dermal contact (showering/bathing): For future residents, use 18,000 cm^3 and 6,600 cm^3 for skin surface area, for both RME and CTE, respectively for adult and child; 350 days/year for exposure frequency for adult CTE; 0.58 and 0.25 hour/event for duration of event, for adult RME and CTE, respectively (RAGS part E).

Tables 3-10 & 3-11	It does not appear that the Region 3 non-cancer RBC values have been adjusted to reflect a HI = 0.1. Please correct all Region 3 non-cancer RBC values and rescreen the chemicals as necessary.
Table 3-11	The Region 3 RBC value used for screening chloroform was the cancer RBC. However, as indicated in the RBC table, when adjusted for a HI=0.1, the non-cancer RBC is more conservative. Please use the adjusted non-cancer RBC value for screening chloroform in groundwater.
Table 3-11	The Thallium RBC is incorrectly listed as 2.9 micrograms per liter (µg/l). The correct value is 2.6 (µg/l) according to 10/5/2000 RBC table.
Table 3-11	Mercury should be footnoted to indicate that the surrogate methylmercury was used.
Table 3-11	CTDEP GA/GAA criteria for 2-butanone in groundwater is incorrect. The number listed (350 (µg/l)) is for MIBK. The correct number is 400 µg/l.
Table 3-11	The USEPA MCL listed for arsenic is incorrect. On January 16, 2001, a new MCL for arsenic was approved. The correct USEPA MCL for arsenic is now 10 µg/l. Please correct this screening value.
Table 3-11	CTDEP GA/GAA criteria listed is incorrect for 4-methyl-2-pentanone (MIBK). The correct value should be 350. The GA/GAA criteria for trans-1,2-dichloroethene appears to be incorrect also. The correct number is 100 micrograms/liter. Please correct these screening criteria values.
Table 3-11	The CTDEP RSR Surface Water Protection Criteria value listed for phenanthrene is incorrect. The correct surface water protection criteria for phenanthrene is 0.077 µg/l.
Table 3-11	CTDEP GA/GAA criteria for the following chemicals could not be verified: benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene,

indeno(1,2,3-cd)pyrene and carbon disulfide. Please indicate which surrogate chemical values have been used or the source of the values listed in the table.

Table 3-13

This table includes sediment as an evaluated media for the older child trespasser in this RI. However, sediment is not a media evaluated in this RI. Please correct Table 3-13.

Tables 3-20 & 3-21

Toxicity information is provided for "tetrachloroethane", however the information presented is actually for "tetrachloroethene". Please confirm that the appropriate contaminant and toxicity values are utilized.

p. 4-7, §4.2.1.1

The report ascribes widespread, low-level detections of TCE to "multiple, historic, small, low-concentration releases." While it is agreed that there is no evidence of a persistent source representing a large contaminant mass, this statement tends to downplay the possibility of some significant releases of solvents via the historic leachfields at the Torpedo Shops. If TCE and its degradation products found far downgradient today (e.g., TCE at 23 μg/L in 7MW9S; TCE at 5.5 μg/L, DCE at 12.2 μg/L, and VC at 31 μg/L in 2DMW29S; DCE at 1.7 μg/L and VC at 4.7 μg/L in 3TW1; all in July 2000) originated at the leachfields, these releases may not have been "small" and "low-concentration." Degradation and mixing (dispersion) may have brought concentrations down significantly from their original levels.

p. 4-8, §4.2.1.2

The text notes that elevated metals may indicate "discrete, limited releases and in some cases may be reflections of normal background variations in metals levels." It might be noted here that elevated metals can also result indirectly from site-use impacts on redox conditions. For example, reducing conditions caused by degradation of organics in the landfills (Area A and Goss Cove) or from fuels releases (*e.g.*, the Tank Farm), can mobilize inorganics such as arsenic that are present as sorbed species on oxides in the subsurface. This is neither a "release" of the metals, nor a "normal" background condition, yet it is an important mechanism by which site impacts can result in elevated metals.

p. 4-10, §4.2.3.1

The compilation of data bearing on redox conditions across the facility is comprehensive, nicely presented, and of great value in understanding general site geochemistry and its implications for contaminant transport. Figures 4-22 and 4-23 show analytical results for divalent iron for overburden and bedrock wells, respectively. A nice feature of the graphical presentation is the division of the "tags" into those for Fe(II) < 0.5 mg/L in red and Fe(II) > 0.5 mg/L in green. This color choice is

consistent with the previous maps of DO (Fig. 4-32) and ORP (Fig. 4-33), in that it shows low values in red and high values in green. However, this reviewer found it somewhat confusing because high Fe(II) tends to correlate with low DO and low ORP. It is suggested that the colors be reversed on Figures 4-22 and 4-23 so that all maps show red tags for indicators of reducing conditions, and green tags for indicators of oxidizing conditions.

p. 4-13, §4.2.3.2 Figure 4-41 shows the distribution of specific conductivity in overburden groundwater beneath the southern region. Wells 8MW5S, 8MW1, 8MW2D, and 8MW6D are shown with conductivities in the range 19 - 42 mS/cm. These values seem rather high (by at least an order of magnitude), even for brackish water influenced by tidal mixing of estuarine water and/or landfill leachate. Please check the field records for consistent reporting of the conductivities. For example, could the instrument have been set to read in mS/m, so that the recorded values are a factor of 100 too high?

p. 4-14, §4.2.3.2 The discussion of dissolved carbon dioxide mentions that the highest observed value in the Southern Region was in well 23MW03D, which also exhibited extremely high pH. The high pH is ascribed to a "well construction problem" (which is likely correct), the high dissolved CO_2 is termed "erroneous" in view of the high pH. It might be more precise to denote the high CO_2 as "anomalous," rather than "erroneous." That is, the CO_2 analysis may be valid, but the high concentration may also be related to the well construction problem (*e.g.*, reaction products of the cement).

p. 4-16, §4.2.3.3 The concluding discussion states, "In the valley sites ... reducing conditions suggest that iron and manganese oxide coatings on aquifer grains will not be present to sorb dissolved metals resulting in increased mobility for most of the metals." While the conclusion regarding mobility of metals in this environment is generally supported, it might be noted that the dredge spoil, in particular, may still retain oxide coatings that continue to dissolve. That is, it seems possible that the dredge spoil came from an oxidizing environment where the sediment acquired oxide coatings, including various sorbed metals (*e.g.*, As). Having been moved to the environment described (*i.e.*, valley fill characterized by low groundwater velocity and high organic content), these oxide coatings may dissolve slowly and serve as a continuing, internal "source" of the sorbed metals that are released. The prevalence of reducing conditions in the present-day pore water does not necessarily mean that oxide coatings are absent, particularly for materials whose environment has been changed radically. This is particularly significant in the present case, because this

combination of circumstances could result in elevated metals in settings such as the Area A Wetland.

§ 5.0 Area A Landfill and Wetland (Site 2)

§ 5.0 — Section 5.0, Area A Landfill and Wetland (Site 2), is redundant in a number of areas. The redundancy is related to the fact that a number of the investigative activities and samples were associated with both the Area A Landfill and the Area A Wetland. Reducing or eliminating the redundant discussions would substantially improve readability and clarity.

§ 5.0 — The groundwater data used for the Area A Landfill and Wetland (Site 2) portion of the BGOURI corresponded to one of the quarterly groundwater monitoring events. The wells included were all shallow overburden wells. Please include a discussion of why the groundwater investigation was limited to the overburden wells and did not include bedrock wells.

§ 5.0 — The nature of the soil samples collected at the Area A Landfill is not adequately discussed. It is unclear whether these samples represented fill material, dredge material or natural soils. Clarification on this point would be helpful.

p. 5-4, § 5.2.1.3 — The first sentence of the fifth paragraph on this page states: "Twelve groundwater samples (plus two field duplicates) were collected from five shallow and 12 deep monitoring wells." Please clarify the discrepancy between the number of samples and the number of wells.

p. 5-5, § 5.2.1.4 — In the second and third paragraphs on this page, the term "engineering parameters" is used. Please define this term.

p. 5-5, § 5.2.1.4 — Section 5.2.1.4 ends by indicating that the preferred alternatives that came out of the FFS were off-site land filling and off-site incineration. The next section (5.2.1.5) discusses the interim remedial design of the landfill containment and capping system. Please provide the train of thought that led to a seemingly different direction for the landfill remediation.

p. 5-6, § 5.2.1.7 — The second sentence of the first paragraph in Section 5.2.1.7 references Building 373. This building apparently no longer exists, based on discussions in other portions of the report. If the location formerly occupied by building 373 is to be used as a reference point it should be indicated on one of the figures.

This same paragraph states that "groundwater samples were collected from 27 monitoring wells during the first round of the Phase II RI" and "eight wells were sampled during the second round of groundwater sampling, resulting in a total of 14 samples ..." Please explain this apparent discrepancy.

p. 5-7, §5.2.1.10

Section 5.2.1.10 indicates that the data collected for the Area A wetland portion of the BGOURI was the same as was collected for the Area A landfill portion of the BGOURI. These wells are shown on Figure 5-2. The text does not clearly indicate the relationship between the wells sampled for the BGOURI, those sampled during the Phase II RI conducted by B & R Environmental and/or those sampled during the Phase I RI conducted by Atlantic. Please provide addition information to clarify this issue.

p. 5-8, §5.2.1.10

The second complete sentence on this page states: "The 11 monitoring wells that were sampled are shown on Figure 5-1." The figure referenced should be Figure 5-2. Please correct.

In addition, the text states that the sampling and analysis conducted for the BGOURI at the Area A Landfill corresponded to the fourth round of sampling for quarterly groundwater monitoring program which has been instituted in response to the interim remedial action for the landfill. The second paragraph in Section 5.2.1.9 indicates, however, that a total of 16 monitoring wells are sampled during the quarterly sampling events. Please explain why data from only 11 of these wells is included as a part of the BGOURI.

p. 5-8, §5.2.1.10

The first paragraph on this page states that samples from 10 of the 11 wells included in the BGOURI were filtered to determine dissolved metals. Please indicate why a sample from well 2WGW38DS was not filtered for the determination of dissolved metals.

p. 5-14, §5.3.4.2

Section 5.3.4.2 does not discuss changes in groundwater levels and flow patterns that resulted from the capping and drainage alterations. Please include a discussion of these topics in this section.

p. 5-20, §5.4.1.3

The first complete sentence on the page indicates that radionuclide data for the groundwater collected from the overburden wells is presented in Appendix D. This data, however, does not appear to be in Appendix D. Please correct this discrepancy.

p. 5-21, §5.4.1.3 The second paragraph on this page indicates that radionuclide data for the groundwater collected from the bedrock wells is presented in Appendix D. This data, however, does not appear to be in Appendix D. Please correct this discrepancy.

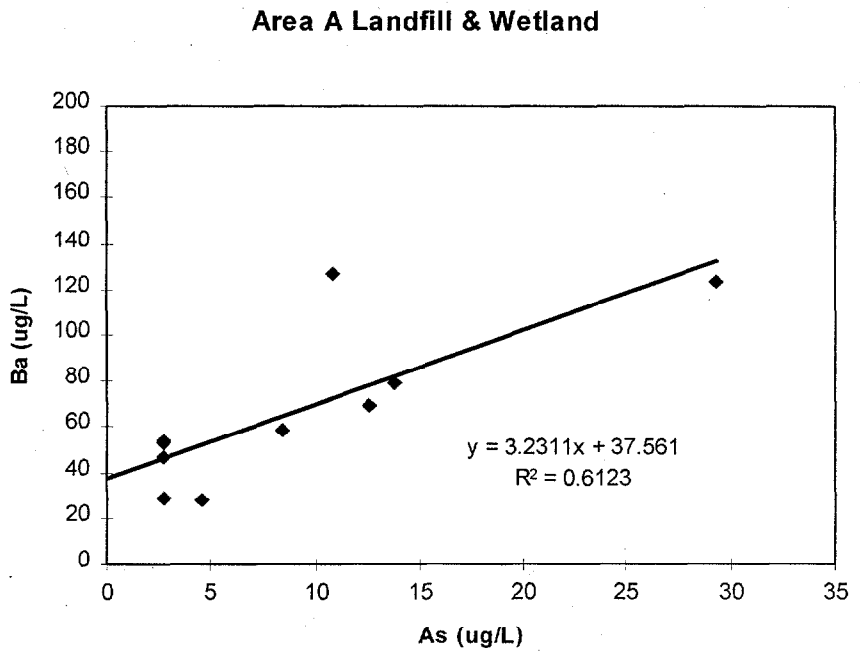
p. 5-24, §5.4.2.2 Bedrock well 2WMW22D is referenced in the last paragraph on the page but it is not shown in Figure 5-1. Please revise Figure 5-1 to indicate the position of 2WMW22D.

p. 5-26, §5.4.3 Table 5-1 summarizes the sampling performed in Site 2 for the BGOURI, and the locations are shown on Figure 5-1. The figure shows a well pair, 3MW12S/D, just downgradient of the dike. The Work Plan (Table 2-1) indicated that these wells would be sampled as part of the BGOURI for Site 3 (Downstream Watercourses / OBDA), but no results appear to be included in the RI report, under either Site 2 (sec. 5) or Site 3 (sec. 6). What became of the sampling of these wells? They are quite important, in that they appear to be positioned to intercept groundwater that may originate above the dike in the Area A Wetlands, descend into bedrock, and discharge upward in the Downstream Watercourses area. This pathway is of considerable significance, as there should be some assurance that contaminants from upgradient (*e.g.,* elevated inorganics) are not likely to re-contaminate the remediated Watercourses.

p. 5-29, §5.5 The discussion of fate and transport with specific reference to the chemicals of concern for the particular site and the geochemical conditions of the site is welcome. The discussion on p. 5-29 to 5-30 of metals should be expanded to address specifically the three metals previously noted as being in exceedance of background values: arsenic, barium, and mercury. What are the implications of the site Eh/pH conditions for the mobility of these metals of particular concern? This is particularly significant as long-term monitoring for landfill impacts moves forward, as the interpretations of the likely source(s) and transport mechanisms for inorganics will bear on measures of "success" of the remedy. For example, if arsenic is present in the dredge spoil that underlies the Area A Wetland, and reducing conditions are expected to prevail there indefinitely, one might not expect to see As concentrations diminish, regardless of the presence of the landfill or the effectiveness of the cap.

p. 5-29, §5.5 It is interesting to note that both arsenic and barium are found in Site 2 groundwater at elevated levels. It also appears that these two elements are correlated. The accompanying plot shows Ba *vs* As for the overburden wells shown in Figure 5-2, with the exception of 2WGW47DS. (This well exhibits the highest As and Ba among those shown in the figure, but with

the ratio [Ba]/[As] much higher than for the other wells. This may represent a spurious analytical result for Ba.) Equilibrium models such as MINTEQA2 (developed by EPA) or PHREEQC (the analogous USGS geochemical code) suggest that a barium arsenate solid phase (*e.g.*, $Ba_3(AsO_4)_2$) may control the concentration of arsenic in solution. However, such calculations have been questioned because of uncertainties in the relevant thermodynamic constants. It is perhaps more likely that both barium and arsenic are sorbed on iron oxides within the dredged material, and are desorbed in a fixed ratio reflecting that of the sorbed elements. The positive correlation of these elements is also consistent with the associated redox conditions (ORP ranging from -126 mV to -451 mV along the southwestern margin of the wetland; Figure 4-21).



p. 5-33, §5.6.5

The Uncertainty Section indicates that chromium and manganese were eliminated as COPCs based on a background comparison. The discussion goes on to explain that contribution by both metals is considered insignificant via the groundwater dermal pathway according to RAGS, Part E. However, RAGS Part E, Appendix B.4. indicates that chromium should be evaluated for the groundwater dermal pathway. Please provide an evaluation of the potential risks from chromium in groundwater at this site. An evaluation similar to the evaluations that have been provided in the Uncertainty Sections of the other sites evaluated in this RI would be appropriate.

p. 5-35, §5.7.4

The BGOURI concludes that a FS is not called for at this time for Site 2 (Area A Wetlands and Landfill), arguing that the landfill has been remediated with a cap and groundwater monitoring is currently under way. These arguments are reasonable; evaluation of additional remedial alternatives is necessary only in the event that the present remedy is shown to be inadequate. However, one reservation (stemming more from review of the recent annual report for the Area A Landfill monitoring program than from results presented in the BGOURI) is that the present monitoring may not be optimal for demonstrating the presence or absence of landfill impacts to groundwater. In particular, the concern is that the monitoring program includes three "upgradient" wells that are screened in three different hydrostratigraphic units: fill/alluvium, dredge spoil, and bedrock. Analytical results from these wells nominally are to be compared to results from "downgradient" wells, which are almost entirely screened in the dredge spoil. It is noted, too, that the "upgradient" well in the dredge spoil (2WMW21S) is not hydraulically upgradient of the landfill. Well 2WMW21S is a reasonable choice of a "reference" well for the dredge spoil, in that it is not impacted by the landfill, but it does not represent groundwater that is about to pass through or beneath the landfill, so that comparisons with downgradient groundwater cannot provide an indication of changes that might be ascribed to the landfill. Efforts to identify potential landfill impacts to groundwater for this site also highlight a broader issue with respect to defining a meaningful "background" chemistry for groundwater, particularly for inorganics. There is some suggestion that pore waters in the dredge spoil are inherently reducing, perhaps due to high organic content and low groundwater flux. Arsenic, barium, and mercury concentrations in Site 2 groundwater exceed their respective "background" values. However, these elements are all sensitive to redox conditions. While the mercury is almost certainly anthropogenic, the arsenic and barium are likely present naturally in the dredged material. The apparent sensitivity of arsenic and barium concentrations to redox conditions may be due to their association with iron oxides. Further discussion between Navy and regulators is needed to reach a consensus on what constitutes a meaningful scheme to gauge landfill impacts. This discussion should examine the definition of "upgradient" and "downgradient" wells, as well as definition of a relevant "background" condition to which comparisons can be made.

Figure 5-1

Monitoring wells 2LMW19D is not shown on Figure 5-1. This well is referenced a number of times throughout the text of this section (e.g. Page 5-21 end of the first paragraph). Please update Figure 5-1 to show the position of 2LMW19D.

Figures 5-1 & 5-2	Sampling locations (soil, sediment, surface water and some groundwater) associated with the previous investigations of the Area A Landfill and Wetland (Site 2) are not shown on the figures for this section. A figure or figures illustrating these locations would add significantly to the value of the discussions of historic investigations.
Table 5-2 & Figure 5-2	Table 5-2 and Figure 5-2 would be easier to interpret if the data under the headings "Total Metals" and "Dissolved Metals" were combined under the single heading "Metals." A clarifying note could be placed below the table and on the figure to indicate that metals results for filtered samples correspond to the dissolved state and that metals results for unfiltered samples are total metals. This type of presentation would allow for direct comparison of the filtered and unfiltered data and simplify Table 5-2 and Figure 5-2.
Tables 5-3 & 5-7	Please add chromium and manganese as COCs for direct contact exposure scenarios.
Table 5-4	Please add the legend for NV in the "Rationale for Contaminant Deletion or Selection" column.
Table 5-6	For construction workers (groundwater), there is no ingestion of groundwater. Therefore, please use "None" for ingestion in the "Type of Analysis" column.

§ 6.0 Area A Downstream Watercourses/OBDA (Site 3) and OBDANE (Site 14)

p. 6-2, §6.1.1	The text notes that a disposal area was discovered north of Stream 5 during the remediation project, and that nothing further has been done. This sounds rather alarming to readers of the RI document; more information should be provided here concerning follow-up measures being pursued (*e.g.*, further characterization, proposed removal, *etc.*) With respect to the BGOURI in particular, what assurances can be given that the newly discovered source has not adversely impacted underlying and downgradient groundwater? Are existing wells and the existing database adequate to assess potential groundwater impacts? Might this bear on the detections of chlorinated solvents and degradation products at 2DMW29S? Please elaborate.
p. 6-5, § 6.2.1.4	The first paragraph in Section 6.2.1.4 indicates that the soil and sediment sampling locations associated with the Focused Feasibility Study performed by Atlantic are indicated in Figure 6-1. Figure 6-1, however,

does not show these locations. Please revise Figure 6-1 to show these locations.

p. 6-7, §6.2.1.9	Table 6-1 summarizes the sampling performed in Sites 3 and 14 for the BGOURI, and the locations are shown on Figure 6-1 and "hits" are shown on Figure 6-2. Figure 6-2 shows well 2DMW11D, but it appears that no sampling or analyses were done for this well. The Work Plan (Table 2-1) indicated that it would be sampled as part of the BGOURI. What became of the sampling of this well? Like 3MW12D, this well may be positioned to intercept groundwater that may originate above the dike in the Area A Wetlands, descend into bedrock, and discharge upward in the Downstream Watercourses area. Again, this pathway is of considerable significance, and should be assessed.
p. 6-7, § 6.2.1.9	The second paragraph of Section 6.2.1.9 indicates that the seven temporary monitoring wells that were installed and sampled as a part of the BGOURI are shown in Figure 6-1. Figure 6-1, however, seems to show 10 temporary monitoring wells. Please explain this discrepancy.
p. 6-7, § 6.2.1.9	The first paragraph of Section 6.2.1.9 indicates that the three soil samples collected at site 3 during the BGOURI were analyzed for bulk density, porosity, pH and TOC. Appendix B and Table 6-1 indicate that only one of the soil samples (S3SB29D0911) was analyzed for all of these parameters. Please clarify the text in this paragraph.
Table 6-10	The cancer risk factor listed for Central Tendency Exposure (inhalation) for the adult resident in Table 6-10 does not correspond to the value presented in Table 10.4 of Appendix C. Please verify that the appropriate inhalation cancer risk value is presented.
p. 6-11, § 6.3.4	The fourth paragraph on page 6-11 indicates that two wells (3MW12S and 3MW12D) were installed in the area of the OBDA during the Phase I investigation. These wells are not shown on Figure 6-1. Please revise Figure 6-1 to include these wells.
p. 6-12, § 6.4.1	Section 6.4.1 does not include a review of soil, sediment or surface water data collected historically at the Area A Downstream Watercourses/OBDA. Please summarize the historic data for all media in this section as was done for other sites.
p.6-18, § 6.4.3	On page 6-18, the third paragraph under the heading "Bedrock Wells" refers to "overburden groundwater samples." Please change these two references to "bedrock groundwater samples."

p. 6-19, § 6.5.1	On page 6-19, the final sentence of the first paragraph should be changed to "No soil samples were analyzed for organics or metals during the BGOURI."
p. 6-20, § 6.5.1	On page 6-20, under the heading of "Pesticides" an argument is made that the low level detections of DDT and DDD in well 2DMW30S were due to the high level of dissolved solids in the sample. While it is understood that DDT and DDD have a propensity to adhere to particulates (a measure of which would be Total Suspended Solids), it is not clear how the high level TDS would lead to the presence of DDT and DDD in the sample. Please provide clarification on this issue. Also not that this argument is made a number of times throughout Section 6.
p. 6-29	Since the maximum detected concentrations of arsenic and vinyl chloride exceed their respective Connecticut criteria, these two chemicals are retained as COCs for the migration pathways (volatilization for vinyl chloride and surface water for arsenic).
§6.6.2, ¶3	*Exposure assessment:* Although under current land use, residents are not potential receptors, they need to be considered potential receptors for future scenarios. Children must also be considered potential receptors and their exposures need to be quantified.
p. 6-35, §6.7.4	The RI recommends that Sites 3 and 14 (Area A Downstream Watercourses/OBDA, OBDANE) proceed to a FS. This is appropriate, particularly since there are evidently sources of chlorinated solvents that are not understood. Of particular concern is the newly discovered disposal area north of Stream 5. It is not clear that delineation of this potential source of groundwater contamination is adequate to evaluate remedial alternatives. Further characterization may be required, *e.g.*, as a "data-gap investigation" to support the FS. The recommendations specifically mention that monitored natural attenuation (MNA) may be viable for the contamination detected at 2DMW29S. The RI does not explicitly address possible connections between the newly discovered disposal area and the chlorinated solvents observed at 2DMW29S, which appears to be downgradient. Further characterization may be needed to establish this relationship, and will be central to any argument for MNA. EPA's guidance on MNA states clearly that *source control* is essential to the success of MNA. Therefore, identification of the source of the chlorinated solvents appearing at 2DMW29S, and demonstration that the source has been eliminated (either by active measures or by depletion since the original release) are critical steps.

Tables 6-4 & 6-8	Please add chromium and manganese as COCs for direct contact exposure scenarios.
Table 6-7	For construction workers (groundwater), there is no ingestion of groundwater. Therefore, please use "None" for ingestion in the "Type of Analysis" column. For child residents (groundwater and air), exposures must be quantified. Therefore, please use "Quant" in the "Type of Analysis" column.
All other Tables	Please add chromium and manganese as COCs and quantify exposures to child residents.

§ 7.0 Torpedo Shops (Site 7)

p. 7-8, §7.4.1.1	The second sentence of the last paragraph on this page states: "4,4'-DDT and its breakdown products, 4,4'-DDD and 4,4'-DDT ...." Please change this sentence to read: "4,4'-DDT and its breakdown products, 4,4'-DDD and 4,4'-DDE ...."
p. 7-11, §7.4.2	Table 7-3 (positive groundwater analytical results for temporary wells at Site 7) shows 1,4-dichlorobenzene results under both VOCs and SVOCs. Should the latter be an entry for hexachlorobenzene, as in accompanying tables? Please check for consistency.
p. 7-14, §7.4.2.4	The first sentence of the final paragraph indicates that 13 metals were detected in BGOURI samples from bedrock wells. The next sentence indicates that only 11 metals were detected in these samples. Please correct this discrepancy.
p. 7-16, §7.5.1	The section on monocyclic aromatic compounds includes a discussion of possible sources and transport processes that might bear on the detections of hexachlorobenzene, and this is welcome. In contrast, however, the occurrence of 1,3- and 1,4-dichlorobenzene, chlorobenzene, and benzene, which occur at comparable or higher concentrations and at more sample locations, does not receive similar treatment in this section. Such a discussion is provided later, on pp. 7-22 and 7-23. Perhaps a pointer to the later discussion under natural attenuation should be added to the text in the section on monocyclic aromatics, so that the former does not appear to omit treatment of the chlorobenzenes.
p. 7-26, §7.5.2.2	The report concludes that chlorobenzene is not likely to be present as a

degradation product of dichlorobenzene, because the latter is found at lower concentrations. This conclusion does not necessarily follow, if a finite release of DCB was subsequently reduced in mass by degradation. It is possible that the daughter products (chlorobenzene and benzene) could be present today at higher concentrations than the remaining parent.

p. 7-34, §7.7.1

The first paragraph of Section 7.7.1 indicates that methylene chloride is "a common lab artifact" and "was identified as a COPC based on a few historic, low-level detections." This paragraph goes on to state that "None of the BGOURI soil samples had detectable concentrations of this compound." The most substantial detections of methylene chloride occurred during the Phase II RI in locations west of the torpedo shops near Triton Road, as is shown on Figure 7-3. The soil samples collected during the BGOURI were few in number (4) and were not located in the same area. Additionally, while methylene chloride is a common laboratory contaminant, the detections apparently made it through the data validation process. Most types of laboratory contamination would be detected in method blanks. If the method blanks had shown comparable levels of methylene chloride, the samples would have been listed as non-detect. Please provide clarification of these points in Section 7.7.1 and provide further justification for determining methylene chloride to be a laboratory contaminant.

p. 7-39, §7.7.4

The RI recommends that Site 7 (Torpedo Shops) proceed to a FS. Again, this is appropriate in view of the lack of idenfiable source(s) for some of the detections of chlorinated solvents (*e.g.*, well 7MW1D, upgradient of the site facilities. At a minimum, long-term monitoring should be evaluated in the FS in order verify that the scattered chlorinated solvents (TCE) remain at low levels or decline, and that the DCB plume west of Building 325 declines, as well.

Figures 7-1, 7-2, 7-3, & 7-4

Figure 7-3 shows COPCs in soil. One of the samples shown is 7TB07 which is located just south of building 325. This sample is not discussed in the text. In fact, Figure 7-1 shows a temporary monitoring well in this location (7TW07). Please provide some clarification.

Figure 7-2 and 7-3 do not show where soil sample S7SB010912 was collected. It is understood that this sample was not tested for organics or metals but it would be nice to locate it on the map. Please indicate the location for this sample on the figure.

According to the Figure 7-3, soil sample S7SB180506 was collected at the location identified as 7TW18. This location designation indicates a

temporary well. Figure 7-1 and Figure 7-2, however, show a soil boring in this location (7TB18). Please clarify this discrepancy.

Figure 7-1 shows a soil boring on the southwest side of building 325 identified as 7TB17. This boring is not shown on figures 7-3 or 7-4. It is unclear what the purpose of this boring was or whether any samples were collected from it.

Figures 7-2 and 7-3 apparently show both historic soil data and soil data collected during the BGOURI. Figure 7-4 apparently only shows groundwater data associated with the BGOURI. If this is the case, the text on the top of page 7-12 should clearly identify the data shown on these tag maps.

Table 7-5

Indicates that barium was not retained as a COPC for subsurface soil based on direct contact screening criteria. Section 7.6.1 indicates that barium was retained as a COPC for subsurface soil based on the direct contact screening criteria. Table 7-9 indicates that barium was not selected as a COPC in subsurface soil based on the direct contact screening criteria. Please correct the information provided in the text of this chapter.

Tables 7-5 & 7-6

Include antimony and arsenic on the COCs list.

Table 7-7

There is an inconsistency in the approach to eliminate chemicals that have maximum detected concentrations higher than the federal risk-based screening levels (*i.e.*, EPA Region IX values) but lower than the state's potential ARARs (*i.e.*, Connecticut's residential soil criteria). For example, with the maximum concentrations higher than Region IX values but lower than Connecticut's residential soil criteria, antimony and arsenic are not retained as COCs while cadmium is. Please correct.

Table 7-13

For construction workers (air from surface soil): there are exposures to fugitive dust and volatile emissions from surface soil. Therefore, please use "Quant" in the "Type of Analysis" column.

For full-time employees (air from surface soil), there are exposures to fugitive dust and volatile emissions from surface soil. Therefore, please use "Quant" in the "Type of Analysis" column.

For trespassers (air from surface soil): there are exposures to fugitive dust and volatile emissions from surface soil. Therefore, please use "Quant" in the "Type of Analysis" column.

The "Medium" column for future scenario needs to be split into surface soil and subsurface soil.

For construction workers (groundwater), there is no ingestion of groundwater. Therefore, please use "None" for ingestion in the "Type of Analysis" column.

For child residents (groundwater and air), exposures to child residents must be quantified. Therefore, please use "Quant" in the "Type of Analysis" column.

All other Tables — Please correct the COCs as from Table 7-7 and quantify exposures to child residents.

§ 8.0 Area A Weapons Center (Site 20)

p. 8-5, §8.3.4 — The second paragraph on this page references monitoring wells 2WMW6S and 2WMW6D. These wells are shown in Section 4 figures but not in Section 8 figures. These wells are located in close proximity and downgradient to Site 20. Please comment on why they were not used in the groundwater evaluation for the Area A Weapons Center.

p. 8-5, §8.4.1 — Section 8.4.1does not discuss the historic findings for sediment and surface water at this site. Please summarize the data for these media in this section.

p. 8-11, §8.5.1 — The text notes that TCE was not detected in downgradient wells in the BGOURI or in the Phase II RI. However, it might be added that, while the downgradient wells at Site 20 have not shown TCE detections, there are widespread, low-level detections of TCE in bedrock in Sites 3 and 7, which is downgradient of Site 20. It remains possible that TCE releases from Site 20 have impacted bedrock groundwater downgradient.

p. 8-14, §8.6.3 — The ICR listed in the text for the adult resident's exposure to groundwater does not correspond to the value provided in Table 8-8. Please verify that the correct value is listed in the text of the document. The HI for adult residents for the RME scenario is also in conflict with the value listed in Table 8-8. Please verify that the appropriate values are stated in the text of the document.

p. 8-19, §8.7.4 — The RI recommends that Site 20 (Area A Weapons Center) proceed to a FS. This is both appropriate and consistent with the recommendations for Site 7.

Table 8-4	Please add manganese as a COC for direct contact exposure scenarios.
Table 8-5	Please add copper as a COCs for direct contact exposure scenarios.
Table 8-6	For construction workers (groundwater), there is no ingestion of groundwater. Therefore, please use "None" for ingestion in the "Type of Analysis" column. For child residents (groundwater and air), exposures to child residents must be quantified. Therefore, please use "Quant" in the "Type of Analysis" column.

§ 9.0 Hospital Incinerator (Site 16)

p. 9-1, § 9.2	Attempts to sample groundwater near the former locations of the Hospital Incinerator (Site 16) were unsuccessful due to shallow overburden. Since the primary focus of the RI is base wide groundwater additional steps should be taken to evaluate groundwater of this site. These steps could include installing bedrock monitoring wells and/or installing overburden wells further downgradient of the site where overburden may be more substantial and groundwater may potentially be encountered.
p. 9-2, §9.3.1	The second paragraph of Section 9.3.1 (Hospital Incinerator - Site 16) references "Drawing 2." It is unclear what this refers to and where it can be found.
p. 9-16 § 9.6.4	This Section should be expanded to include a discussion of the uncertainties associated with the lack of groundwater monitoring data. Another uncertainty which should be discussed in this section involves the limited data available for the subsurface soil investigation, (one sample). The elevated detection limits for the SVOC samples collected for 16B are also a source of uncertainty that should be evaluated.
p. 9-18, §9.7.3	The RI recommends that Site 16 (Hospital Incinerator) proceed to a No Further Action decision document. Although there were no indications in site soil sampling and analyses of compounds that are likely to impact groundwater (*e.g.*, dioxins and PCBs are strongly sorbed on soils), groundwater at the site has not been sampled at all. It can only be inferred that groundwater is not impacted. Proposed temporary wells were not installed because of shallow bedrock encountered. At least one bedrock well should be considered for the area immediately downgradient of the site to verify that groundwater is clean.

Table 9-9	Occurrence, Distribution, and Selection of COPC's in Subsurface Soil at Site 16, Direct Contact Exposure Pathways: The COPC flag for arsenic should indicate that arsenic was selected as a COPC for this pathway since the concentration used for screening exceeds the screening level.
Table 9-12	For construction workers (air from surface soil), there are exposures to fugitive dust and volatile emissions from surface soil. Therefore, please use "Quant" in the "Type of Analysis" column. For full-time employees (air from surface soil), there are exposures to fugitive dust and volatile emissions from surface soil. Therefore, please use "Quant" in the "Type of Analysis" column. For trespassers (air from surface soil), there are exposures to fugitive dust and volatile emissions from surface soil. Therefore, please use "Quant" in the "Type of Analysis" column. The "Medium" column for the future scenario should be split into surface soil and subsurface soil.

§ 10.0 Goss Cove Landfill (Site 8)

§10	Please perform an editorial review of the document to verify that the correct name for this Site is listed. In several instances, Site 8 is referred to as Gross Point Landfill.
§10	This section frequently identifies the Fusconi Dry Cleaner site, which is upgradient to the landfill, as the source of PCE and its breakdown products detected at the Goss Cove Landfill. The data presented make a strong case for this, however, the text should be modified so that it is clear that there is still some degree of uncertainty in these conclusions. It is difficult, for example, to completely rule out the possibility of other sources in addition to Fusconi Dry Cleaners. Please revise the text to express this uncertainty. See for example, page 10-10 (end of third paragraph), page 10-11 (last paragraph), page 10-14 (last paragraph), page 10-19 (last paragraph), page 10-26 (third paragraph).
p. 10-13, §10.4.1.2	The first sentence under the heading "Bedrock Groundwater Data" indicates that all bedrock monitoring wells were installed upgradient of the landfill. During the BGOURI, no additional monitoring wells were installed. As such, the BGOURI did not access bedrock groundwater within the landfill area. Please comment on this issue and discuss the

effect it has on the evaluation of groundwater for the Goss Cove Landfill and its potential impacts on surface water.

p. 10-15, §10.4.2 On page 10-15, the last sentence of the second paragraph states that the presence of vinyl chloride in well 8MW2D indicates that cis-1,2-dichloroethene is biodegrading at this location. While this is likely the case, there is always some degree of uncertainty in these interpretations. Please indicate this in the text. For example, "The vinyl chloride in this well is *likely* the result of the biodegradation of cis-1,2-dichloroethene."

p. 10-15, §10.4.2 The text notes that well 8MW2D showed an increase in PCE from 5 J μg/L in previous rounds to 31 μg/L in the BGOURI sampling, and that TCE (25 μg/L), cis-1,2-DCE (33 μg/L), and VC (1 μg/L) were detected, as well. This is interpreted as a downgradient manifestation of the dry cleaner PCE plume. While this inference is plausible, it is not well supported by other evidence. In particular, continuity with the upgradient PCE is not established. Is the speculation that the PCE has moved through the overburden from the source area to the vicinity of 8MW2D, or that it penetrated bedrock and discharged upward into overburden as it approached the river. No chlorinated solvents have been detected in overburden groundwater between 8MW8S and 8MW2S (e.g., 8MW4, although screened at only 5-15 ft bgs, showed ND for the chlorinated solvents). No wells in the downgradient area (e.g., in the vicinity of 8MW2D) penetrate to bedrock to establish that the PCE is discharging back upward into the overburden near the river. In fact, the well pair 8MW2S/D was shown in the March 30, 1994 gauging event (see, e.g., Fig. 2-5, *Draft Groundwater Monitoring Plan for Site 8 - Goss Cove Landfill*, October 2000) to be characterized by a downward gradient (the shallow well level was at 2.94 ft, the deep well at 2.68 ft). Similarly, the June 2000 gauging event shows the shallow well at 0.52 ft and the deep well at 0.20 feet. This would appear to argue against upward discharge from bedrock to overburden, unless the vertical gradient reverses at depth. The detections of chlorinated solvents at 8MW2D indicate a lack of delineation of the dry cleaner plume in the downgradient area, if these hits can indeed be traced to that source.

p. 10-15, §10.4.2 The text states that TCE was detected at 8MW2D at 1.52 μg/L, but this appears to be the result for 8MW9S. Table 10-2 and Figure 10-2 show TCE at 25 μg/L for 8MW2S. Please check text for consistency.

p. 10-19, §10.5.1 On page 10-19, the end of the first paragraph under the heading "Monocyclic Aromatic Compounds" indicates that these compounds will

not likely undergo microbial degradation at an appreciable rate. Given that these compounds are amenable to microbial degradation and the lack of macronutrient data, please provide supporting text to justify the argument that microbial degradation is not expected to be an important pathway in groundwater.

p. 10-21, §10.5.1 — The discussion of the fate and transport of metals for Site 8 notes that mobility is sensitive to pH and redox conditions. This discussion should be expanded to include specific mention of the principal metals of concern at the site (arsenic, lead, and zinc), and the range of pH and indicators of redox conditions. In particular, what is the impact of the landfill materials on redox conditions in site groundwater, and what is the expected influence of the cap on the long-term evolution of redox conditions? What are the implications for transport of As, Pb, and Zn?

p. 10-26, §10.7.1 — On page 10-26, the first sentence indicates that the horizontal and vertical extent of most chemicals in the groundwater could not be defined due to the proximity to the Thames River. It is unclear how the Thames River would interfere with this assessment. Please clarify this issue.

p. 10-28, §10.7.4 — The BGOURI concludes that a FS is not called for at this time for Site 8 (Goss Cove Landfill), because the landfill has been remediated with a cap and a long-term groundwater monitoring program is currently being implemented. These arguments are reasonable; evaluation of additional remedial alternatives should be necessary only in the event that the present remedy is shown to be inadequate. One weakness of the present characterization of groundwater at the site is the lack of unequivocal support for the contention that the chlorinated solvents found at 8MW02D on the west-central side of the site are derived from the dry cleaner plume originating offsite to the east. While this seems plausible, no conceptual model for transport from the source area to this location in deep overburden is offered, and no data are presented that demonstrate continuity with the purported source. Without further support for the conclusion that the chlorinated VOCs at 8MW02D are part of the dry cleaner plume, the possibility that the contamination originates elsewhere remains open.

Table 10-3 — Please add manganese as a COC for direct contact exposure scenarios.

Table 10-4 — Please add manganese as a COC for direct contact exposure scenarios.

Table 10-6	For construction workers (groundwater), there is no ingestion of groundwater. Therefore, please use "None" for ingestion in the "Type of Analysis" column. For adult and child residents (groundwater and air), exposures to these receptors must be quantified. Therefore, please use "Quant" in the "Type of Analysis" column.

§11.0 Spent Acid Storage and Disposal Area (Site 15)

p.11-3, §11.2.6	From the first paragraph in Section 11.2.6 and from Figure 11-1 it seems that downgradient groundwater was not fully characterized. This should be discussed in Section 11.7.1 (Nature and Extent - Summary and Recommendations).
p.11-8, §11.4.2	The second to last paragraph of Section 11.4.2 indicates that the extent of silver in groundwater could not be established based on the wells sampled. This should be discussed in Section 11.7.1 (Nature and Extent - Summary and Recommendations).
p.11-8, §11.5.1	The last sentence on page 11-8 indicates that pesticides were detected in groundwater during the Phase II RI at this site but were not analyzed during the BGOURI. The reasoning behind not analyzing for pesticides as a part of the BGOURI should be briefly discussed.
p.11-9, §11.5.1	The second to last sentence of the first paragraph on page 11-9 indicates that data does not indicate vertical migration of TCE. It should be made clear that only one "deep" well was sampled as a part of the BGOURI.
p.11-10, §11.5.1	The first full paragraph on page 11-10 states: "No PAHs were found in the deeper overburden wells." It should be made clear that only one "deep" well was sampled as a part of the BGOURI.
p.11-11, §11.5.1	The final paragraph of Section 11.5.1 indicates that one of the conclusions of the Phase II RI was that detected lead was likely associated with suspended solids. As such, provide a brief rationale for not analyzing filtered groundwater in the BGOURI.
p.11-11, §11.5.1	The final sentence of Section 11.5.1 indicates that the predominant form of dissolved lead is lead carbonate. Please provide the reasoning behind this assumption.

p. 11-15, §11.7.1	Detection of widespread TCE at Site 15 (SASDA), including the maximum hit (16 μg/L) at the single downgradient well (15MW3), indicates possible chlorinated solvent contamination of unknown extent. More work may be necessary to delineate the TCE in this area.
p. 11-18, §11.7.4	The RI recommends that Site 15 (SASDA) proceed to a FS due to the detection of elevated metals in groundwater (*e.g.*, lead). This is an appropriate step. An additional concern that should also be addressed in the FS is the discovery of TCE at 16 μg/L in the one downgradient well, 15MW3S. The extent of this solvent contamination has not been delineated, nor has its source been identified. Further characterization may be required to support the FS.
p. 11-18, §11.7.4	The last sentence of the second paragraph on page 11-18 states: "...It also appears that a source of TCE that is unrelated to the site is impacting the Site 15 groundwater...." However, as is noted throughout Section 11, TCE was measured at its highest level in a downgradient well. While it is understood that the site's surface is relatively impermeable, the higher downgradient TCE level should be mentioned here as evidence that sheds doubt on the location of the source.
Table 11-3	Please add manganese as a COC for direct contact exposure scenarios.
Table 11-4	Please add manganese as a COC for direct contact exposure scenarios.
Table 11-6	For construction workers (groundwater), there is no ingestion of groundwater. Therefore, please use "None" for ingestion in the "Type of Analysis" column. For child residents (groundwater and air), exposures to these receptors must be quantified. Therefore, please use "Quant" in the "Type of Analysis" column.

§ 12.0 Solvent Storage Area (Building 33) (Site 18)

p. 12-11, §12.6.2	The 95% UCL concentration was utilized for the subsurface soil exposure point concentration. Please provide rationale for using the 95% UCL for subsurface soil samples when only five subsurface soil samples were collected. This statement does not correspond to the footnotes provided in Table 3.2 of Appendix C or Table 12-16, Exposure Point Concentrations for Site 18.

Table 12-5	Please add arsenic as a COC for direct contact with subsurface soil and manganese as a COC for direct contact with groundwater.
Table 12-10	Please add arsenic as a COC for direct contact exposure scenarios.
Table 12-13	Please add manganese as a COC for direct contact exposure scenarios.
Table 12-15	The "Medium" column for future scenario should be split into surface soil and subsurface soil. For full-time employees (groundwater), there is no ingestion of groundwater, therefore please use "None" for ingestion in the "Type of Analysis" column. Exposures to a child resident (groundwater and air) must be quantified. Therefore, please use "Quant" in the "Type of Analysis" column. For construction workers (air), exposure via volatilization is expected to be insignificant because of dispersion with outdoor air. Therefore, please use "None" in the "Type of Analysis" column.

§ 13.0 Tank Farm (Site 23)

p.13-29, § 13.6.3	Paragraph 1, Sentence 1: Please insert "and adult residents" after "Potential ICRs and HIs were calculated for construction workers."
Table 13-3	Please add manganese as a COC for direct contact exposure scenarios.
Table 13-4	Please add manganese as a COC for direct contact exposure scenarios.
Table 13-6	There is no ingestion of groundwater for construction workers. Please insert "None" for ingestion in the "Type of Analysis" column

Section C.5 of Appendix C (RAGS Part D tables) for all sites

Please correct all tables so they are consistent with the corrected tables in the HHRA section.

Please delete the "95% UCL of Normal Data" column from all tables. The use of 95% UCL is not applicable to the assessment of exposure to groundwater (EPA Region I's Risk Update #2, August 1994). For each site, the maximum detected concentrations in groundwater should be used to calculate the RME.

REFERENCES

CTDEP, January 1996. Remediation Standard Regulations. Bureau of Water Management, Permitting, Enforcement and Remediation Division, Hartford, Connecticut.

RAGS, Part E. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual. (Part E, Supplemental Guidance for Dermal Risk Assessment), Interim Guidance, 2000.

USEPA, December 1989. Risk Assessment Guidance for Superfund (RAGS), Volume I - Human Health Evaluation Manual (Part A).

USEPA. Risk Assessment Guidance for Superfund (RAGS), Volume I - Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments).

USEPA, 2000. Risk Assessment Guidance for Superfund (RAGS), Volume I - Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment).

USEPA, October 2000. Region III Risk-Based Concentration Table. Philadelphia, PA.

USEPA, November 2000. Region IX Preliminary Remedial Goals Table. Solid and Hazardous Waste Program, San Francisco, California.

USEPA, December 2000. Drinking Water Standards and Health Advisories. Office of Water.

USEPA, December 2000. Integrated Risk Information System (IRIS). On-line database.