



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

February 7, 1997

Mr. Tom Yourk, BEC
Stratford Army Engine Plant
550 Main Street
Stratford, CT 06497

Re: Remedial Investigation Reports
Stratford Army Engine Plant
Stratford, Connecticut

Dear Tom:

The United States Environmental Protection Agency (EPA) has reviewed the document entitled "Draft Final Phase II Remedial Investigation Report" for the Stratford Army Engine Plant in Stratford, Connecticut. In performing a review of this document, EPA found it necessary in many instances to review the Phase I Remedial Investigation Report since much of the data was collected and reported during this phase of the project.

EPA's comments on the above-referenced documents are attached to this letter.

Also attached, is a letter from the National Oceanic and Atmospheric Administration (NOAA) indicating that they have performed a cursory review of the document and outlines a few major concerns. EPA recommends that NOAA and the U.S. Fish & Wildlife Service be included in any future efforts to complete the characterization of risk to the off-shore environment adjacent to SAEP. Both NOAA and U.S. Fish & Wildlife Service are Natural Resource Trustees.

In order to most effectively address our comments, EPA recommends that the Army submit written responses to the attached comments prior to preparing another revision of the Remedial Investigation (RI) Report. Following EPA's review of the responses, we recommend a meeting(s) to further discuss the issues and develop a strategy to with which to proceed.

If you have any questions regarding the attached comments, please contact me at (617)573-5785.

Sincerely,

A handwritten signature in cursive script that reads "Meghan F. Cassidy".

Meghan F. Cassidy
Remedial Project Manager



Enclosures

cc: Glen Boldt/AEC
Vincenzo Crifasi/USCOE
Ken Feathers/CT DEP
Ken Finklestein/NOAA
Tim Pryor/U.S. Fish & Wildlife
Bill Brandon/EPA
Jayne Michaud/EPA
Susan Svirsky/EPA

ATTACHMENT I

The following represent general comments on the draft final document entitled "Phase II Remedial Investigation Report, Stratford Army Engine Plant, Stratford, Connecticut".

1. Section 3.2.3: This section reports that groundwater results indicated several exceedances of CDEP Criteria. EPA recommends that future groundwater sampling be performed using low stress (low flow) purging and sampling techniques (See attached EPA Region I protocol). This standard operating procedure (SOP) provides a general framework for collecting groundwater samples that are indicative of mobile organic and inorganic loads. EPA believes that analytical results from groundwater samples collected using this method are more reproducible and representative of actual groundwater conditions.
2. The report indicates that groundwater in several locations exceeds the CDEP standards established to prevent possible risks based on volatiles migrating into buildings. The report however seems to indicate that this issue is not of concern based on the assertion that chlorinated solvent contamination on-site originates off-site. Regardless of the origin of this contamination, if there is a potential risk within buildings on SAEP, these risks will have to be addressed prior to any lease or transfer of the property.
3. A map showing underground utilities, especially connections to the identified outfalls, is necessary. An analysis of these conduits should be performed to determine whether there are ongoing sources (i.e., sediments within pipes, dry wells, contaminated soils/groundwater entering pipes, etc.) that may be continuing to contribute to the sediments at the outfalls.

ATTACHMENT II

The following are EPA's comments on the draft final document entitled "Baseline Human Health Risk Assessment, Stratford Army Engine Plant, Stratford, Connecticut".

General

1. EPA Region I Risk Updates are provided with these comments for information and to support several of the comments specifically.
2. The toxicity tables should be reviewed to ensure that the most recent toxicity values are used in the risk assessment. Some values in the draft document are outdated.
3. EPA's comments reflect Superfund risk assessment methods (although it is noted that RCRA follows these same methods). Therefore, EPA views these comments as relevant to SAEP and should be addressed using current EPA guidance. In instances where CT DEP methods differ significantly from EPA methods, the Army's response to comments should explain the difference.
4. The exposure assumptions for the trespasser seem liberal. For example, only 10 or 20 days of exposure per year is assumed. EPA questions whether this is realistic as a current, and particularly a future, exposure assumption.
5. As it stands, the draft final risk assessment (p. 5-80) concludes that human health risks are attributable to :
 - PCBs and arsenic in sediment at the Outfall 8 discharge pipe. However, the report notes that data were limited, thus the conclusions are uncertain. Additional samples at downstream locations and at areas where recreational receptors may be exposed would help reduce the uncertainty in this assessment.
 - Commercial fisherman - PCBs result in a risk of $9e-05$. However, the risks will be higher for a subsistence or recreational fisherman (See specific comments pertaining to inclusion of this receptor.).

The outcome of the risk assessment is likely to change once the Army incorporates other pathways, receptors and chemicals as noted in the specific comments that follow.

Specific comments

6. Page 5-2 and 5-3: Comparison to background concentrations is not generally used to screen out chemicals of concern (COCs) (see EPA Region I risk assessment guidance in Risk Updates No. 3). Literature values (e.g. from USGS or Dragun) are not generally used for sites in the region; site-specific data are preferred when making comparisons to background. The quantity

and quality of data, and statistical methods influence whether or not background is appropriate for screening chemicals from the risk assessment (either as a COC or in the risk characterization). The comments below indicate which chemicals EPA recommends carrying through the risk assessment. However, if the maximum soil concentrations are lower than the Region III residential risk-based concentrations ($RBCs_{[0.1, 1e-06]}$) (see comment 11 below), the chemical can be omitted from the risk assessment. This does not apply to COCs for ecological receptors.

Other factors may warrant retaining COCs such as fate and transport characteristics or public concern. Constituents related to site activities should not be eliminated (i.e., in the hydraulic/plating area). See Risk Update No. 3, August 1995 for more detailed guidance.

7. Page 5-3: This report should note that EPA Region I does not use recommended daily allowances (RDAs) to screen out nutrients because the RDAs are not usually toxicity based and do not consider sensitive subpopulations. (Sec. 5.2) However, EPA agrees with the exclusion of the nutrients identified in Table 5.3-4 (iron, calcium, magnesium, potassium, and sodium) which we typically omit from human health assessments due to their known nutritional value.

8. Page 5-5 (also Table 5.2-2 Main Site Soils Background Comparison to Soil): EPA believes that the following constituents should be retained as COCs in the assessment: aluminum, barium, lead, manganese, mercury, and vanadium.

9. Page 5-5 (also Table 5.2-3): Hydraulic/Plating Area - the following constituents should not be eliminated from the risk assessment: aluminum, mercury, vanadium.

The last column in these tables is incorrect for vanadium.

Please discuss whether beryllium, selenium, silver, and thallium are/were related to the hydraulic/plating area activities.

10. Page 5-6, Sec. 5.2.4: The chemicals eliminated based on frequency of detection (FOD) are not listed. Please include the chemicals and the FODs in the text and refer to the other text or tables as needed.

11. Page 5-7, Sec. 5.3: The comparison to Region III risk based concentrations should be included as a table. Please note that for screening purposes, EPA Region I uses the individual RBCs set at a hazard quotient of 0.1 and a risk level of $1e-06$. If a chemical exceeds the RBC (0.1) it may need to be included in the risk assessment if it is in a group of chemicals with the same toxic endpoint, and which cumulatively has a hazard index greater than 1.

12. Page 5-11: Dibenzo(a,h)anthracene and Aroclor 1254 should not be excluded on the basis of frequency of detection because these are parts of mixtures which are evaluated as PAHs and PCBs. For dibenzo(a,h)anthracene a relative potency factor of 1.0 should be applied.

13. Page 5-20, Sec. 5.6.1: Based on draft dermal guidance under review at EPA, we recommend using the following dermal absorption values: arsenic 3%; PCBs 14%; PAHs 13%; PCP 24%; 2,4-D 10%; chlordane 4%; other metals 1%. These values are currently undergoing peer review and may change.

Currently EPA Region I recommends values for three chemicals in soil. These values are cadmium (1%), TCDD (3%)(dioxins/furans), and TCB(6%).

14. Page 5-21: In addition to the commercial fisherman, recreational and subsistence fisherman should be included in this risk assessment. Shellfish bans or advisories do not preclude exposures; therefore please include these receptors in the baseline risk assessment. (Refer to EPA guidance in the August 1994 Risk Updates No.2).

15. Page 5-28: For the commercial fisherman, the mixing height of 3m may be appropriate; however, for the recreational shellfish consumer, the default value would be more appropriate. Parameter values for the recreational and subsistence fisherman should be included as noted in comment #14 above.

16. Pages 5-29 to 5-32:

- Section 5.6.5: There is no mention of fish species caught or consumed in potentially impacted water bodies. This information is relevant and needs discussion here.
- EPA recommends collecting fish tissue data for use in risk assessment rather than modeled fish tissue data. In particular, this data will be necessary to adequately characterize human exposure to PCBs in fish. Discussions regarding future sampling efforts should include EPA.

17. Page 5-36: Clarify whether there is any potentially contaminated surface soil which could be contacted by a human receptor. This includes soil beneath pavement for future construction exposures.

18. 5-36 to 5-38: Does SAEP have any information to support the assumptions for excluding the child (1 to 12 year old) from recreational pathways? EPA believes the young child should be assessed. Also, the exposure frequencies seem low and may require some adjustment. If additional information to support the values presented is available, please clarify.

19. Page 5-37: Please refer to EPA Region I guidance on fish/shellfish consumption values (August 1994 Risk Updates). Fish/shellfish consumption rates used by EPA are averaged on an annual basis, therefore an exposure frequency (EF) of 365 days should be used. Although consumption rates can be recalculated for shorter durations, the proposed EF may realistically be 365 days per year since harvested shellfish may be frozen.

20. Page 5-40: Last bullet on the fraction soil/sediment ingested from contaminated source. Soil ingestion rates are not related to number of hours spent on a site, but are related to activity and age. The baseline risk assessment should not assume a fraction ingested for recreational receptors; however, we recognize this is a source of uncertainty which should be discussed in the exposure assessment and risk characterization.

21. Page 5-43: The fraction contacted from contaminated source should be omitted. When assuming recreational activities in a contaminated area, EPA assumes that the media the receptor may contact contaminated media throughout the exposure event.

22. Page 5-44: See comment #20 regarding the fraction ingested.

23. Page 5-44: Section 5.7.1.7: The fraction of seafood ingested from the area should be 1.0. This is a large source of uncertainty and may be discussed quantitatively using a fraction ingested value. The values used in this assessment, i.e., 1% and 10%, are very low and have not been substantiated for recreational or subsistence fish consumers.

24. Page 5-45: Omit the “fraction ingested (and dermally contacted) from contaminated source” for the incidental ingestion of (and dermal contact with) groundwater pathway. See comment #20 above.

25. Table 5.4-1 and 5.4.2 Toxicity Values: EPA has released the new PCB cancer assessment which contains new slope factors and guidance regarding a tiered approach that should be applied to this risk assessment. Based on this, the new values for central tendency and high end exposures should be included. These values will differ depending on the media and the persistence of the particular PCBs present. For fish and sediments, dioxin-like PCBs may be present and may need to be included in the analysis. (As noted previously, all Arochlors must be included in the risk assessment.) If the Army’s contractor does not have the new guidance, please contact EPA.

ATTACHMENT III

The following comments relate to the hydrogeologic data presented in the Phase I and Phase II Remedial Investigation Reports for the Stratford Army Engine Plant in Stratford, Connecticut. While EPA's goal at this point in time was to provide comments on the Phase II Remedial Investigation Report, we found it necessary to review both documents in order to fully address the hydrogeologic conditions and any potential impact to groundwater/surface water.

1. The combined Phase I and Phase II data sets leave many fundamental questions unanswered, particularly those pertaining to nature and extent of contaminant sources areas, geometry of contaminant plumes extending down gradient from these sources, and identification of plume discharge areas into local surface waters and sediments. These data gaps must be addressed in this order so that the ultimate question, the risk levels presented to human and ecological receptors from site contaminants, can be properly quantified and addressed.
2. With respect to ground water contamination, numerous probable on-site source areas can be interpreted from the Phase I data, yet the primary thrust of the Phase II report appears to have been to explore the possibility of additional off-site sources. The Phase II effort is justified in that all sources must be identified, yet at a minimum, further work is needed in terms of completing an understanding of the nature and extent of on-site VOC contaminants in the following areas:
 - a. General area between buildings B-15, B-2, and B-16. Building B-13 is roughly in the center of this area. Previous sampling rounds for both soil and ground water have consistently identified both chlorinated and fuel-related VOCs as well as other contaminants. The soil data was not collected below 7 feet bgs, despite persistence of contaminants at these depths. Ground water data is also mainly limited to shallow water-table screens, although a limited amount of "intermediate" depth ground water information is available at two locations (PZ-16D[21-31'] and PZ-5D[33-43']). These wells were not sampled in Phase I, and no "deep" ground water data is available; no "deep" monitoring wells exist in this part of the site. Widespread VOCs were detected in numerous sediment (e.g. OF-002, OF-007) and/or surface water (e.g. OF-002, OF-003, OF-004, OF-007, LT-1, LT-2) sampling locations, in the intertidal areas to the east (off-shore), suggesting a potential ground water transport mechanism for these contaminants.
 - b. General area between buildings B-16, B-3, and B-19. Building B-5 is roughly in the center of this area. Previous sampling rounds for both soil and ground water have identified both chlorinated and fuel-related VOCs as well as other contaminants. The soil data presented in the Phase I RI is limited to shallow samples, generally less than 6.5 feet bgs. Ground water data is also mainly limited to shallow water-table screens, although a limited amount of "intermediate" depth ground water information is available at three locations (WC-2D[24.5-34.5'], PZ-13D[21.5-31.5'], and PZ-1D[24-34']). WC-2D was sampled in Phase I, and indicated substantially greater contaminant levels than the adjacent shallow well (MW-3). At this point it is not possible to establish whether the trend of increased contamination with depth extends below the "intermediate" level sampled at WC-2D. No "deep" ground water data is available; no "deep"

monitoring wells exist in this part of the site.

c. Former lagoon areas; Details concerning the lagoon closures are not presented in the Phase I/II reports. Nonetheless, Phase I/II data indicate a persistence of low levels of VOCs as indicated by results from a limited number of shallow soil samples. Phase I ground water results indicated low levels of VOCs, but several shallow wells located along the northern periphery of the lagoon areas (i.e., WC-13S, WC-14S, LW-7, LW-10S, etc.) were the only ones sampled. Phase II sampling included several "intermediate" and "deep" monitoring wells. Shallow monitoring wells, however, screened at the water table, provide the vast majority of access points into the aquifer in this part of the site. [The list of "LW" series monitoring wells sampled for the Phase II included 12 shallow water table wells, 7 "intermediate" level screens, and 3 monitoring wells with "deep" screens]. These wells do not suggest any clear pattern of VOC distribution in ground water, but again most of the wells are shallow. Furthermore, the midpoint of the deepest "deep" screen is well over 50 feet above the top-of-rock contact. This indicates that a considerable volume of unconsolidated aquifer is unmonitored. This issue is relevant, not only from a basic characterization standpoint, but also due to the fact that past characterization and/or remedial activities may have inadvertently caused spreading of contaminants to deeper aquifer levels. For example, Figure 3-5 of the Phase II RI, cross section D-D', shows the screened interval at LW-2 as penetrating the entire thickness of peat, effectively allowing for cross communication of the aquifer zones above and below the peat.

d. Other potential source areas. The letter dated October 16, 1996 from ABB to the Army (Subject: Sampling and Analysis Recommendations Letter for Environmental Baseline Survey at Stratford Army Engine Plant, Stratford, CT) identifies numerous potential source areas in need of further assessment. Many of these potential source areas are consistent with areas of concern suggested by the Phase I/II RI data and EPA generally concurs with the recommendations provided in this letter. However, the specific actions ultimately chosen to fill the data gaps may vary depending on subsequent discussions. Nonetheless, this letter provides a better example of the level of specificity needed to address the outstanding source issues, which are only broadly outlined in the items a, b, and c, above.

3. The Phase II RI succeeded in integrating a large amount of hydrogeologic data from Phases I and II of the RI as well as other previous reports. However, certain aspects of the site's hydrogeologic framework and conceptual model will require further work. As discussed during the December 1996 BCT meeting at SAEP, the first step in this process should involve a compilation and presentation of existing data essential to forming a technically defensible conceptual model which addresses all key areas and aspects of the site. Working technical sessions, with all key BCT parties participating, could serve to expedite this process. It should be understood by all parties that the conceptual model, by definition, may change as dictated by new data/findings. As a starting point, however, EPA believes that the current data base should be further analyzed, evaluated, and re-presented in terms of formulating an initial conceptual model. At a minimum, the following items should be developed and integrated into an updated conceptual model for the site:

a) Surface contour maps for all key hydrostratigraphic units;

An understanding of the geometry of the geologic units underlying the site is needed in three-dimensions. Preparation of surface contour maps for all key hydrostratigraphic units is needed. At a minimum, surface contour maps should be made for the top-of-bedrock, top-of-peat, and top-of-silt units as means of identifying potential contaminant migration pathways. This is particularly relevant in that solvent contaminants have been identified at the site and the potential for DNAPL has not been ruled out (despite the weak circumstantial evidence mentioned repeatedly in the Phase II RI concerning an alleged lack of historical usage of solvents at the site). Preferential migration of immiscible liquids may have occurred in the past along key hydrostratigraphic interfaces, such as the top-of-silt or top-of-rock surfaces, and may have resulted in areas of residual or free-phase DNAPL contamination which have not yet been identified.

The top-of rock surface is particularly poorly understood in that data from this surface only exists in the extreme northwestern as well as southeastern corners of the site. Further, Phase II data from this interface is indirect [no cores were collected] and as such may be subject to error. In any case, the limited current data suggest a minimum relief on the top-of rock surface of 60 feet. This is considerable and needs to be better defined and understood. Additional data acquisition (e.g., seismic refraction and/or reflection, borings, CPT, etc.) may be needed to further this effort.

The three-dimensional top-of-silt surface is also characterized by a potentially significant degree of relief. For example, an examination of Phase II cross section A-A' depicts the silt unit as occupying a depression in the general area between WC-5S and WC-4S. This depression, which is expressed in the shapes of both the lower and upper surfaces of the silt unit, coincides with an area of potential solvent release. In this respect, a detailed understanding of the geometry of the stratigraphic units in this area, which may have influenced contaminant migration is essential. Further examination of Phase II cross sections (e.g., G-G') suggest that the silt unit pinches out to the west. In the absence of the silt unit, contaminants may have migrated vertically to deeper levels within the aquifer. It may be useful in this context to examine the surface maps of other hydrostratigraphic units such as the interface between the "sand and gravel" and "sand and silty sand" till subunits, which as shown on G-G', exhibits up to 20 feet of vertical relief.

b) A three dimensional representation of the freshwater/saline water interface;

EPA has found the three-dimensional position of the interface between fresh and saline waters to be significant in coastal environments, particularly in terms of understanding contaminant distribution, migration, and discharge. It is believed that the basic salinity data has already been collected, and would facilitate construction of a three-dimensional representation of the fresh

water/saline water interface by contouring recorded salinity values. If this is not the case, this information can be obtained quickly and inexpensively through use of downhole geophysical tools (e.g., borehole conductivity).

In addition, a greater level of understanding concerning the dynamics of the fresh water/saline water interface during tidal fluctuations, particularly as this may affect the flux magnitude and locations of discharge points of contaminated ground water is needed. Additional water quality data which represents the range of conditions (e.g., high and low tide stages) may be needed.

c) Further delineation of all contaminant source areas in three dimensions;

Delineation of potential sources is needed. This particularly pertains to on-site source areas identified or suspected on the basis of previous work. Off-site sources, such as that inferred from the Phase II RI, may also be relevant.

d) Hydrogeologic cross sections (if they do not presently exist), both parallel and perpendicular to primary ground water flow/contaminant transport directions, which connect source areas and discharge areas.

e) True synoptic ground water head contour maps are needed for each hydrostratigraphic unit, for both high and low tide stages.

f) Subsurface utilities and/or other site features which may have the potential to influence ground water or contaminant migration need to be presented and evaluated. For example, do the discharges from the various “outfalls” contain a component of intercepted ground water flow? Do subsurface product transfer lines exist, and do they represent potential source areas?

g) Expanded monitoring point coverage (e.g., monitoring wells, sediment/surface water quality sample locations) may be called for in any areas where deficiencies are identified. Areas of potential deficiency include source areas, intra plume areas, and discharge areas. Frash Pond is a ready example of an area which is insufficiently monitored, particularly given the interpretation of this area as a discharge point for ground water contamination, as presented in the Phase II RI. Additional monitoring points, as presented in the Phase II RI, are needed in the western part of the site in order to better understand ground water flow between on- and off-site areas as well as for on-site areas for which flow gradients are currently poorly defined.

h) Collection of additional ground water quality data from revised monitoring well network in keeping with revised site conceptual model and utilizing low-flow techniques. The current Phase I/II data base does a poor job in distinguishing between sediment/surface water contaminants which may be the result of ground water discharge versus those resulting from outfall discharge containing suspended materials. Low-flow sampling offers a better means of establishing the true measure of dissolved contaminants in ground water.

ATTACHMENT IV

The following comments relate to the ecological data as presented in the Phase I and Phase II Remedial Investigation Reports and the Baseline Ecological Risk Assessment for Stratford Army Engine Plant (SAEP) in Stratford, Connecticut.

General Comments

1. As a result of our review, EPA believes there is sufficient information available to establish that there is unacceptable ecological risk in the sediments adjacent to the site. However, there is insufficient data to determine what contaminants are driving risk, the extent of contamination, and other information necessary to move forward to the Feasibility Study. There are also numerous errors and other items that are cause for concern in the three reports. Again, EPA recommends that after the Army has the opportunity to review our comments that we meet to outline and agree to the study objectives and data gaps before performing additional work at the site.
2. Additional PCB samples should be analyzed for congeners as well as Aroclors. We have a situation here in the Housatonic River where the PCB contamination could be from sources in addition to SAEP. Also, the source of the PCBs at the facility seems uncertain, better identification of the congeners may allow attribution of sediment contamination to a particular area of the site.
3. EPA could not find any inventory or discussion of the origins of the Outfalls 1 - 7 which appear to be major contributors to contamination in the estuary. We need to establish the source of these pipes to fully understand the issues regarding nature and extent at the site.
4. Sediment bathymetry and lithology needs to be defined for the area of concern in the estuary before any further sediment sampling is undertaken. Remote methods such as side-scan sonar would be desirable to map the entire area.
5. Additional sediment sampling is necessary to define nature and extent of contamination throughout the tidal area and marine basin, and should be performed together with additional, more rigorous, biological sampling to fully delineate the ecological risks at the site.
6. Information in all of the reports suggests that the groundwater plume is discharging into the nearshore sediments. Yet no measures of groundwater quality were performed in this exposure area. Discussions should take place with the hydrogeologists to determine the best methods for assessing the plume contribution to the intertidal area. In addition, Frash Pond also may be threatened.
7. The sediment background data set can be enhanced by using suitable data collected by EPA from 1993 to 1995 throughout the Housatonic River area. EPA will provide this data to the Army for their use.

Phase I Remedial Investigation Report

8. When comparisons are made throughout the report to USEPA Ambient Water Quality Criteria (AWQCs), the statement is made that "Even though the concentration of *compound* detected exceeds the criteria it may not impact marine aquatic life based upon the fact that USEPA developed the criteria on an acid soluble concentration basis and the criteria may be overly protective" Statements of this type are inappropriate and should not be included in the document. First, contaminant concentrations should be compared to State Water Quality Standards which have regulatory significance. Secondly, the public comment period for the AWQCs occurred during their publication in the Federal Register, not in individual site reviews. If the AWQCs are exceeded then that should be stated. Later in the limitations or uncertainties section the author can discuss a concern with what they perceive as an overly conservative measure.
9. Page 2-4: The ten soil samples from the causeway were only analyzed for asbestos. The causeway soils and soils adjacent to the shoreline need to be thoroughly characterized, both as potential continuing source areas and from a risk assessment perspective, both human (recreational user) and ecological (wading bird).
10. Page 2-10: At what depth were the surface water samples taken? On what aspect of the tide? Sediment samples should not have been composited over a depth of two feet. It rendered the data meaningless for both human and ecological exposures.
11. Page 4-10: Region I **does not** recognize the use of generic soils background concentration information such as the ranges of concentrations found in the "eastern U.S.". Site specific soil background concentrations should be determined for comparison.
12. Page 4-24: EPA could not locate here, or anywhere else in the report (including the appendices), the percent solids information for sediment. Please provide this information. If percent solid data is not available, the quality of this data is questionable.
13. Page 4-29: Region I **does not** recognize the use of ratio to background (RTB) comparisons for soil or sediment data. Background concentrations may be near a risk benchmark concentration value in some areas. In these circumstances, (for example nickel) the "background" concentration in surface sediments of 21.6 ppm, when the sediment screening benchmark ERL is essentially the same number (20.6 ppm). The less conservative benchmark value, the ERM is 51.6 ppm. The representation of information for only those concentrations with an RTB of 10 or greater would result in highlighting only those samples where nickel concentrations were greater than 216 ppm, which would represent a hazard quotient of 4. This masks a number of areas that may be of concern. Present the data as concentrations, and make comparisons on that basis.

Phase II Remedial Investigation Report

14. Page 2-3: Provide a rationale for only taking sediment samples from the 0 to 6" interval and then the 12 to 24" interval. What about the concentrations in the intervening 6"?

15. Page 3-12: Much care needs to be given to obtaining samples with acceptable percent solids. Region I function guidelines discuss concerns with using any sediment with less than 30 % solids. Much of the sediment data collected in Phase II fails this criteria. The data and analytical methods should be reviewed to determine the usability of this information. Further sampling events need to include sampling techniques to minimize this problem.

16. Page 3-16: The statement is made that "Sampling and analysis of surface water at the SAEP illustrated that there has been no degradation of surface water quality resulting from groundwater discharge." EPA did not find any reference to a sampling effort that would have been able to address this data quality objective. In fact, application of the State Surface Water Protection Criteria identifies numerous groundwater samples in exceedence of the criteria. Admittedly there is uncertainty surrounding the availability of only unfiltered ground water samples for inorganics. We recommend that this statement be removed from the text, as it is not supported by fact, and that a sampling program be designed to directly address the question.

17. Page 3-32: See comment #13 above.

18. Page 3-36: Close examination of the sediment and oyster tissue data suggests that there may be a major transcription error in the data for transect TC. The values for chromium, copper, lead, nickel, mercury, silver and zinc appear to be associated with the wrong constituent. Supporting this is the concentration of 523 ppm of Hg at TC1, a value approximately 250 times greater than other concentrations at other transects. In addition, mercury was not detected in oyster tissue from that area, a situation which is highly improbable. Mercury data from Phase I at nearby OF 3 sampling location found Hg at less than 1 ppm. The data should be thoroughly reviewed, and the text revised accordingly.

19. Page 3-37: Comparison of oyster tissue concentrations to Mussel Watch data is unacceptable. It is unclear what Mussel Watch stations were used. Comparisons should be made to site-specific reference locations of known data quality comparable to the site samples and similar time frames and seasons. The cadmium and nickel concentrations detected in site samples are quite high. Comparable oyster tissue data was collected by EPA in 1993 just north of SAEP along the beds in the Housatonic River at nine stations. The highest reported concentration of cadmium was 1.110 mg/kg wet weight, and for nickel 0.654 ppm. Further evaluation (or resampling) of the oyster tissue is warranted. Any future sampling effort should be coordinated with the EPA.

Baseline Ecological Risk Assessment

20. Page 1-2: The text states that thirteen surface water stations were sampled. The rest of the paragraph only speaks of 12. Please clarify how many stations were sampled.

21. Page 1-6: Figure 6.3-2 does not identify the benthic sampling stations. Include these locations on a map.

22. Page 6-6: Assessment endpoints and measurement endpoints have not been properly defined. This information is necessary and should be included in a response to comments package.

23. Page 6-6: At the bottom of the page under benthic macroinvertebrates, it states that "Invertebrate tissue concentrations will also be an important measurement endpoint." Yet the only invertebrate tissue analyzed was for the eastern oyster, a sessile, epibenthic filter feeder. While oysters are a useful organism in investigations of bioaccumulation of contaminants, particularly from the human health perspective, there are other benthic infaunal organisms with life histories and niches in the food web that would serve as better indicators for an invertebrate tissue concentration measurement endpoint. This endpoint should be reevaluated and resampled, rather than modeled as was done later in the report.

24. Page 6-7: Under Fish, it is stated that because the fish "...must leave the site area at low tides, this area does not represent an important habitat or nursery area, especially when compared to extensive wetlands areas across the river from the site. Hence, no measurement endpoints were identified of the evaluation of fish populations." On page 6-9, it is stated that the atlantic silverside was selected as a receptor due to its importance as a forage species, omnivorous feeding habitats, and can utilize the intertidal mudflats for habitat at all but the lowest tide stages. These statements are inconsistent. The silversides or mummichog must be included as a measurement endpoint for the fish assessment endpoint, and will also serve the avian assessment endpoint.

25. Page 6-8: Measurement endpoints should include the exposure for the piping plover and least tern.

26. Page 6-11: The surface water characterization program of 11 stations sampled only once is inadequate to characterize surface water quality. Additional surface water sampling needs to be done to further define the surface water issues.

27. Page 6-11: Surface water criteria for inorganics are exceeded in the vicinity of the outfall pipes, and chromium and zinc exceeded acute criteria. These outfalls are permitted, the situation needs to be examined in greater detail. AQUIRE may provide benchmark concentrations for contaminants which do not have established AWQCs. State standards must also be evaluated.

28. Page 6-15: Antimony should be retained as a COC due to the exceedence of benchmark values, as it may contribute to total risk even if not site related.
29. Page 6-15: Speciation of chromium should be done on future samples due to the presence of Cr +6 on site and the toxicity associated with it. SEM/AVS analyses should be conducted on future samples as an estimate of the bioavailability of the divalent metals.
30. Page 6-17: The EPA SQCs are not promulgated. These three low molecular weight PAHs should be retained because in a situation of multiple PAHs, they are likely contributing to toxicity.
31. Page 6-83: Define the variables a, b, and c used in the equation for community loss index.
32. Page 6-83: Only one toxicity test species was used, and only an acute endpoint measured, the testing should be redone using two species and chronic endpoint tests. There were a number of other issues with the test that would also suggest conducting it again. The sediment holding times were exceeded. Th laboratory control sample is listed as having 301 organisms? This is 7 to 8 times the organisms exposed in the rest of the samples. Four replicates are the absolute minimum, five are recommended. For marine amphipod tests, 20 organisms per replicate are recommended. The laboratory control did not achieve the 90 % survival acceptance criteria. The ranking analysis is a weak measure of the significance of the test response.
33. Page 6-85: In addition to the RME, exposure using the mean (either arithmetic or geometric as appropriate) should be calculated.
34. Page 6-86: There is no listing for Evans and Engel 1991 in the references. Provide the full citation for this reference.
35. Page 6-86: The text states that the BSF of 2.7 for benthic uptake is most conservative. In fact, this represents the median. Site-specific BSFs should be generated.
36. Page 6-86: It is inappropriate to normalize sediment concentrations and BSFs for inorganics. While it has been demonstrated that organic carbon has a role in bioavailability for inorganics, the relationship has not been quantified in a manner that is widely accepted in the scientific community.
37. Page 6-86: It appears that there is an error in the calculation of 46% of 4.6 mg/kg. Please correct as necessary.
38. Page 6-87: The factor of two should be removed form the calculation of the dietary methyl mercury concentration. The uncertainty is great enough due to differences in species uptake to remain conservative and not introduce the factor of two. Site-specific information will reduce this uncertainty.

39. Page 6-88: A conversion factor of 0.2 is suggested in the first bullet, and a factor of 0.13 is used in the last paragraph. Explain/remove the discrepancy.
40. Page 6-90: The C_w equation is incorrect here, on page 6-58, and tables 6.3-4. It should read $C_w = C_{sed} / K_p$, rather than $C_w = C_{sed} \times K_p$, please correct.
41. Page 6-89: There is a discrepancy in the excretion value (K) of 0.0035/day and the value 0.00035/day proposed on the previous page. In addition, the units are missing. Correct as necessary.
42. Page 6-92: Region I uses the term “reference toxicity value” (RTV). We do not favor the conversion of an LD50 to a LOEL or NOEL, however a LOEL to NOEL conversion can be done with the appropriate application of uncertainty factors.
43. Page 6-93: RTVs need to be reviewed and a broader search conducted to obtain the most appropriate values for the site from the literature. The methodology used for RTV selection should be discussed.
44. Page 6-95: The dry weight concentration of methyl mercury is stated as 11.53 mg/kg, but on page 6-89, it is calculated to be 137 mg/kg. Explain/correct discrepancy.
45. Page 6-104: The text states that risks to the Great Blue Heron would be less than calculated, due to “...its small size and its proximity to more suitable habitat.” This statement does not make sense because in fact the heron was selected as representative of large wading birds, the habitat is highly suitable for heron foraging.
46. Page 6-105: EPA disagrees with the conclusion that the risk to heron from PCBs at the site poses a “small, incremental contribution to regional PCB exposure in the Housatonic River”. Sediment data from the site and other area studies do not support this conclusion. Remove or validate with information.
47. Tables 6.3-2 and 6.3-3: The units are incorrect. Correct as necessary.
48. Table 6.4-5: Assumptions for the receptor species were not reviewed, they should be discussed together with representatives from the trustees.
49. Table 6.4-7: The dry weight of lead in fish is stated as 8 mg/kg. However, on page 6-33 it is stated to be 42 mg/kg. Explain this discrepancy.