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

May 22, 2000

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

Re: Review of the Background Soil Investigation for Old Fire Fighting Training Area, Naval Station Newport, Newport, Rhode Island

Dear Mr. Shafer:

EPA reviewed the Draft Background Soil Investigation for the Old Fire Fighting Training Area (OFFTA/Katy Field) at Naval Station Newport. This report describes the results of an investigation of soils on Coasters Harbor Island, for the purpose of establishing background concentrations of arsenic and other trace metals. At this site, "background" is explicitly defined as the concentrations of constituents of interest (trace metals, in this case) that are naturally occurring, or that are present because of anthropogenic activities that are not site-related. Detailed comments are provided in Attachment A.

Although the report does not expressly describe how the background data will be used, the Navy has indicated that the data will be used to evaluate site data from the OFFTA during the remedial investigation and feasibility study. As you know, the use of background data to eliminate contaminants of concern from a human health risk assessment is currently an unresolved issue between our respective agencies. EPA will be responding formally to the Navy on this issue shortly.

Based on Navy's assessment of available information, including historical records of land use, two areas (C and D; Dewey Field) were chosen as primary sample locations, and two other areas (H and I; grounds surrounding officers' quarters) were selected as secondary locations Location H was subsequently eliminated, owing to the proximity of bedrock, underground utilities, and roadways. In accordance with the approved Draft Work Plan (TtNUS, 2000), 20 sample locations were identified: 17 in Areas C and D, and 3 in Area I. In response to previous comments, the soil types covering Coasters Harbor Island have been identified, and all of the background sample locations are within the Udorthents-Urban Land Complex soil type Based on historical information and the distribution of soils on the island, these sample locations appear to be reasonable and appropriate. The sampling points are located at maximum distance from the OFFTA site, in the same soil type as at OFFTA, in areas that would most likely represent conditions that prevailed at OFFTA before fire-fighting training activities ensued.

The sampling program and analytical results are presented in this report, as well as a summary of the statistical analyses to which the data were subjected, conclusions, and recommendations for use of these background data. All project deliverables, as described in the Draft Final Work Plan, have been fulfilled. Tier III data validation procedures were used.

I look forward to working with you and the Rhode Island Department of Environmental Management toward the cleanup of the OFFTA. Please do not hesitate to contact me at (617) 918-1385 should you have any questions.

Sincerely,

Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

Attachment

cc: Paul Kulpa, RIDEM, Providence, RI
Melissa Griffin, NETC, Newport, RI
Jennifer Stump, Gannet Fleming, Harrisburg, PA
Diane Baxter, Tetra Tech-NUS, Wilmington, MA
Mary Philcox, URI, Portsmouth, RI
David Egan, TAG recipient, East Greenwich, RI

ATTACHMENT A

Page	Comment
p. 6, §§2.2 & 4	The text summarizes the nature of contamination at the OFFTA site, as determined by investigations to date (Phase I, 1990-91; Phase II, 1993-94; and Phase III, 1998). In the description of soil contamination at the OFFTA site, TtNUS notes that samples with the highest overall metal concentrations were collected at or below the water table and were associated with petroleum staining and odors. This observation is not directly related to the Background Soils report because it refers to samples from the OFFTA site, not the background investigation sampling. However, it is important because site-related activities could be responsible for mobilization and subsequent redeposition of contaminants of concern (CoCs). The behavior of arsenic is a good example, as there are precedents (*e.g* , Shepley's Hill, at former Fort Devens, MA). At the Fort Devens site, arsenic appears to occur naturally in the aquifer matrix, which is composed of glacially-deposited sand and gravel. Under oxidizing conditions, arsenic is immobile (usually through sorption onto Fe- and/or Mn-oxides). When the redox environment changes - for example, when installation of a landfill cap promotes reducing conditions, or when reducing conditions arise through microbial degradation of anthropogenically-introduced hydrocarbons - the oxides are reduced, releasing Fe and Mn into solution, and liberating arsenic. However, anomalously high arsenic was detected in only one sample in the background soils investigation for OFFTA; this possible outlier does not necessarily indicate evidence of arsenic transport from the OFFTA site to areas C or D. Additional comments regarding possible explanations for this anomalous datum are discussed below.
p. 10, §§3.3 & 1	It is apparent from the description of field activities in Section 3.0 that the background soil sampling was conducted in accordance with the Work Plan. Sampling areas were selected after discussion with EPA and RIDEM, and the target soil depths of 0 to 2 ft and 4 ft to 6 ft were stated in the Draft Work Plan to meet the objective of obtaining both surficial and shallow subsurface samples. In some places it was not possible to produce a subsurface sample from the 4-6 ft depth, because refusal was met before that interval, and at three locations, no subsurface sample was taken because either refusal or the water table was encountered at depths less than 4 ft. It appears from Table 3-2 that all but one of the subsurface samples is composed of till. What is the bedrock type underlying this area? Because till is a poorly-sorted glacial deposit that may be derived quite locally from the underlying bedrock, it is possible that some of the

chemical anomalies that were observed in the data are, in fact, related to the bedrock composition. If possible, please identify the bedrock in this area, with particular attention to proximity to faults that may be mineralized by hydrothermal solutions that could have contained arsenic, or the presence of sulfide minerals in the bedrock matrix.

p. 15, §§4.0 & 8

In the third bullet under Step 1, the text states that significant differences (based on statistical test results) were found between surface soil and subsurface soil, and that the two data sets could therefore not be combined into one. This question was explicitly posed in the Work Plan, where TtNUS had discussed the possibility of merging the two data sets for increased statistical power in comparing background data to site data.

In addition to the statistically significant differences, the text also states that the 'overall mineral composition' of surface and subsurface soils was different. This difference should be discussed, if possible, especially in light of possible implications for observed chemical anomalies (*e.g.*, arsenic). Were the mineralogical compositions of these samples determined? If so, how (*e g.*, by x-ray diffraction, optically, or by visual inspection)?

p. 16, §§4.0 & 12

In the fourth bullet under Step 2, it is concluded from the Step 2 results that significant differences were found between the Areas C and D data sets and the Area I data set for surface soil. If the Area I data are statistically different from the Area C/D data set, then would it be possible that Area C/D soil is *not* the same soil type as OFFTA/Katy Field before fire-fighting training activities ensued? Could this be attributed to the small sample size of Area I sampling?

p. 16, §§4.0 & 15

In the second bullet under Step 3, Appendix B, Tables 12 (surface soil) and 13 (subsurface soil), present the calculated 95% UTL values for use as background values for the OFFTA site. In each of these tables, 95% UTL values could not be derived for four elements (antimony, cadmium, potassium, and zinc in Table 12; antimony, beryllium, potassium, and zinc in Table 13). The text states that, as an approximation, the maximum detected values *could* be used in place of the UTLs for these elements, but that these values may be 'less conservative' and may have 'less confidence' than the UTL. This discussion should be expanded, and the recommended values for these elements should be clarified; with what level of confidence could the maximum detected concentrations be used as background values?

p. 16, §§4.0 & 16 — In the third bullet under Step 3, this paragraph discusses the anomalous arsenic value (84.9 mg/kg) that was detected in a field duplicate pair of subsurface soil samples. Because statistical testing could not confirm that this point was an outlier, the original UTL (42.8 mg/kg) was retained as the background subsurface value for arsenic. As the calculation of this UTL includes the 84.9 mg/kg value, could the UTL be biased high? What would be the value if the 84.9 mg/kg point was removed? How conservative is the UTL of 42.8 mg/kg as a background value?

p. 17, §§4.0 & 18 — In the fifth bullet under Step 3, the text states that antimony in surface soils and beryllium in subsurface soils did not fit a normal or lognormal distribution; therefore, UTLs were not calculated for these elements. Similarly, UTLs could not be calculated for cadmium in surface soil and antimony in subsurface soil. How conservative is the choice of maximum detected values for the background concentrations of these elements?

p. 19, §§5.2 & 3 — In this paragraph and in Table 5-1, it is noted that the calculated arsenic surface soil background value (5.5 mg/kg) as well as the subsurface soil background value (42.8 mg/kg) both exceed the RIDEM soil criteria for arsenic (1.7 mg/kg). It is known that most of the Coasters Harbor Island surface soils are either disturbed or composed of fill material (*e.g* , p. 7, §3.1). The provenance and composition of the surface soil should be discussed, including the possibility that the surface soil may be derived from the same rock type as the underlying till. This discussion should also include possible explanations for the elevated arsenic observed in the surface soil samples.

p. 20, §5.2 — In Table 5-1, recommended background values reported in this table for beryllium indicate a surface soil concentration of 0.439 mg/kg (the calculated UTL) and a subsurface soil concentration of 1.1 mg/kg (maximum detected; UTL could not be calculated). Both of these values exceed the RIDEM criterion of 0.4 mg/kg. What might explain these elevated beryllium levels in both surface and subsurface soils from Areas C and D?

p. 21, §§5.2 & 5 — The report concludes that bedrock underlying Coasters Harbor Island is the likely source of the higher arsenic background value in subsurface soil versus surface soil. The prevalence of bedrock lithologic units throughout New England that are known to be high in arsenic-bearing minerals support this theory (*see* Ayotte, J.D., Nielsen, M.G., Robinson Jr , G R., and Moore, R. B., 1999, Relation of arsenic, iron, and manganese in ground water to aquifer type, bedrock lithogeochemistry, and land use in the New England Coastal Basins; USGS Water-Resources Investigations

Report 99-4162). Figure 11 of this USGS report shows the distribution of bedrock units that are known to be associated with anomalous arsenic concentrations in ground water in Maine, New Hampshire, Massachusetts, and Rhode Island. One unit in particular, a clastic metasedimentary rock type containing carbonate and sulfide minerals, is associated with significantly higher arsenic concentrations in ground water than the other five bedrock types in the study area. While this map does not give information on rock types underlying Newport Naval Base, it clearly indicates the presence of this metasedimentary unit on the eastern shore of the Sakonnet River, directly east of Aquidneck and Coasters Harbor Islands. The possibility that this rock type also extends beneath Coasters Harbor Island should be addressed. The discussion of bedrock beneath the soils sampled in Areas C and D should focus on mineralogy and provenance of the material (till) comprising the subsurface background samples.