



DEPARTMENT OF THE NAVY

ENGINEERING FIELD ACTIVITY, NORTHEAST
NAVAL FACILITIES ENGINEERING COMMAND
10 INDUSTRIAL HIGHWAY
MAIL STOP, #82
LESTER, PA 19113-2090

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NAVSTA NEWPORT RI
5090 3a

IN REPLY REFER TO

5090
Code EV23/CF
May 9, 2006

Ms. Kimberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section
USEPA Region 1
1 Congress Street, Suite 1100
Boston MA, 02114-2023

Mr. Paul Kulpa, Project Manager
Office of Waste Management
Rhode Island Department Of Environmental Management
235 Promenade St.
Providence Rhode Island, 02908-5767

Dear Ms. Keckler/ Mr. Kulpa:

SUBJECT: DRAFT WORK PLAN FOR BASEWIDE BACKGROUND STUDY, NAVAL
STATION NEWPORT, NEWPORT, RHODE ISLAND

The Navy's responses to EPA and RIDEM comments on the subject document are provided as enclosures (1) and (2). Based on these comments and responses, the work plan will be finalized and the fieldwork will be scheduled.

From the review of data reports for sites/study areas including 09 (OFFTA), 08 (NUSC Disposal Area), 19 (Derektor Shipyard), as well as others, there are elevated concentrations of arsenic in soil in areas of the sites that were not impacted by fill or releases, and areas upgradient of these sites contain concentrations of arsenic that are not only above the RIDEM levels of 7 mg/kg, but are even well above the RIDEM ceiling level of 15 mg/kg. It is because of this repeated finding at NAVSTA Newport that the Navy has decided to conduct a basewide background soil investigation. The undertaking of the study is not lightly made, however it is vital that the Navy better understand the chemistry of the soils as progress of the Installation Restoration Program (IRP) has been impeded by this issue multiple times.

In August 2003, we provided our comments on the State of Rhode Island's proposed changes to the arsenic standards, stating

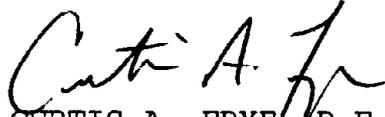
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our concerns that proposed changes did not account for unique geological conditions in the state which contain arsenic at elevated concentrations. However, the state regulations were implemented as proposed and accordingly do not allow for such a natural occurrence. Given that CERCLA 104(3)(A) prohibits removal or remedial actions for "...naturally occurring substances in its unaltered form...", the Navy must proceed with determining background concentrations and incorporate this information into response actions.

With this study, we will add to the data set of background arsenic values. Our goal is to reach consensus with both the EPA and RIDEM on background levels at Naval Station Newport and, thereby remove a significant obstacle for making progress under the IRP.

If you have any questions, please do not hesitate to contact me at (610) 595-0567 extension 142.

Sincerely,



CURTIS A. FRYE, P.E.
Remedial Project Manager
By direction of the
Commanding Officer

Enclosures:

1. Responses to USEPA Comments, Draft Work Plan Basewide Background Study, Naval Station Newport, Newport, RI, (Comments dated February 9, 2006)
2. Responses to RIDEM Comments, Draft Work Plan Basewide Background Study, Naval Station Newport, Newport, RI, (Comments dated February 24, 2006)

Copy to:

C. Mueller, NSN
M. DeStefano, RIDEM
S. Parker, TtNUS
J. Stump, Gannett Fleming

**RESPONSE TO COMMENTS FROM THE USEPA
DRAFT WORK PLAN BASEWIDE BACKGROUND STUDY
NAVAL STATION NEWPORT
Comments dated February 9, 2006**

<u>PAGE</u>	<u>COMMENTS AND RESPONSES</u>
General Comment	<p><u>Comment 1</u></p> <p><i>Surface and subsurface soils will be sampled. The current draft indicates that samples will be collected from both surface (0- 1 ft) and subsurface soils (4-6 ft) for each soil type. In a previous comment from EPA, Navy acknowledged the need to collect subsurface samples in order to establish a background data set for soils at depth, as this information is relevant to some of the NAVSTA Newport sites. Per EPA Region 1's policy, subsurface soil should be changed to 1 to 10 feet for each soil type.</i></p> <p><u>Response 1</u></p> <p>Concur. However, it will also be clarified that the samples will be collected from a two foot interval within the 1 -10' depth range.</p>
General Comment	<p><u>Comment 2</u></p> <p><i>Bedrock will be sampled at two locations. To supplement metals data from the surficial and subsurface soils, bedrock cores will be obtained from the two lithologies underlying NAVSTA Newport. Although bedrock mineralogy may or may not be accurately reflected in the trace-metal composition of the overburden due to physical transport processes, geochemical segregation during soil formation, etc., GF endorses this effort to acquire additional information that may support interpretations and conclusions based on the soil background data set.</i></p> <p><u>Response 2</u></p> <p>The comment is noted, and the work plan is in compliance with this observation.</p> <p><u>Comment 3</u></p> <p><i>PAHs are not addressed in this draft Basewide Background Study. In the earlier version of this document, ambient levels of PAHs were to be determined as part of the background investigation. It is apparent from the subject document that soil background data will be collected for TAL metals only. GF concurs with the change.</i></p> <p><u>Response 3</u></p> <p>Comment noted.</p>

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COMMENTS AND RESPONSES

General Comment

Comm nt 4

Section 5 (Data Analysis and Statistical Testing) has been revised. The text now provides a substantially more detailed and more comprehensive discussion of the steps to be taken for data evaluation and interpretation. The tabulation of different statistical tests (Tables 5-1 through 5-4), in which assumptions, advantages, and disadvantages of each test are summarized, is particularly helpful for the non-specialist. It is encouraging to see that Navy intends to incorporate some understanding of naturally occurring geochemical processes (i.e., ratios of trace metals to a reference element such as iron or aluminum) in the interpretation of the background data and in future site-to-background comparisons.

Response 4

Comment noted.

p. 1-1,§1.1

Comment 5

The first sentence of the first paragraph refers to background levels near IR sites that were determined through "[P]revious investigations." Please add the appropriate citations for these investigations.

Response 5

Citations will be added for previously published background soil investigations.

p. 2-3, §2.2.2

Comment 6

The primary soil types comprising the background data set are listed here by their abbreviations, e.g. "...Ma, Mm, Ne..." etc. However, the names and descriptions of these soil types do not appear until the following page; please consider editing the text to explain these abbreviations where they first appear in this section.

Response 6

The text will be edited as requested.

p. 2-7, §2.2.3

Comment 7

In the discussion of the udorthents-urban land complex (UD) soil characteristics, it is noted that 38 samples of this soil type were collected during the OFFTA Background Soil Investigation (Tetra Tech NUS, 2000). Furthermore, some of these samples reported "...anomalous concentrations of one or more metals." As indicated in the text, these outliers may lie within the range of concentrations for this soil type when the Basewide database is assembled. Please indicate either here, or on §2.2.5, p. 2-10, 2, whether or not background soil data from the OFFTA study will be incorporated into the Basewide data set and what criteria (statistical or otherwise) will be the basis for this decision.

Response 7

Data from the OFFTA study had not been planned to be included based on the work plan sampling data elements listed.

p. 2-11, Table 2-1

Comment 8

The tabulated summary of soil samples indicates that 44 surface samples are available; addition of the numbers in the table suggests that the total is 42. Please correct this discrepancy.

Response 8

Sample numbers will be checked and revised as necessary.

Section 3.2

Comment 9

It is EPA Region 1's policy to consider residential/commercial exposures to surface soil from 0 to 1 foot deep and subsurface soil at 1 to 10 feet deep. The surface soil depth was established based on the assumption that residents are likely to contact this soil through daily activities like gardening or children playing in the soil. Subsurface soil is defined based on the general depth of frost penetration in New England soils. Subsurface soils would likely be excavated during construction where mixing of soil can occur. As a result, this soil can be brought to the surface for contact under future land use scenario. Subsurface soil samples can be collected at 2 foot intervals as mentioned in this section. Please see Region 1's Risk Update #3 (August 1995) for more details on soil depths.

Response 9

The Navy concurs, and appropriate changes will be made as stated in the response to comment 1.

p. 3-8, §3.3,
& Table 4-1

Comment 10

This section does not clarify the depths of proposed surface and subsurface soil samples. This needs to be mentioned in the work plan.

The text in §3.3 (first sentence of the last paragraph in this section) states that "[B]edrock samples will be analyzed for TAL metals only." In Table 4-1, the analytical method for TAL metals in bedrock samples is given as TBD (To Be Determined). When will the analytical method be selected? How will comparability to the soil analytical method be determined? Analysis of underlying bedrock may provide important insight into differences in chemical compositions of the various soil types. However, it should be noted that the analytical method(s) to be used for the bedrock samples may or may not effectively extract all of the constituents of interest, unless a total digestion procedure is used.

Response 10

Sample depths will be clarified in the work plan. It is agreed that a total metals digestion must be specified for the TAL analysis of bedrock samples prior to beginning the field investigation work. SW-846, Method 3052, or equivalent, will be employed for total metals digestion of geologic materials.

p. 5-8, §5.3, ¶¶2 to 6

Comment 11

This section on data analysis and statistical testing begins with the statement that the data obtained in this investigation will be analyzed according to Navy and EPA guidance (NFEC, 2002; USEPA, 2000a; USEPA, 2000b). In addition, it is apparent that Navy intends to incorporate some knowledge of reasonably well understood, naturally occurring geochemical processes (e.g., adsorption by hydrous ferric oxide surfaces) in determining background conditions. In particular, Navy indicates that element ratios - the ratio of the concentration of a trace metal of interest, such as arsenic, to the concentration of a reference element such as iron or aluminum - can be used in comparisons of background and site data. Element ratios that are characteristic of background are relatively constant, while outliers (e.g., a sample enriched in arsenic relative to iron) signal possible contamination. Consideration of the geochemical processes (for example, adsorption of arsenic by hydrous ferric oxide) allows for the possibility that a soil sample containing elevated arsenic may also contain a high concentration of iron, yet both may be naturally occurring and not due to anthropogenic input. If As and Fe are present in the same ratio in the site soil as in the background data, the site soils may be drawn from the same population as the background soils, even though individual samples may exceed regulatory criteria for arsenic.

Response 11

Comment noted.

**RESPONSE TO COMMENTS FROM RIDEM
DRAFT WORK PLAN BASEWIDE BACKGROUND STUDY
NAVAL STATION NEWPORT
Comments dated February 24, 2006**

<u>PAGE</u>	<u>COMMENTS AND RESPONSES</u>
Section 1.0 Introduction; Page 1.	<p><u>Comment 1</u></p> <p><i>Background studies are site specific. While it is possible to perform a background study at several sites at once the results from these studies cannot be transferred to other sites, unless it is adjacent to a site where a background study has been performed and the soil types at both sites are identical. Therefore, it is misleading to label this investigation as a Base Wide Background Study. A Background Study for Existing Sites on the Base or similar terminology should be used. Finally, at certain sites there may not be a need to perform a background study due to the nature and extent of contamination and the expected remedial action. As an illustration, if a site is to be capped, the installation of the cap will probably address any issues pertaining to background concentrations of metals. Therefore, it is recommended that the Navy evaluate probable remedial alternatives at the site prior to performing that site-specific background study. This will avoid the time and expense of performing the study and will allow funds to be directed towards other remedial investigations and/or actions.</i></p> <p><u>Response 1</u></p> <p>The work plan was designed in accordance with Navy guidance for background environmental analyses. It is the Navy's position that the statistical similarity of analyte concentrations from one background location should be representative of other locations with the same soil type(s), all other factors being equal with respect to contaminant source or fate and transport. The final report is anticipated to discuss whether the metals in the different soil types are the result of natural processes or anthropogenic activities. The report will state that separate data sets will be created for each soil type that may be used in future site-specific studies at the base in order to ascertain whether site-related samples exhibit concentrations greater than background samples of the same soil type, and hence indicate evidence of a release as opposed to being naturally occurring.</p>
Section 1.0 Introduction; Page 1.	<p><u>Comment 2</u></p> <p><i>A background study is proposed for all metals at the site. Issues concerning background concentrations are primarily limited to certain metals. This brings into question the need to perform a background analysis and extensive statistical testing on all metals. It is recommended that the background statistical analysis be limited to site-specific metals of concern.</i></p> <p><u>Response 2</u></p> <p>The Basewide Background Study will be addressing all TAL metals basewide but will be useful to focus any future comparative evaluation of site-specific metals contamination for each area on the base. This is a prudent approach because if additional metals are identified during future sampling, baseline</p>

background comparisons will be available.

Section 1.1 Specific
Investigation Objectives;
Page 1-2, Paragraph 4-5.

Comment 3

The work plan notes that the primary driver for this investigation is the elevated levels of arsenic on the Navy base. This section of the work plan includes a discussion and interpretation of the Site Remediation Regulations as it pertains to background. This discussion appears to ignore Section 12 of the Site Remediation Regulations, which was specifically created when the regulations were modified in 2004 to address issues related to background concentrations of arsenic. If it is the Navy's intent to present an unbiased summary of the regulations then a discussion of Section 12 must be included in the work plan. Please be advised and take into account that the modified arsenic standard and the procedures delineated in Section 12 were designed to eliminate the need to perform background studies and address elevated levels of arsenic.

Response 3

Results from investigation work in each study area/location will take into account Section 12 requirements under the State Remediation Regulations. In addition, results from the Basewide background study will be compared to the modified arsenic standard and cleanup decisions made accordingly, and in accordance with the FFA.

Section 1.1 Specific
Investigation Objectives;
Page 1-2, Paragraph 7

Comment 4

This section of the work plan summarizes RIDEM regulations as it pertains to anthropogenic contributions to background. Please be advised that releases at a contaminated site are not limited to release generated by the current property owner. Further, it is inconsistent with the regulations to label releases associated with previous activities on the site as background. As an illustration, if one obtains property where the previous owner disposed of lead contaminated sand blast debris, the new property owner, who may never have used sand blast grit, cannot characterize the observed concentrations of lead as a results of human activities unrelated to releases at the contaminated site. This distinction should be noted in the work plan.

Response 4

As noted in the work plan, RIDEM regulations define background as including "ambient concentrations of hazardous substances consistently present in the environment in the vicinity of the contaminated site, which are the result of human activities unrelated to releases at the contaminated site". The appropriateness of each station will be evaluated in this regard. As stated throughout the work plan, each location to be sampled will be evaluated for soil/bedrock type and characteristic, land use of areas evaluated/represented, and the actual chemicals detected. During the investigation work at each site/location, one element will be to evaluate the history of the area as it is known, including current and past land use. The history of each location that will be sampled as a background location will be evaluated and that description will be included in the report.

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Section 1.2 Project
Deliverables;
Page 1-3.

Comment 5

Please add the following to the list of deliverables:

1. *Map depicting the concentrations of arsenic and lead found at the background locations (surface and subsurface).*
2. *Map with pertinent geological data.*
3. *Summary table for lead and arsenic*
4. *Summary table of analytical data for all metals that a background study is being performed on*
5. *Map and summary table as describe above for any other analyte, which the Navy intends to request a background exemption.*
6. *Table describing the depth and geologic characteristic of each sample.*
7. *Summary tables of statistical test employed including sample results and statistical critical values and limitations of a particular test (as an illustration if a test for normality is conducted the table should include the test result for the sample data, as well as, the critical or cut off value from the test which will determine whether the sample is normal and any limitation of the test, i.e. test is only suitable for small samples, etc).*

Response 5

The above items, or applicable portions of them, will be included in the Basewide Background Report as appropriate. Until the data is collected and evaluated, the "deliverable" list is not fully identified. Once data is known and its usefulness verified, then the appropriate deliverables can be identified.

Section 2.2.3 Soil Types;
Page 2-7, Paragraph 3.

Comment 6

The work plan notes that the UD soils are highly variable in composition. To address this problem the work plan proposes using information from adjacent soil types to determine background for UD soils. Please be advised that background samples are supposed to be collected as close as possible to the site samples and be of the same soil type. If offsite UD soils abut an UD onsite area the Navy must provide justification for not using the offsite UD soil on a case-by-case basis (such as, offsite UD soils have been contaminated). If a suitable offsite UD soil cannot be found alternative soil types may be proposed, if it can be demonstrated that the alternative soil type is similar to soils found on the site. It cannot be assumed that since a soil abuts an UD area the UD area was composed of that type of soil. This can be verified as incorrect by review of soil survey maps in the state (a variety of soil types abut each other). Therefore, the work plan must be modified as follows: If a suitable offsite UD soil formation is not available, on a case by case basis, a qualified soil scientist will evaluate the onsite UD soils at a variety of locations and determine which one, if any of, the abutting soil types are suitable as potential background soil sample locations (that is assuming that these areas were not rejected by other criteria, such as known contaminated land, etc).

Response 6

Characterization of background metals concentrations in UD areas is problematic. Over 70% of the base is classified as UD (soils disturbed by cutting to a depth of two feet or more), with 20% of that covered by buildings or pavement and approximately 10% appearing to be undisturbed. This means that the UD areas are highly variable (as the Soil Survey of Rhode Island acknowledges). Based on all of this, it will be difficult to find soils that could be considered background and then difficult to collect a sufficient number of samples to characterize the variability of the UD soil type. The alternate approach presented in the work plan was to identify the soil types bordering the UD areas assuming they are a combination of UD and the adjacent soil type (or nearby well drained soil types such as Mm, Ne, and Pm) and use those samples to represent the UD metals. This approach seems reasonable to both the Navy and the EPA and the most representative combination of nearby soil types will be examined and reviewed as part of performing individual site evaluations.

Section 2.2.3 Rock Type
Page 2-8, Paragraph 2.

Comment 7

This section of the work plan states that the soil at the base was formed from the bedrock found beneath the base. The overburden in New England was created as a result of the action of the glacial deposition. Therefore, it is unlikely that the bedrock at a particular location is responsible for the layers of material deposited on top of it at that location. As such it is inappropriate to state that the bedrock geology and chemistry is relevant to the overburden geology and chemistry at a particular location, except for the soils immediately above the bedrock.

Response 7

The bedrock geology and chemistry are relevant to the overburden *chemistry*, because groundwater flows through both the bedrock and the overburden. In addition, the bedrock geology and chemistry are relevant to the overburden *geology* because the bedrock beneath the base is the Rhode Island formation and the Purgatory Conglomerate, and the glacial deposits above the bedrock consist predominantly of material from the Rhode Island formation and the Purgatory Conglomerate. (According to the USGS, most of the glacial debris in New England was transported no more than a few kilometers from its bedrock source (Koteff and Pessl, 1981*), and the *Bedrock Geologic Map of Rhode Island* (Hermes et al., 1994) shows that the Rhode Island formation and the Purgatory Conglomerate are the only rock units north and west of the base for many kilometers. Additional support for the conclusion that the overburden at the base consists predominantly of material from the Rhode Island formation and the Purgatory Conglomerate includes field observations of the coarse fragments in the overburden.)

*Koteff, C., and F. Pessl, Jr. 1981. Systematic ice retreat in New England. USGS Professional Paper 1179.

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Section 2.2.3 Property Use;
Page 2-8, Paragraph 3.

Comment 8

This section of the report deals with property use as it relates to the presence of metals. The report states that pesticides may have been used on what is now Navy property when it was agricultural land. Further, this prior agricultural related use is responsible for the observed concentrations of metals in the soil. The work plan has not noted that a wide variety of pesticides were used by the Navy, including lead and calcium arsenate. Further, arsenic is a common wood preservative and it may be found in areas where preserved wood was made, used or stored. Therefore, it is inappropriate to imply that the anthropogenic source of arsenic is a result of agricultural application of pesticides or fertilizers. The work plan and any subsequent report must remove any statements implying that the only source of arsenic was prior agricultural use. In addition it must include a section on the use of pesticides and fertilizers by the Navy and note the wood preservation is also a source of arsenic.

Response 8

As stated in the prior responses, background sample locations will be evaluated for both current and prior land use. Upon the analysis of the sample data, the appropriateness of any historical use of the area/location will be evaluated, not limited to application of arsenical pesticides/fertilizers. The arsenic discussion may or may not prove germane to the background analysis.

Section 2.2.3 Property Use;
Page 2-8, Paragraph 4.

Comment 9

This section of the report implies that agricultural application of pesticides will meet the definition of background. Please be advised that agricultural use of a pesticide is not considered background under State regulations. Further, purchasing a property, which is known to, contained elevated levels of arsenic or other pesticides, from agricultural use, or any other use, does not preclude or mitigate the need to remediate the site. Therefore, the statements that agricultural use of pesticides can be considered background must be removed from this and any other section of the work plan.

Response 9

RIDEM's 2004 Remediation Regulations define background as: "the ambient concentrations of Hazardous Substances present in the environment that have not been influenced by human activities, or the ambient concentrations of **Hazardous Substances consistently present in the environment in the vicinity of the Contaminated-Site which are the result of human activities unrelated to Releases at the Contaminated-Site.**" This would appear to include the possibility of pesticides as background under conditions where their presence is the result of agricultural use and not related to site activities. The Remediation Regulations also state that background conditions may be considered in establishing remedial objectives.

EPA regulations regarding background at CERCLA sites are contained in the 2002 Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites. The guidance defines background as: "Substances or locations that are not influenced by the releases from a site and are usually described as naturally occurring or anthropogenic: (1) Naturally occurring

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substances present in the environment in forms that have not been influenced by human activity. (2) Anthropogenic substances are natural and **human-made substances present in the environment as a result of human activities (not specifically related to the CERCLA site in question).**" This would include the possibility of pesticides as background under conditions where their presence is not related to site activities. Appendix B of this guidance provides hypothetical cases, one of which identifies DDT as present at levels consistent with the conclusion that it is an area-wide background condition. The appendix states that COPCs present at concentrations consistent with background should be retained in the quantitative risk assessment and their contribution to site-risk discussed in the risk characterization and that during the risk management phase, clean-up goals should not be set at concentrations below natural or anthropogenic background concentrations. Moreover, the normal application of pesticides or fertilizers is not a "release" under CERCLA.

According to the Navy guidance for background environmental analyses, sources of anthropogenic background chemicals include agricultural runoff and agricultural and residential application of pesticides. As stated in the prior responses, background sample locations will be evaluated for both current and prior land use. Upon the analysis of the sample data, the appropriateness of the historical use of the area/location will be evaluated. The arsenic discussion may or may not prove germane to the background analysis. The purpose of the background report is to enable the evaluation of site releases by comparison to background, and to further elaborate on the potential contaminant sources within background locations.

Section 2.2.4, Definition of Study Boundaries; Selection of Sample Areas, Page 2-9.

Comment 10

This section of the work plan includes a discussion of the site and the different areas where background samples may be collected. The work plan states those areas that have not undergone major change since 1942 will be used. Please be advised that lack of a major change since 1942 is not a criteria by which a background station can be collected. As an illustration a parcel of land could be subject to pesticide use since 1942, and yet has not undergone a major change via aerial photography. Further, the area is question may have been subject to agricultural use prior to 1942. Therefore this statement must be removed from the report.

Response 10

The 1942 date is the date that the Navy extended operations into much of the area to be evaluated. Prior use of the land is agricultural as noted on historical air photos. Certainly past land uses will be evaluated for the data from each soil type.

Section 2.2.4, Definition of Study Boundaries; Selection of Sample Areas, Page 2-9.

Comment 11

This section of the report states background samples will be collected from six locations representing the six different soil types. As has been stated in previous comments background samples must be collected as close as possible to the site being studied. Further, it is inappropriate to state that the soil chemistry found at one location for a certain soil type represents the soil chemistry for that soil type over the entire base. Therefore, this proposed method must be removed from the report and the background samples must be

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taken as close as possible to the individual sites.

Response 11

See response to Comment 1. If other measurable factors can be identified by RIDEM that control soil chemistry in background locations which would allow subclassification of samples collected for the background study, then Navy would be willing to investigate relevant factors and consider including such in the basewide background study sampling plan. Towards this end, if RIDEM has specific suggestions regarding how to classify locations according to soil chemistry for the background study, then now would be an appropriate time to make a specific recommendation. In the absence of any recommendations as stated in Comment 1, the final report will discuss whether the metals in the different soil types are natural or anthropogenic.

Section 2.2.4, Definition of Study Boundaries; Selection of Sample Areas, Page 2-9.

Comment 12

This section of the report states that based upon a review of aerial photograph, maps, historical information the locations depicted in Figure 2-3 were selected as background sampling locations. As has been stated in previous reviews of background work plans, the historical evidence, maps, aerial photographs, etc. which was used to determine background sampling locations must be included as an appendix for regulatory review.

Response 12

All necessary information will be included in the report as appropriate. However, all information is available for review by regulatory personnel.

Section 2.2.4, Definition of Study Boundaries; Selection of Sample Areas, Page 2-9.

Comment 13

The work plan proposes collecting two bedrock samples from the southern end of Coasters Harbor Island. As previously stated the overburden at that site was a results of glacial deposition. This would negate the need to collect bedrock samples as has been explained in earlier comments.

Response 13

Please refer to the response to Comment 7, above.

Section 2.2.5, Decision Rule; Page 2-10

Comment 14

"Are the distribution normal or log normal."

The work plan notes that one of the decision rules is to determine whether the distributions are normal or log normal. As written it appears that this is the first step in the process. In order to avoid confusion in the implementation of the work plan, please include a statement indicating that the first step will be to determine normality.

Response 14

Section 2.2.5 was not written as a step-by-step discussion of the application of statistical methods. Section 5.1 outlines the proposed sequence of statistical

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analyses and discusses the distributions.

Section 2.2.5, Decision Rule;
Page 2-10

Comment 15

The work plan states that the next step in the statistical approach is to compare the means of the two populations and the right tails (high values). The next step in any statistical evaluation is to determine whether outliers are present and if so whether they should be removed from the evaluation. Once that is done a series of comparison can be made between the two populations to ascertain whether they are the same or different. Finally, one is interested in both the low and high values as it provided information concerning the comparability of the two populations. Please modify the work plan to include these requirements.

Response 15

Section 2.2.5 was not written as a step-by-step discussion of the application of statistical methods, and it does not state that the next step is to compare means. Section 5.1 outlines the proposed sequence of statistical analyses. The quantile test compares high end values, while low end values are evaluated as part of general comparisons of rank or mean, which is in accordance with regulatory guidance.

Section 2.2.5, Decision Rule;
Page 2-10

Comment 16

The work plan proposes merging subsets of data unless statistics demonstrates that there are significant differences. A more conservative approach, which is used by some states in background analysis, is to assume that the two populations are different, unless they are shown to be statistically the same. Performing the test using both approaches will assure that the populations are the same.

Response 16

It is a well established and accepted methodology to establish and test the statistical hypothesis in accordance with guidance (EPA, 2002) by means of "background test, form 1", which involves a hypothesis that two background areas are similar and the null hypothesis is rejected when significant differences are observed – in this case, the first background area being greater than the second, or vice versa. The alternative approach, similar to what the commentor mentions, is referred to in guidance (EPA, 2002) as "background test, form 2", in which the hypothesis is that the first area is greater than the second by a pre-determined amount, "S", and also a second hypothesis that the second area is greater than the first by a pre-determined amount, "S". Because of the arbitrary nature of establishing the "correct" or "best" value for the quantity "S", the second method is not widely practiced and is not being proposed for use in the basewide background study. However, from a practical standpoint, the outcome will be similar with either approach because with several metals being measured simultaneously in each soil type, there is a high likelihood of concluding that there is some type of elemental significant difference between two soil types. In conclusion, the datasets will not be merged if there are significant differences. The work plan will remain as written with the goal to have statistically valid background data for comparison to other field data.

<u>PAGE</u>	<u>COMMENTS AND RESPONSES</u>
<p>Section 2.2.5, Decision Rule; Page 2-10</p>	<p><u>Comment 17</u></p> <p><i>"Data sets from two different soil types may also be merged if 1 there are no significant differences between the data sets or 2 the information is being used to establish background concentrations for UD or UB area."</i></p> <p><i>As indicated in the previous comments, this approach is inappropriate and therefore this statement must be removed from the report.</i></p> <p><u>Response 17</u></p> <p>Please refer to the response to Comment 16, above. Note that the proposed approach for handling UD soil has been considered by the USEPA and the Navy, and is the considered the best practical solution due to the inability to ascertain the exact source and geographical origins of fill material.</p>
<p>Section 3.2, Soil Sampling; Page 3-5,.</p>	<p><u>Comment 18</u></p> <p><i>The work plan proposes collecting 198 samples. The following IR sites do not have background studies, Gould Island, Tank Farm 4 & 5, and Coddington Cove Rubble. At forty samples per site the total number of samples is 200. Please modify the report accordingly.</i></p> <p><u>Response 18</u></p> <p>Twenty surface soil samples and 20 subsurface soil samples are needed for each of the 6 soil types for a total of 240 samples. Since background data are already available for 42 surface soil samples (see p 2-10 of the work plan), a total of 198 samples (78 surface soil samples and 120 subsurface soil samples) need to be collected for the base-wide investigation. Sample numbers in the draft work plan will be rechecked and revised, if necessary.</p>
<p>Section 3.2, Soil Sampling; Page 3-5,.</p>	<p><u>Comment 19</u></p> <p><i>The work plan appears to contain a typographical error in that it states that 78 surface and 120 subsurface samples will be collected. The Navy has proposed collecting 20 surface and 20 subsurface samples at each site. Therefore the total number of samples should be 100 surface and 100 subsurface samples. Please modify the work plan.</i></p> <p><u>Response 19</u></p> <p>See response to Comment 18.</p>
<p>Section 3.0, Field Sampling Plan; Page 3-1, Whole Section.</p>	<p><u>Comment 20</u></p> <p><i>The work plan should include a section on regulatory notification. The work plan should specify that the regulatory agencies will receive a schedule for field activities and will be notified one week prior to the start of the sampling effort. In addition, when possible, a twenty-four hour notification should be given for any cancellation of field activities.</i></p>

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Response 20

Although not called out in the draft work plan, the regulatory agencies will be notified prior to the initiation of fieldwork. This notification will be at least one week prior to commencement of the event. This information will be provided in Section 1 of the revised work plan.

Section 5.0, Data Analysis and Statistical Testing;
Page 5-1, Whole Section.

Comment 21

The work plan notes that Navy guidance will be followed. Please be advised that the Rhode Island Department of Environmental Management, Office of Waste Management has not adopted the Naval Guidance with respect to how background studies are performed. The particular statistical test, which are used, and the data evaluation, which follows depends on the nature of the data set. Therefore, this section of the work plan must state that the particular test, which is employed, is dependent upon the data set and regulatory acceptance.

Response 21

Efforts will be made for regulatory acceptance of the background data. To help ensure appropriate decision-making, the work plan includes references to available guidance to help determine whether particular tests are valid and appropriate under various conditions.

Section 5.0, Data Analysis and Statistical Testing;
Page 5-1, 2 Paragraph.

Comment 22

This section of the report notes that geological, geochemical and biological characteristics of site will be evaluated since these may have an affect on the observed presence of arsenic. The work plan then provides a possible scenario in which a release of oil could result in an environment in which there are elevated levels of arsenic. If a release of petroleum or any other chemical results in elevated levels of arsenic or any other chemical being observed, (even if the source concentration of arsenic is background), one is still responsible for dealing with elevated levels of arsenic. The fact that one releases, in this example, petroleum into the environment, does not relinquish one of the effects of this release, which in this example is elevated levels of arsenic. Therefore, this paragraph must be removed from the work plan.

Response 22

The paragraph is provided as an illustration of possible situations leading to elevated arsenic conditions, but is not intended to illustrate the decision process to determine whether such conditions will require corrective actions. Actual sample results will be evaluated against the probable site conditions and differences or similarity relative to background will be determined.

Section 5.0, Data Analysis and Statistical Testing;
Page 5-1, 2 Paragraph.

Comment 23

The report states that naturally occurring reducing environments may not mobilize all of the metals equally and thus result in elevated levels of certain metals at the edge of a reducing front. This statement would imply that there are dramatic differences in metals concentrations on the edge of a reducing front. Please provide a copy of the scientific literature, which supports this position and include applicable sections of said literature in the report.

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Response 23

Standard geochemistry or soil chemistry practices support the position that different metals can exhibit significantly different mobility under a given set of subsurface geochemical conditions (e.g. manganese can remain in solution and migrate under Eh and pH conditions that promote iron precipitation). This premise is noted in most chemistry or geochemistry text books.

Section 5.0, Data Analysis and Statistical Testing;
Page 5-1, 2 Paragraph.

Comment 24

The report notes that reducing front will translate into differences in metals concentrations. It cannot be assumed that at all locations differences in leaching ability will translate into differences in concentration. The difference in concentration may simply reflect the fact that the metals were either naturally or anthropogenic ally higher in that location. The report must note this and state that additional test would have to be performed to verify this confusion.

Response 24

The paragraph in question simply provides an example to show that elevated concentrations of a metal are not by themselves definitive proof of an anthropogenic release of that metal.

Section 5.0, Data Analysis and Statistical Testing;
Page 5-2, Second Paragraph.

Comment 25

This section of the work plan notes that any values, which appear to be outliers, will be evaluated. At the end of the evaluation, if they still appear to be an outlier then they will be subject to a statistical outlier test. Please be advised that one may not be able to "visually see" an outlier. Therefore, the work plan must be modified to state that in addition to the visual evaluation, an outlier test will be performed on the data set. Any values, which appear to be outliers, either visually or statistically, will then undergo evaluation to determine whether they are indeed outliers.

Response 25

The two "outlier tests" shown on Table 5-1 are sufficient to determine whether a sample point is an outlier based on running an actual statistical test. These tests will be run for each metal, where the necessary assumptions are met.

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Section 5.0, Data Analysis and Statistical Testing; Page 5-2, Second Paragraph.

Comment 26

This section of the work plan states that either the Dioxin Test or Rosner Test will be used to ascertain whether outliers exist. There are additional tests that can be performed, such as, the Extreme Value Test and the Discordance test. The particular tests or method employed will depend upon the data itself. Typically, more than one statistical test is performed since no single test is without limitations. Therefore, the work plan must be modified as follows: The Dixon, Rosner, Extreme Value Test, Discordance test or other appropriate statistical test or methods or combinations there of will be used to ascertain the presence of outliers. On all data sets at least two different tests will be performed.

Response 26

As stated under Comment 25, the two-outlier tests are sufficient to identify a data outlier.

Section 5.1, Preliminary Steps; Page 5-1, 4th Paragraph.

Comment 27

The work plan proposes averaging duplicate samples. Typically, this procedure is employed when the results are reasonably close in value. If the results are dramatically different however, this brings into question not only the validity of the duplicate samples but also the quality of the data set for the other samples, which were collected. In this case it may not be appropriate to average the results for the duplicates. It is acknowledged that it was not the intent to average data, which is considered questionable. As the work plan is public document, and in order to avoid confusion, the work plan must stipulate that duplicate samples will be averaged if the results are reasonably close in value.

Response 27

Sample points that are consistent with each other will be averaged and if inconsistent will not be averaged. For duplicate samples, this is a step of the data validation process, and will be stated explicitly in the revised work plan.

Section 5.1, Preliminary Steps; Page 5-1, 4th Paragraph.

Comment 28

This section contains a series of bullets for the various tests that may be applied to the data. As noted in other comments additional tests are needed to confirm normality and outliers. In addition, the actual test used will depend upon the data. Therefore, please add the following bullet to this section:

Additional test or procedures, other than those outlined above, that may be deemed necessary.

Response 28

The breadth of the 8 statistical tests presented in the work plan should be more than sufficient to assess the data. If not, additional tests will be identified and discussed as appropriate, based on the data results.

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Section 5.1, Preliminary Steps;
Page 5-1, Whole Section

Comment 29

This section of the work plan notes that the Sharpio Wilks Test will be used to access normality. There are a number of statistical tests that may be used to access normality such as the Fillibens Statistic, Coefficient of Varistion Test, Student Range Test, Geary's test etc. No single test is ideal (as an illustration, the Sharpio Wilks Test does not work well when several values in the sample are the same). Therefore, considering the importance of the concept of normality, the work plan must be modified as follows: The Sharpio Wilks Fillibens Statistic, Coefficient of Varistion Test, Student Range Test, Geary's test, D'Agostinao Pearson test, etc or other appropriate statistical test or methods or combinations there of will be used to ascertain if the data is normally distributed. On all data sets at least three different tests will be employed and a visual evaluation of the data (histogram) will be presented.

Response 29

It is not a given that three tests will be run for every data set nor that a histogram will be prepared to display the results. However, data sets will be consistently prepared for regulatory review.

Section 5.1, Preliminary Steps;
Page 5-2, 4th Paragraph

Comment 30

"If the data sets are both equal and the standard deviations (based upon Bartletts test for equal variances)....."

Determining whether the variance is equal is critical for the application of the student t test. The Bartlet test is sensitive to populations, which depart from normality. The Levines test is a robust test, which is not as sensitive to deviations from normality as the Bartletts test. Therefore, please modify the above as follows: If the data sets are both equal and the standard deviations (based upon Bartletts test and/or the Levenes test for equal variances).

It is recommended that both tests be applied.

Response 30

Decisions on what tests will be performed on the data sets will be made upon completion of field collection and organization of the data. Levine's test may be employed if the results of Bartletts test are challenged or suspect.

Section 5..2.2, Summarize Descriptive Statistics;
Page 5-6..

Comment 31

This section lists the various statistical test that will be performed. There appears to be a typographical omission in that mode was not included along with medium and average. Please modify the work plan accordingly. In addition the sample results for a particular contaminant that the Navy is performing a background assessment on, should be depicted in tables in ascending order. It is also recommended that the descriptive statistics results be below the ascending order values. This will allow one to rapidly evaluate the results and see trends.

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Response 31

Decisions on what tests will be performed on the data sets will be made upon completion of field collection and organization of the data. Mode is not a statistical parameter directly used for background comparison calculations, but is related to the overall shape of the data distribution. Therefore, the significance of mode is best reviewed visually by means of a histogram instead of presenting the value in a tabular format.

Section 5.3, Elemental
Correlation;
Page 5-8, Whole Section.

Comment 32

Elemental correlation is proposed to be used to determine the upper bond of the background concentration range and to be used in the future to determine whether background studies are even needed at other sites. The purpose of a site-specific background study is to ascertain whether the observed concentrations represent background. As such, making correlations to aluminum or iron in the soils is not necessary and is typically not done. Therefore, please remove the proposal to conduct elemental correlation in the work plan.

Response 32

Elemental correlation was not proposed simply as a method "to determine whether background studies are even needed". Elemental correlation will be performed in conjunction with comparative tests. This method allows investigation of mineral relationships not otherwise apparent from weathered soils, and can also provide insight into similarity of the source of elements in background versus site soils. The usefulness of this method will be evaluated on a case-by-case basis, as it depends upon the strength of the relationship shown by the data and an evaluation of physio-chemical principles which may explain the underlying nature of the relationship. In many cases, elemental correlation can be a powerful tool to help identify the factors responsible for variation in concentrations and can help discriminate between site-related and non-site-related sources among the concentrations observed.

Section 5.3, Elemental
Correlation;
Page 5-8, Whole Section.

Comment 33

Elemental correlation assumes that the ratio of concentrations between two metals can be used and extrapolated to predict upper background concentration of a metal. The fact that iron or aluminum may form complex with trace metals cannot be used to extrapolate the background concentrations of these trace metals and/or state that a release of trace metals at a site, which may end up forming complexes with the iron and aluminum, is now not a release. Therefore, these statements must be removed from the work plan.

Response 33

The rationale behind any decisions or interpretations based upon elemental correlation will be fully documented and explained in the report, and will be available for review and comment by all regulators.

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Section 6.0 Reporting;
Page 6-1.

Comment 34

Please provide the chemical data on an excel spreadsheet by contaminant and soil type, location and depth. As an illustration, if surface and subsurface soils were collected for arsenic in MA soils at a particular location, the table will have a column with all of the surface arsenic results for that location and a separate column for all of the subsurface arsenic results for that location.

Response 34

Presentation of the data will be determined upon completion of data collection and organization of the data, and will include some type of tabular listings by soil type and depth. All data will be available to regulators and if necessary special accommodations can be considered for exporting the data into a desired format upon request.

Section 6.0 Reporting;
Page 6-1.

Comment 35

Please add the following to the list of deliverables:

- 1) Map depicting the concentrations of arsenic and lead found in the surface and subsurface soils at the various sampling locations.*
- 2) Summary table of analytical data, as well as, a separate summary table for arsenic and lead.*
- 3) Map and summary table as describe above for any other analyte, which the Navy intends to request a background exemption.*
- 4) Table describing the depth and geologic characteristic of each sample, including whether said samples were collected from the water table.*

Response 35

Please refer to the response to Comment 5, above.

Section 6.0 Reporting;
Page 6-1, 3rd bullet.

Comment 36

Although not stated, it is assumed that the result of each statistical test and the critical value for the test will be provided. That is if the critical value to determine whether two populations are the same is a value greater than X this will be listed in the results section for that test and the value obtained from the data will also be listed.

Response 36

For each statistical test, the probability level (P-value) and/or critical reference value will be listed as well as the calculated sample statistic.