



RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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TDD 401-222-4462

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Curt Frye
U.S. Department of the Navy
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Code 1823-Mail Stop 82
Lester, PA 19113-2090

RE: Draft Base Wide Background Investigation Work Plan Station Newport, Newport, Rhode Island

Dear Mr. Frye,

The Rhode Island Department of Environmental Management, Office of Waste Management (RIDEM), has reviewed the Draft Base Wide Background Investigation Work Plan dated January 12, 2006. In the work plan the Navy notes that the concentrations of arsenic in soils at Navy Station Newport is consistently higher than RIDEM's direct exposure standard. As a result the Navy has elected to conduct a base wide background study. As you are aware the Office of Waste Management modified the arsenic standard and the procedures for dealing with arsenic in 2004. This regulation change has largely dealt with background levels of arsenic, which are above risk-based levels. As such, the Navy's position that, even with the regulations changes, a background study is necessary is unique. The Office of Waste Management strongly recommends that the Navy deal with the arsenic issues on the base by simply following the requirements laid out in the modified regulations. Abiding by the modified regulations will avoid the time and the expense of performing a background study. In addition, if elevated levels of arsenic are found at a particular site, the methods to deal with these levels will probably reflect the measures outlined in the modified regulations.

Should the Navy elect to move forward with this background study, the Office of Waste Management has attached comments on the submitted work plan. As background studies are site specific, the work plan must be modified to make it clear that a background study is being performed for each existing site on the base. If the Navy has any questions concerning the above, please contact this Office at (401) 222-2797, ext. 7111.

Sincerely,

Paul Kulpa
Paul Kulpa, Project Manager
Office of Waste Management

cc: Mathew DeStefano, OWM
Richard Gottheb, DEM OWM
Kevin Flynn, DOA
Kymberlee Keckler, EPA Region I
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**Comments on Draft Work Plan
Base Wide Background Soil Investigation**

1. **Section 1.0 Introduction;
Page 1.**

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.

2. **Section 1.0 Introduction;
Page 1.**

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.

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

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.

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

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.

**5. Section 1.2 Project Deliverables;
Page 1-3.**

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).

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

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).

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

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.

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

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.

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

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.

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

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 in question may have been subject to agricultural use prior to 1942. Therefore this statement must be removed from the report.

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

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 taken as close as possible to the individual sites.

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

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.

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

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.

**14. Section 2.2.5, Decision Rule;
Page 2-10**

“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.

**15. Section 2.2.5, Decision Rule;
Page 2-10**

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.

**16. Section 2.2.5, Decision Rule;
Page 2-10**

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.

**17. Section 2.2.5, Decision Rule;
Page 2-10**

“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.”

As indicated in the previous comments, this approach is inappropriate and therefore this statement must be removed from the report.

**18. Section 3.2, Soil Sampling;
Page 3-5,**

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.

**19. Section 3.2, Soil Sampling;
Page 3-5,**

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.

**20. Section 3.0, Field Sampling Plan;
Page 3-1, Whole Section.**

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.

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

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.

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

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.

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

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.

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

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.

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

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.

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

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 thereof will be used to ascertain the presence of outliers. On all data sets at least two different tests will be performed.

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

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.

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

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.

**29. Section 5.1, Preliminary Steps;
Page 5-1, Whole Section**

This section of the work plan notes that the Shapiro Wilks Test will be used to assess normality. There are a number of statistical tests that may be used to

access normality such as the Fillibens Statistic, Coefficient of Variation Test, Student Range Test, Geary's test etc. No single test is ideal (as an illustration, the Shapiro 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 Shapiro Wilks Statistic, Coefficient of Variation Test, Student Range Test, Geary's test, D'Agostino Pearson test, etc or other appropriate statistical test or methods or combinations thereof 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.

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

“If the data sets are both equal and the standard deviations (based upon Bartlett's test for equal variances).....”

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

It is recommended that both tests be applied.

**31. Section 5.2.2, Summarize Descriptive Statistics;
Page 5-6.**

This section lists the various statistical tests that will be performed. There appears to be a typographical omission in that mode was not included along with median 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.

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

Elemental correlation is proposed to be used to determine the upper bound 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.

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

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.

**34. Section 6.0 Reporting;
Page 6-1.**

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.

**35. Section 6.0 Reporting;
Page 6-1.**

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.

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

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.