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LETTER AND U S NAVY RESPONSE TO U S EPA REGION I AND RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT COMMENTS REGARDING DRAFT FINAL SUPPLEMENTAL REMEDIAL INVESTIGATION SITE 8 NS NEWPORT RI
05/13/2011
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C-NAVY-05-11-4365W

May 13, 2011

Project Number 112G02124

Ms. Ginny Lombardo
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Mr. Gary Jablonski
Rhode Island Department of Environmental Management
235 Promenade Street
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Reference: CLEAN Contract No. N62470-08-D-1001
Contract Task Order No. WE19

Subject: Draft Final Technical Memorandum (Supplemental Remedial Investigation) and Navy Responses to EPA and RIDEM Comments
Site 08, NUSC Disposal Area Naval Station Newport, Newport RI

Dear Ms. Lombardo, Mr. Jablonski:

On behalf of Ms. Maritza Montegross, U.S. Navy NAVFAC, Tetra Tech is pleased to provide the draft final Supplemental Remedial Investigation (SRI) for Site 08 at Naval Station Newport, Rhode Island. Also enclosed are the updated responses to EPA and RIDEM comments on the draft SRI. Both the SRI and the response documents have been updated in accordance with the agreements reached at the technical meeting held on April 14, 2011.

Your response to the SRI is requested by June 13, 2011. Please contact me at (978) 474-8449 or jim.ropp@tetratech.com should you have any questions.

Sincerely,

James Ropp, P.E.
Project Manager

Encl: (1 CD and hardcopies, EPA-3, RIDEM-2)
Draft Final SRI
Responses to EPA an RIDEM Comments on the Draft SRI

c: M. Montegross, NAVFAC (w/ encl. – 1 hardcopy, 1 CD)
D. Moore, NAVSTA (w/ encl. – 1 hardcopy, 1 CD)
P. Steinberg, Mabbett (w/ encl. – 2 hardcopies)
P. Crump, RIDEM (w/o encl.)
K. Munney, USF&W (w/ encl. – 1 hardcopy)
S. Parker, Tetra Tech (w/ encl. – 1 hardcopy)
D. Seiken, Tetra Tech (w/o encl.)
AR c/o G. Wagner, Tetra Tech (w/encl. – 1 hardcopy of Responses, 1 CD)
G. Glenn, Tetra Tech (w/o encl.)
File G02124-3.2 (w/o encl.), G02124-8.0 (w/encl. – original)

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Navy Responses to EPA Comments (dated January 20, 2011) on the Draft Technical Memorandum, Supplemental Remedial Investigation (SRI) for Site 08, NUSC Disposal Area (dated December 2010)

May 13, 2011

General Comments:

1. There is no figure corresponding to Figures 3-2 through 3-6 showing concentrations for 1,1,1-TCA. Please add a figure showing the 1,1,1-TCA distribution.

Response: Agreed. A corresponding figure showing 1,1,1-trichloroethane (TCA) in groundwater has been added.

2. For clarity, please indicate on a figure which wells are completed in bedrock and which are in the overburden (or overburden/bedrock).

Response: Agreed. A note has been added on Page 2-1 and on Figure 3-1 explaining that the "B" indicator is for bedrock wells and the other wells are either in the overburden or at the overburden/bedrock interface (except for MW-01C, which is in bedrock).

3. Figures with cross-sections showing the 1,1,1-TCA plume downgradient from Building 179 and also showing cross-sections with both 1,1,1-TCA and TCE daughter products should be added to the SRI or included in the revised draft FS.

Response: Agreed. A generally north-south trending cross section, that also depicts 1,1,1-TCA concentrations in groundwater, has been developed for the Building 179 area (included as Figure 6-2 of the SRI). Plume contours are less distinct for other chlorinated VOCs and those data are shown instead on Figures 3-2 through 3-7.

4. If the Navy intends to pursue Monitored Natural Attenuation (MNA) as a remediation strategy for this site, EPA recommends collection of adequate additional data – specifically, the parameters commonly used to evaluate the potential for anaerobic biodegradation of chlorinated VOCs to support MNA. Refer to Table 2.3 of EPA's "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water," September 1998 [EPA/600/R-98/128].

Response: Agreed. Additional sampling for MNA parameters was conducted March 14-18, 2011, in accordance with the letter work plan provided on March 2, 2011, as amended by e-mail discussions with EPA and RIDEM on March 9-10, 2011. Results will be provided in a technical memorandum planned for May 2011 and will be incorporated into the revised draft Feasibility Study (FS).

5. Neither the characterization of the TCE in the North Meadow nor that of the 1,1,1-TCA in the Building 179 plume bounds the contamination at depth. While there may be plausible arguments to support the contention that contamination is unlikely to have penetrated to great depth in this system (e.g., information about vertical hydraulic gradients may support this), such arguments are not advanced in the memorandum. Remedies to be considered in the FS may require additional characterization to bound the plumes at depth.

Response: Comment noted. The conceptual site model (CSM) for the North Meadow and the Building 179 Plume will be updated in the FS. See also the response to Specific Comment #3.

Specific Comments:

1. Page 2-4, Section 2.4, Construction of Monitoring Wells: The text states that North Meadow borings for MW-127B and MW-128B were terminated after encountering high-yielding fractures when advanced to depths of 44 ft bgs and 51 ft bgs, respectively. It was determined that these transmissive intervals "*likely correspond to the fracture set with the dissolved VOC plume.*" This presupposes that all of the contaminant transport of concern is confined to a single fracture or closely spaced fracture set. It is noted that there are two locations in the North Meadow (MW-117B and MW-118B) where well couplets are available, and these both show TCE at comparable concentrations in both the shallow and deep intervals (MW-117D1 (19 – 29 ft bgs; 140 ppb) and MW-117D2 (29 – 39 ft bgs; 130 ppb); MW-118D1 (27 – 37 ft bgs; 200 ppb) and MW-118D2 (35 – 45 ft bgs; 160 ppb)). These locations seem to confirm that the TCE can invade fractures at multiple depths, including at least one depth below the first (shallowest) transmissive fracture encountered. The current characterization leaves open the question of whether or not the TCE contamination has penetrated to greater depth. Please note that some potential remedial actions may require additional characterization to bound the TCE concentration at depth.

Response: The data from the North Meadow do not suggest plume(s) traveling in discrete fractures. Rather, there are many interconnected fractures and fracture zones within the extremely fractured and degraded rock matrix. The contamination is traveling to the more highly weathered/fractured zones that correspondingly have the highest hydraulic conductivity. Due to the yield of the fracture zone encountered in MW-127B and MW-128B, it is clear that this zone has extremely high hydraulic conductivity. Therefore, groundwater flow in this area will be towards this fracture zone. This additional information confirms the CSM presented in the RI (Tetra Tech, 2010). The major fracture encountered in these two wells is the major north/south-trending bedrock fracture zone that is the primary migration pathway for the chlorinated solvents that is described in the RI's CSM.

As discussed during the April 14, 2011 technical meeting, it is acknowledged that there is some uncertainty in the total depth of the plume; however, based on the CSM, the identified bedrock fracture zone is the primary route of contaminant transport and the discharge is to Deerfield Pond. The groundwater contour map (Figure 3-1 of the SRI) shows a steep gradient toward the pond but does not fully reflect the north-south fracture zone because few wells are screened in that interval. There is some contaminant transport northward along this fracture zone although the primary groundwater flow direction is westward to the pond.

Depending on the selected remedy for Site 08, additional characterization of the plume at depth, if needed to support the remedial design, can be considered as part of a pre-design investigation (PDI) following the ROD.

2. Page 3-2, Section 3.1.1, North Meadow – Groundwater: It is notable that fairly high concentrations of TCE were detected at MW-118D1 (27 – 37 ft bgs; 200 ppb) and MW-118D2 (35 – 45 ft bgs; 160 ppb), which is located near the upgradient boundary of the site. Is it known whether or not there was historical waste disposal in this area?

Response: There are no documented releases in the North Meadow. MW-118D1/D2 are located downgradient of the North Meadow where the release likely occurred (e.g., TCE was detected at 1,200 ug/L in MW-128B). Therefore, the detected concentrations in MW-118 are associated with downgradient plume migration from the North Meadow, which is consistent with the CSM presented in the RI.

3. Page 3-2, Section 3.1.1, North Meadow – Groundwater: The text notes, "TCE concentrations decreased with depth," which is supported by the data for MW-117D1/D2, which show 0.14 mg/L shallow and 0.13 mg/L deep, and data for MW-118D1/D2, which show 0.20 mg/L shallow and 0.16 mg/L deep. It is noted, however, that these decreases with depth are small, possibly within the

expected repeatability of the sampling and analysis. It remains unknown at what depth the contamination might fall below water-quality criteria (e.g., the MCL).

Response: It is agreed that the concentration differences observed with depth are small and may be within the expected repeatability of the sampling and analysis. This observation is consistent with the CSM, which identifies bedrock in the North Meadow as being highly degraded/weathered/fractured and the contamination not being confined to discrete fractures. See also the response to Specific Comment #1. The vertical extent of the contamination is believed to be the elevation of NUWC Pond, which is an expression of the major water bearing fracture zone encountered in MW-127B and MW-128B. The CSM for the North Meadow will be updated for the revised draft FS. See also the response to Specific Comment #1.

4. Page 3-3, Section 3.2.1, Building 179 Area – Groundwater: No map is provided to display concentrations of 1,1,1-TCA in the 2010 sampling. Given its importance in defining the Building 179 plume, please provide a map showing 1,1,1-TCA detections in the supplemental sampling, including those for newly installed borings MW-129B and MW-130B.

Response: Agreed. See response to General Comment #1.

5. Page 3-4, Section 3.2.1, Building 179 Area – Groundwater, Biodegradation/Natural Attenuation Parameters: Overburden and Bedrock Groundwater: This subsection indicates that conditions favoring anaerobic reductive dechlorination are widespread throughout this area. EPA notes that the biodegradation/natural attenuation parameters were measured in only 3 of the 6 bedrock wells and 3 of the 5 bedrock/overburden wells, so caution is urged against overinterpretation of these data. Where these parameters were measured, conditions appear to be favorable to natural attenuation – e.g., there is a direct correlation between ORP and sulfate concentrations. For two of the three bedrock wells in the Building 179 Area, the MNA scores indicate conditions that are adequate for anaerobic biodegradation; one bedrock well shows limited evidence. However, two of the overburden/bedrock wells yielded 'inadequate evidence' of natural attenuation and the MNA score for the third was 'limited evidence.' Please consider revising this discussion to acknowledge that conditions favoring anaerobic reductive dechlorination are *not* widespread but do occur in parts of this area in the bedrock.

Response: The referenced section is an accurate description of the data collected in the 2010 SRI. Natural attenuation data also were evaluated and presented in the RI report and additional natural attenuation data were collected during March 14-18, 2011. An updated evaluation of natural attenuation at the site will be provided in the FS.

On January 25, 2011, EPA provided their MNA scoring worksheet as a supplement to their comments on the draft SRI. As noted in General Comment #4, EPA's scoring is based on the guidance document entitled "Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water," September 1998 [EPA/600/R-98/128]. Please note that the Navy's preferred approach is to develop a weight-of-evidence analysis which is consistent with EPA guidance, but without the numerical scoring system. More recent guidance documents such as "Natural Attenuation for Groundwater Remediation" (National Research Council, 2000) state that the simplified scoring system should not be used. Rather, there should be more emphasis on various lines of evidence such as temporal and spatial trends that show decreasing COC concentrations and plume footprint, biodegradation products, comparison of COC and daughter products footprints to geochemical footprints, and potential microcosm studies to demonstrate that COCs are in fact degrading and that conditions are favorable for continued degradation. Example guidance documents which are more consistent with the weight of evidence approach include "Performance Monitoring of MNA Remedies for VOCs in Groundwater" (EPA/600/R-04/027, April 2004) and "Use of MNA at Superfund, RCRA Corrective Action, and UST Sites" (EPA OSWER 9200.4-17P, April 21, 1999).

As discussed at the April 14, 2011 technical meeting, the Navy may conduct additional groundwater sampling for MNA parameters prior to the ROD (after evaluating the March 2011 MNA sampling data), including analyses for the presence of bacteria needed to support reductive dechlorination processes.

6. Page 3-4, Section 3.2.1, Building 179 Area – Groundwater, Biodegradation/Natural Attenuation Parameters: Overburden and Bedrock Groundwater: This subsection refers to "elevated ferrous iron" as an indicator of conditions supporting anaerobic reductive dechlorination. Provide a pointer to these data, as ferrous iron does not appear to be found in either Table 2-1 (which contains groundwater field parameters, if Fe^{2+} was measured in the field) or Table 3-2 (groundwater analytical results, if Fe^{2+} was measured in the lab).

Response: Agree. In the draft SRI, ferrous iron data were presented in the sample log sheets for the wells where it was measured. In the draft final SRI, the new ferrous iron data have been added to Table 3-2. Historic groundwater data have been added as an attachment to the SRI.

7. Page 3-4, Section 3.2.1, Building 179 Area – Groundwater, Biodegradation/Natural Attenuation Parameters: Overburden and Bedrock Groundwater: This subsection states that "*...anaerobic biodegradation is likely supported in localized areas.*" Only one well in this subgroup (MW-7A) supports this statement, while the other two for which natural attenuation parameters were measured show conditions that are not conducive to anaerobic biodegradation.

Response: Comment noted. The text was worded as such ("supported in localized areas") because the one in three wells showing favorable conditions was in contrast to bedrock groundwater elsewhere at the site where "...conditions likely to support anaerobic reductive dechlorination are widespread throughout the area..." See also the response to Specific Comment #5. It should be noted that the two overburden wells showing lower potential for anaerobic biodegradation (MW-11 and MW-12) are essentially side-gradient wells outside the chlorinated ethene plume (see Table 3-2 of the draft SRI). The lack of chlorinated ethene detections in these wells contributes, in part, to the lower MNA scoring.

8. Page 3-5, Section 3.2.2, Building 179 Area – Soil: The text indicates that 2 of the 3 soil borings were installed in backfill material and the Navy will remobilize to collect additional soil samples to confirm the successful removal of the contaminated soil from the former UST area. Provide a schedule for this resampling effort and submission of this data.

Response: The re-sampling of B179-SB2 and B179-SB3 was completed on November 22, 2010. The results have been incorporated into the draft final SRI, including the SRI risk evaluation.

9. Page 3-8, Section 3.4, Additional Groundwater Sampling between Building 185 and North Meadow, Biodegradation Parameters: The text in this subsection states that ferrous iron was not detected at MW-101B, elevated at MW-103B, and 'negligible' at MW-105B. Provide a pointer to these ferrous iron data.

Response: See the response to Specific Comment # 6.

10. Page 3-8, Section 3.4, Additional Groundwater Sampling between Building 185 and North Meadow, Biodegradation Parameters: Three of the wells in this area were sampled for parameters used to assess the potential for anaerobic biodegradation in bedrock. Of these, only one (MW-103B) yielded a natural attenuation score indicating an 'adequate capacity' for reductive dechlorination. The other two (MW-101B and MW-105B) show 'limited evidence'. Again, these results should not be overinterpreted due to the sparse data, but conditions for anaerobic biodegradation do not appear to be widespread in this area. This should be stated clearly in the text.

Response: This section as written is an accurate and thorough description of the data collected in the SRI. No change is necessary. See also the response to Specific Comment #5.

11. Page 4-2, Section 4.1, Screening Levels for Groundwater: Add another bullet for Region 1's Vapor Intrusion RSLs as used in Table 4-10 (see footnote 7).

Response: The EPA Vapor Intrusion Regional Screening Levels (RSLs) have been clarified as requested.

12. Section 4.2, Selection of COPCs: It is Region 1's practice to divide the non-cancer RSLs by 10 to use for screening non-cancer COPCs to account for cumulative adverse effects from multiple contaminants. Therefore, the non-cancer screening levels at HI=0.1 of the non-cancer RSLs should always be used for screening COPCs.

Response: They were calculated using 0.1 in the draft SRI. The confusion may be from Tables 4-1 and 4-2 which had listed the unadjusted RSLs. The adjusted RSLs are presented in these two tables in the draft final SRI.

13. Page 4-3 and 4-4, Section 4.2, Selection of COPCs, Overburden-Bedrock Interface Groundwater: Note that "1,1-CA" needs to be changed to "1,1-DCA" in the 2nd paragraph of this subsection. In the text, 1,1-DCA is reported as a constituent not retained as a COPC in the RI Report (January 2010). Isopropylbenzene is also reported here as not retained as a COPC in the RI Report. However, 1,1-DCA and Isopropylbenzene were both retained as COPCs in Tables 6-14 and 6-19 of the RI Report. Further, 1,1-DCA was retained as a COC and listed in Table 6-38 of the RI, although Isopropylbenzene was not considered a COC and was not listed in Table 6-38. Please revise the text to address these errors.

Response: The typographical error on page 4-3 has been corrected.

The referenced text regarding 1,1-DCA and isopropylbenzene refers to groundwater COPCs in the overburden-bedrock interface whereas Tables 6-14 and 6-19 of the RI indicate they were retained as COPCs for bedrock groundwater only (see also Tables 6-12 and 6-13 of the RI which show that 1,1-DCA and isopropylbenzene were not retained as groundwater COPCs in the overburden-bedrock interface). Page 4-4 of the SRI (Bedrock Groundwater) correctly identifies 1,1-DCA as a groundwater COPC in bedrock groundwater. Table 6-38 of the RI lists 1,1-DCA as a COC under the residential scenario in which bedrock groundwater would be used.

14. Page 4-4, Section 4.2, Selection of COPCs, Bedrock Groundwater: In the 1st paragraph of this subsection, correct "...based on tap water RSLs and MCLs is presented in Table 4-9."

Response: The typographical error will be corrected.

15. Page 4-6, Section 4.3, Comparison of Concentrations to EPCs used in HHRA, Subsurface Soil: The 2nd paragraph of this subsection states that "risk estimates calculated for all receptors would be within the EPA's target risk range if EPCs for data collected during the supplemental investigation were evaluated." Please clarify. Reference the data and calculations that support this statement. Is the Navy referring to the combined data set or the supplemental data alone? Does the data set referred to here include the samples taken of the clean backfill material (see page 3-5)? Note that the supplemental data set alone is not adequate to represent a subsurface soil decision unit area.

Response: The referenced sentence has been deleted. The sentence referred only to the SRI data set.

16. Page 4-7, Section 4.3, Comparison of Concentrations to EPCs used in HHRA, Groundwater: The 2nd paragraph of this subsection states "noncancer risks for construction workers and hypothetical child and adult residents exposed to the identified COPCs in the supplemental investigation groundwater samples would be within EPA acceptable levels." Please clarify. Reference the data and calculations that support this statement. Since metals were the major contributors to noncancer risks

in the RI data set and metals were not analyzed in the supplemental data set, how were metals accounted for? Note that the supplemental data set alone is not adequate to represent a groundwater decision unit area.

Response: The referenced sentence has been deleted. The sentence referred only to the SRI data set.

17. *Page 4-9, Section 4.5, Summary: Table 4-12 should be discussed and referenced here.*

Response: The table is first cited on page 4-2 and discussed thereafter. In Section 4.5 (Summary), the reference to Table 4-10 in the first paragraph has been changed to Table 4-12.

18. Page 5-1, Section 5.1, Sediment: This is one of several places in the SRI report where chemical detections are attributed to laboratory contamination. It would be helpful to support this claim with field or laboratory blank data indicating the presence of these chemicals, or a reference to a validation report in which this finding was made.

Response: There are two places in the SRI where chemical detections are considered laboratory artifacts (carbon disulfide is mentioned on page 5-1 and 2-butanone is mentioned on page 5-2). Both of these compounds (and others) were detected in laboratory blanks during the SRI. Carbon disulfide was detected in laboratory blanks associated with SDG-WE19-2 and SDG WE19-10 and 2-butanone was detected in laboratory blanks associated with SDG-WE19-3. The data validation reports have been added as an appendix to the draft final SRI report.

19. Page 6-3, Section 6.4, Risk Assessment, Tables:
    - For 1,1,1-TCA, the report lists the RI Data Range as 0.4-1600 ug/L and indicates that this can be dropped as COPC since the SRI data is within RI data range. The RI Report, Tables 6-12 and 6-14, show the 1,1,1-TCA range as 0.4-4 ug/L (not up to 1600). Therefore, the argument presented is invalid. Similarly, for 1,1-DCE, the report lists the RI Data Range as 0.5-79 ug/L and this contaminant can be dropped since the SRI data is within RI data range. The RI Report, Table 6-14, lists the 1,1-DCE range as 0.5-7 ug/L (not 79). Again, the argument is invalid. Both of these constituents have concentrations well over the MCLs and EPA requests that both be retained as COCs.
    - EPA agrees that 1,1,2-Trichoroethane does not need to be carried forward as a COC for the FS.
    - For cis-1,2-DCE, the data presented for RI Data Range is again inconsistent with the RI Report, Table 6-14, which shows the range as 0.3-26 ug/L (not up to 68). In addition, the SRI data range is a bit off from Table 4-10 of SRI which shows 0.37-26 ug/L. Once corrected, the data remain similar in both the RI and SRI. EPA agrees that this constituent does not need to be carried forward as a COC for the FS.
    - As noted above, Isopropylbenzene was a COPC in RI but then dropped as a COC. EPA agrees that Isopropylbenzene does not need to be carried forward as a COC for the FS.
    - What is the basis for the Dibenzofuran in Soil information that is included in the table?

Response: Responses to the above bullets are as follow:

- **Table 6-6 of the SRI will be corrected to list 1,1,1-TCA and 1,1-DCE as COCs to be addressed in the FS. The in-text table on page 6-3 will be corrected to show the data range used in the HHRA to be 0.4 to 4 ug/L for 1,1,1-TCA and 0.5 to 7 ug/L for 1,1-DCE. The data ranges reported in the draft SRI had included data collected from the Building 179 area (see Table 4-13 of the RI) which were not part of the HHRA data set.**
- **Agreed regarding 1,1,2-TCA.**
- **Agreed regarding cis-1,2-DCE. The data range on the in-text table will be revised to 0.3 to 26 ug/L. The detection of cis-1,2-DCE at 68 ug/L was from a vapor diffusion bag sample (see Table 4-16 of the RI).**
- **Agreed regarding isopropylbenzene.**
- **Dibenzofuran will be removed from the discussion on page 6-3.**

20. Table 6-1 [Compared with Table 6-38 of the RI Report]:
   - Benzo(k)fluoranthene should be revised to Benzo(b)fluoranthene.
   - Under Hypothetical Lifelong Residents, 1,1-DCA should be listed as a COPC and chromium should not be listed.
   - EPA does not concur with the elimination of Arsenic and Manganese as COCs in groundwater. The aquifer conditions caused by Navy releases are responsible for the elevated concentrations of Arsenic and Manganese in groundwater and the concentrations are well above the arsenic MCL and manganese health advisory level and risk levels. In addition, EPA does not concur with the elimination of Chromium as a COC in groundwater. Unless the Navy can provide speciation data to support that the Total Chromium concentrations are not reflective of Cr^{+6}, EPA's must make the conservative assumption that this is the case. Chromium levels are well above MCLs and risk-based levels. Therefore, arsenic, manganese and chromium must be retained as COCs for groundwater.

Response: Responses to the above bullets are as follow:

- **Regarding benzo(k)fluoranthene, the database was reviewed, and the error appears to be on Table 6-38 of the RI report. Section 4 tables from the RI report identify the concentrations measured as benzo(k)fluoranthene, not benzo(b)fluoranthene. Therefore, Table 6-1 of the SRI still lists benzo(k)fluoranthene.**
- **Regarding the lifetime resident constituents, 1,1-DCA was added and chromium was removed from Table 6-1.**
- **Regarding the presence of arsenic and manganese above MCLs, it is acknowledged that the release at Site 08 may have produced a chemical environment that resulted in elevated concentrations of arsenic and manganese in the groundwater as a secondary effect (i.e., mobilization of arsenic and manganese from soil to groundwater). Therefore, as agreed at the April 14, 2011 technical meeting, arsenic and manganese will be considered COCs that resulted from a secondary release at Site 08. The Remedial Action to be conducted for the primary release may mitigate the chemical environment that causes the mobilization of arsenic and manganese and an active remedy for arsenic and manganese may not be necessary. Given the site activity and use (e.g., industrial area with no drinking water wells), arsenic and manganese may be addressed through groundwater monitoring and interim land use controls supporting the overall Remedial Action rather than through direct treatment.**
- **As discussed at the April 14, 2011 technical meeting, chromium will be retained as a COC in groundwater (conservatively assumed to be present as Cr^{+6}) unless/until future sampling demonstrates that it is sufficiently present in the less toxic, trivalent form Cr^{+3} to reduce the calculated risks. If confirmed to be present in the trivalent form, then it is anticipated that chromium would be removed from the COC list.**

21. Table 6-2 [Compared with Table 6-38 of the RI Report]:
   - Under Construction Workers, Aluminum should not be listed.
   - Under Industrial Workers, Total Arochlors and Chromium should not be listed and Napthalene should be listed.
   - Under Adolescent Tresspassor, Child Recreational User, Adult Recreational User, Lifelong Recreational User, Hypothetical Adult Resident, Hypothetical Child Resident and Hypothetical Lifelong Resident, Chromium should not be listed.
   - Arsenic is proposed to be eliminated as a constituent of concern throughout this table as the report states that "site concentrations are similar to background." This conclusion is based on a straight comparison of site maximum, 95% UCL and average concentration data to background maximum and average concentration data from the Background Soil Investigation Report (September 2006). However, the site maximum and average both exceed the background maximum and average. Therefore, EPA does not agree that this comparison supports that site levels are similar to background. In addition, site levels are above risk levels. The Background Soil Investigation Report states that "(a)nalytical data from on-site or site-related soil samples will

be statistically compared to background data representing the same soil type (metals) and moisture content category (metals and organics) to determine concentrations elevated above background following appropriate statistical procedures." In order to further evaluate whether arsenic can be eliminated as a COC for soil at NUSC based on background, a higher level statistical comparison of the site data set to the background data set should be completed. Refer to Chapter 5 of EPA's "Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites," September 2002 [EPA 540-R-01-003].

Response: Responses to the above bullets are as follow:

- **Agreed. Aluminum has been removed from the list for construction workers.**
- **Total Aroclors and chromium have been removed from the list for industrial workers. However, naphthalene should not be listed as there was an error on Table 6-28 of the RI for this compound. Appendix H, Table 7-2 of the RI indicates that naphthalene is not a contributor. The same table indicates that total Aroclor poses a 1E-6 risk and chromium does not pose excess risk.**
- **Agreed. Chromium was removed from the cited receptors.**
- **The requested statistical evaluation has been performed with respect to arsenic in "Se" and "PmB" soils (Attachment A). Most of Site 08 is of the "Se" soil type with the exception of the North Meadow area which is type "PmB" (see Figure 3-1 of the 2006 Background Soil Investigation Report and Figure 4-1 of the draft final SRI). The surface and subsurface soil data (total soil) were compared to the surface and subsurface soil background datasets (from the 2006 and 2008 background reports) for both the "Se" and "PmB" areas. The statistical evaluation determined that the detected arsenic concentrations are representative of background conditions within the "Se" soil area, but are greater than background levels in the "PmB" soil area. Table 6-2 has been updated accordingly.**

22. Table 6-3 [Compared with Table 6-38 of the RI Report]:

- Carcinogenic PAHs should be listed as COPC, not just benzo(a)pyrene. Therefore, the other 6 carcinogenic PAHs should be added to the table. Chromium should not be listed.
- Since site maximums and site averages are below the hydric soil background maximum and average for both benzo(a)pyrene and arsenic, EPA agrees that these constituents do not need to be carried forward as COCs to the FS. However, refer to Appendix B of EPA's "Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites," September 2002. The guidance states:
  - "EPA cautioned that eliminating COPCs based on background (either because concentrations are below background levels or attributable to background sources) could result in the loss of important risk information for those potentially exposed, even though cleanup may or may not eliminate a source of risks caused by background levels."
  - "Specifically, the COPCs with high background concentrations should be discussed in the risk characterization, and if data are available, the contribution of background to site concentrations should be distinguished."
  - "When concentrations of naturally occurring elements at a site exceed risk-based screening levels, that information should be discussed qualitatively in the risk characterization."
- Therefore, the SRI should be amended to include a revision to Section 6.4, Risk Characterization, of the RI addressing the potential risks caused by background levels of these constituents in sediment.

Response: The listing of just benzo(a)pyrene is appropriate because this is the COPC identified in the RAGS-D tables Part 7 in Appendix H of the RI report. Chromium has been removed from the list. Section 6.5 of the draft final SRI has been modified to include a qualitative discussion of the background risk associated with benzo(a)pyrene and arsenic in sediment.

23. Table 6-4 [Compared with Table 6-38 of the RI Report]:
   - Chromium should not be listed in this table for any of the 3 users. Therefore, note 3 is not needed.
   - Regarding pesticides and total Aroclors, EPA agrees that these contaminants do not need to be carried forward as COCs for the FS, but not for the reasons stated in footnotes 2 and 4. By screening the maximum detected concentrations against the respective risk-based screening levels, EPA found that the concentrations are either similar to or below the screening levels so they would not significantly contribute to the total site risks.

Response: Concur. Table 6-4 will be revised accordingly.

24. Table 6-5: The selection of COCs for sediment at this site will be somewhat difficult for several reasons not seen in other recent sediment sites. At other sites, the Navy has done multiple regression analyses, and found poor dose-response with many of the candidate COPCs. In this case, we see multiple chemicals with very high correlation between toxicity and chemistry, and many of these chemicals are co-located. Also, the subject of whether a chemical is "site-related" is difficult to discern here. In the case of DDx, the correlations between observed toxicity and concentration are good, and the Navy has a history of using DDT for mosquito control in water bodies/wetlands on Navy bases. Lead, which is site-related, has relatively poor correlation between toxicity and concentration, yet it is co-located with many chemicals that would seem less likely than lead to be driving toxicity. EPA believes that the best approach for setting COCs and PRGs will be to be more inclusive at this stage, and retain candidate COPCs when in doubt (e.g., DDx, Chlordane) and see whether, at the PRG stage, a PEC-quotient or similar approach can be used to capture the chemicals with the best association with toxicity. Certainly we have all three legs of the sediment triad covered here: benchmark exceedences, toxicity, and community impairment. In addition, the reference location was demonstrably non-toxic and low in chemicals, while the site was consistently above benchmarks and toxic. In addition, although the comparison of site average concentrations were below background averages for many of the organics in sediment, the site maximum concentrations were above the background maximums. EPA agrees that Selenium does not have to be carried forward as a COC to the FS for soil.

Response: If pesticides are retained in the calculations, then pond sediment sampling locations with Probable Effects Concentration quotients (PEC-Qs) greater than 1.0 were found in the southern, central, and northern portions of the pond (sample locations SD119, SD121, and SD125, respectively). Pond sediment sampling locations with elevated COPC concentrations are co-located with the PEC-Q exceedences. As discussed at the April 14, 2011 technical meeting, the Navy will further consider the use of a PEC-Q approach for setting PRGs for pond sediment during the FS (during the meeting, EPA indicated that further information would be forthcoming). It is noted that if the PEC-Q method is selected, then it may be possible to achieve PRGs by targeting a reduced list of the COPCs (e.g., reducing DDE concentrations may result in PEC-Q values less than 1.0).

25. Table 6-6: Lead should be listed as a COPC for the pond based on high concentrations and co-location with numerous other chemicals. This co-location makes it difficult to fully exonerate lead as a COPC for the pond, and it is site-related.

Response: Lead is listed as an ecological COPC in pond sediment in Tables 6-5 and 6-6. Lead is also included in the PEC-Q calculations for sediment (see response to Comment #24).

26. Figure 3-2: The concentration of Trichloroethene at MW103B should be color coded as green.

Response: Disagree. As noted in the figure legend, the color coding depicts results as a ratio to the screening criterion, and not sample concentration. For MW103B, the concentration of 15 ug/L is 8.8 times the screening criterion of 1.7 ug/L and should be color coded as blue.

Navy Responses to RIDEM Comments (dated January 24, 2011) on the Draft Technical Memorandum, Supplemental Remedial Investigation (SRI) for Site 08, NUSC Disposal Area (dated December 2010)

May 13, 2011

Comment 1: Page 2-4, Section 2-4, Construction of Monitoring Wells; 1st paragraph, 4th sentence.

"Based on the observed yields, it was concluded that high-yielding fracture set (likely corresponding to the fracture set with the dissolved VOC plume) was encountered, and drilling deeper was not necessary".

The above sentence is unsubstantiated based on the current data due to the fact that in bedrock high-yielding fracture zones do not always correspond to contaminate migration. Please eliminate the following text from the sentence above in the report: *"(likely corresponding to the fracture set with the dissolved VOC plume)".*

Response: The statement was based upon the conceptual site model (CSM). However, since the SRI does not include an update of the CSM, the statement in the SRI has been deleted as requested. The CSM will be further discussed in the FS.

Comment 2: Page 2-5, Section 2-5, Groundwater Sampling.

Please note in the report how groundwater elevations were measured, that is, whether the groundwater elevation used in the contours was obtained before or after purging the well, whether an electric probe, or oil/water probe, was employed, etc.

Response: This section has been modified to indicate that a synoptic water level round was performed on August 5, 2010. Data from the synoptic round are presented in Table 3-1 and Appendix C of the SRI. Groundwater elevations in each of the wells were determined based on depth to groundwater measurements that were collected within a 4-hour time period, using a Solinst oil/water interface probe. Depths were measured relative to a surveyed point marked on the top of each well casing.

Comment 3: Page 2-9, Section 2-6, Sediment and Surface Water Sampling; 2nd paragraph.

The report notes that the surface water sampling requested by RIDEM, could not be collected because Deerfield Creek was dry on 12 August 2010. Please explain why the RIDEM requested surface water samples were not collected during the first round of surface water sampling performed on 25 July 2010. RIDEM's comments were dated 8 June 2010 and the surface water sampling was performed on 25 July 2010, approximately 47 days after RIDEM 's dated request.

Response: The SRI text on page 2-9 has been corrected to indicate that the initial round of sediment and surface water sampling was performed on June 25, 2010 not July 25, 2010 (see also Table 3-5 and the sample log sheets in Appendix C of the SRI). The Navy's responses to RIDEM's June 8, 2010 comments were issued on July 2, 2010. In the same responses, it was agreed to conduct the requested surface water analyses except for TPH. However, this post-dated the initial sampling event and upon returning to the sample locations on August 12, 2010, the creek was dry.

Comment 4: Page 3-2, Section 3.1.1 North Meadow - Groundwater; 4th paragraph.

There appears to be a typo in the following sentence: *"TCE concentrations decreased over time in well MW-02B, from 1,500 µg/L in 2003 to 190 µg/L in 2008, and then to 150 µg/L in 2010."* Please change MW-02B to MW-03B.

Response: The typographical error has been corrected as noted in the 5th paragraph of Section 3.1.1.

Comment 5: Page 3-2, Section 3.1.1, North Meadow Groundwater; 4th paragraph.

This section states that the concentration of certain VOCs decreased over time in MW 02B (note well should have been listed as MW 03B) between the Phase I RI and the Supplemental RI. This and subsequent sections of the report then discusses biodegradation and the associated spatial distribution of anaerobic conditions and whether degradation is occurring in all wells. Please include in the report a table which contains the analytical results for the individual wells over the various sampling rounds with their associated sampling depths.

Response: The requested table has been added as Attachment E to the SRI report (note: a similar table was provided in the March 2, 2001 letter work plan for additional MNA sampling at Site 8).

Comment 6: Page 3-3, Section 3.1.2, North Meadow Soils; last sentence.

"No continuing source in this area is indicated by these results."

Contrary to this statement, based upon the groundwater data collected to date at the site it appears that a continuing source could potentially be in the vicinity of monitoring well (128B) with the highest detection of TCE. Two additional soil samples collected in this large area is not sufficient to make this conclusion. Please delete the above sentence from the report.

Response: This section discusses the soil results in the North Meadow, which were sampled at RIDEM's request to check whether there is a source of VOCs in soil. The results of the soil sampling are consistent with the CSM, showing that there is no known continuing source of VOCs in soil.

The TCE detection at MW-03B, and the concentrations and spatial distribution of TCE and its daughter products at other locations, as reported in the RI and SRI, support the CSM as presented in the RI, i.e., a localized plume of TCE (and daughter products) in bedrock groundwater in the North Meadow is migrating in a northwesterly direction (towards MW-128B) and is influenced by a major north-south-trending bedrock fracture zone in this area. The CSM will be updated in the FS.

See also the response to EPA's Specific Comment #1.

Comment 7: Page 3-3, Section 3.2.1, Building 179 Area Groundwater, Figure 3-1.

Figure 3-1 depicts the groundwater contours for the site. Based upon the information presented it appears that the legs of the 50, 45, and 40 contours west of the stream should not be as steep to the north east as presented and instead include a northwestern component. Please review these contours and modify the figure, if necessary.

Response: No modification is necessary. The potentiometric surface contours in this part of the site closely mimic the ground surface contours. This is particularly evident in the potentiometric surface contours for 30 feet and 35 feet, east of the creek where there are more data. These same potentiometric surface contours are expected to generally mimic the ground surface contours as they continue on the west side of the creek, as drawn.

Comment 8: Page 3-4, Section 3.2.1, Building 179 Area Groundwater; last paragraph.

This paragraph states "*...anaerobic biodegradation is likely supported in localized areas*". However, only one of the three wells tested in this area supported this statement. Please delete or revise the last paragraph from the report, accordingly.

Response: The text was worded as such ("supported in localized areas") because the one in three wells showing favorable conditions was in contrast to bedrock groundwater elsewhere at the site where "...conditions likely to support anaerobic reductive dechlorination are widespread throughout the area..." It should be noted that the two overburden wells showing lower potential for anaerobic biodegradation (MW-11 and MW-12) are essentially side-gradient wells outside the chlorinated ethene plume (see Table 3-2 of the draft SRI). The lack of chlorinated ethene detections in these wells contributes, in part, to the lower MNA scoring.

Additional natural attenuation data were collected during March 14-18, 2011. An updated evaluation of natural attenuation at the site will be provided in the FS.

Comment 9: Page 3-6, Section 3.3.1, Building 185 Complex Soils.

Figure 3-8 is referenced in this section of the text but was not found with the figures. Please provide Figure 3-8.

Response: The figure has been included in the draft final SRI (renumbered as Figure 3-9).

Comment 10: Page 3-6, Section 3.3.1, Building 185 Complex Soils

Soil Boring B185A1-SB3 had a jar head space reading of 1,042 ppm. This reading was substantially higher than the other borings collected in this area. Despite the high jar head space reading the concentration of contaminants in this boring were similar or less than those observed in other borings which had lower jar head space readings. Please add to this section a discussion in regards to these discrepancies. This discussion should also note that this sample emitted a petroleum odor (this was the only petroleum odor noted in the boring logs) and should consider whether the observed PID readings were due to either TPH or Otto Fuel.

Response: Although field observations for the soil sample collected from 3 to 5 feet below ground surface (bgs) at B185A1-SB3 included an elevated jar headspace reading of 1,042 ppm and a slight petroleum odor, the laboratory analytical results for the sample reported only trace to low levels of several VOCs and SVOCs. None of the VOCs or SVOCs exceeded criteria except for benzo(a)pyrene; however, benzo(a)pyrene was detected at higher concentrations in several other samples where PID readings were not elevated. That sample was also analyzed for the Otto Fuel compound 1,2-propylene glycol dinitrate (PGDN); however, PGDN was not detected. As can be seen in the laboratory analytical results, neither typical TPH chemicals (within VOCs/SVOCs) nor Otto fuel were detected in the sample. Therefore, the elevated PID response is attributed to moisture or dirt in the sensor or the presence of an ionizable chemical that is not a site contaminant. A footnote has been added to Section 2.1.

Comment 11: Page 4-1, Section 4-1, Derivation of Screening Criteria; 1st paragraph.

This section notes that as part of the elimination process, soil data was compared to background values from the base wide and NUSC Background Studies. In order to perform a background assessment, data from comparable soil types must be employed. Please provide a map of the soil types for the NUSC complex, as well as, the soil types used in the background assessment and the values employed in the assessment.

As you are aware, under "Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites" (EPA 540-R-01-003 OSWER 9285.7-41 September 2002) EPA guidance (EPA 540-R-01-003) calls for retaining rather than eliminating chemicals based on background: "In RAGS, EPA cautioned that eliminating COPCs based on background (either because concentrations are below background levels or attributable to background sources) could result in the loss of important risk information for those potentially exposed, even though cleanup may or may not eliminate a source of risks caused by background levels. In light of more recent guidance for risk-based screening (EPA, 1996; EPA, 2000) and risk characterization (EPA, 1995c), this policy recommends a baseline risk assessment

approach that retains constituents that exceed risk-based screening concentrations. This approach involves addressing site-specific background issues at the end of the risk assessment, in the risk characterization. Specifically, the COPCs with high background concentrations should be discussed in the risk characterization, and if data are available, the contribution of background to site concentrations should be distinguished. COPCs that have both release-related and background-related sources should be included in the risk assessment. When concentrations of naturally occurring elements at a site exceed risk-based screening levels, that information should be discussed qualitatively in the risk characterization."

Please retain contaminants which exceed risk based screening numbers in the risk assessment as they attribute to the overall risk at the site.

Response: The SRI presented a qualitative evaluation of the new data to site risks identified in the HHRA. In this step with the SRI data, no COPCs were eliminated based on the background comparison. In the HHRA, the cumulative risk was measured for the site-related COPCs and the background COPCs. The SRI does not change the conclusions of the HHRA already published. However, in accordance with Navy Policy, COPCs identified in the risk assessment that are within background levels are not carried forward as COCs for PRG development.

As requested, the draft final SRI has been edited to clarify the background assessment and to include a map of the soil types for the NUSC complex.

Comment 12: Page 4-1, Section 4-1, Derivation of Screening Criteria & Table 4-1.

The report employed EPA RSL equivalent to a lifetime cancer risk of 10^{-6} for carcinogens and a HQ of 1 for non carcinogens. Please add to this section and Table 4-1 RIDEM DEC and leachability criteria.

Response: In accordance with Navy Policy, EPA RSLs were used to select COPCs, and RIDEM DECs and leachability criteria will be used as chemical-specific ARARs in the FS for PRG selection. RIDEM's soil standards were included as Table 4-1 for informational purposes in this SRI.

Comment 13: Page 4-5, Section 4-3, Comparison of Concentrations to Exposure Point Concentrations Used in the Human Health Risk Assessment, Tables 4-13-4-17.

This section discusses the exposure point concentrations and the overall risk for contaminants of concern in the RI and the Supplemental RI. In certain cases the risk number value is provided, in other cases the report simply states that the risk falls within a certain range. Tables 4-13-4-17 contain the exposure point concentrations from the RI and the Supplemental RI. Please include in these tables, (or submit separate tables) the corresponding risk values. These tables should be submitted in response to comments prior to the submission of the draft final report.

Response: The planned use of the data was to provide a qualitative comparison of new (SRI) data to the previous (RI) data. Based on the concentrations measured, the SRI does not change the conclusions of the risk assessment already published (i.e., new risk values were not calculated using the SRI data).

Comment 14: Page 4-5, Section 4-3, Comparison of Concentrations to Exposure Point Concentrations Used in the Human Health Risk Assessment.

The report compares the overall risk in the Phase I RI and the Supplemental RI to the acceptable EPA risk ranges. Please include a comparison to the RIDEM acceptable risk ranges (10^{-6} for individual, 10^{-5} cumulative). This information should be submitted in response to comments prior to the submission of the draft final report.

Response: See the response to Comment #13. The requested comparison was provided in Section 6.7 of the RI report, reproduced below.

Area	Medium	ILCR Exceeds EPA's Target Risk Range of 10^{-4} to 10^{-6}	ILCR Exceeds RIDEM's Cumulative Risk Level of 10^{-5}
Exposed Soil	Surface Soil	Hypothetical Child Residents Hypothetical Lifelong Residents	Industrial Workers Child Recreational Users Lifelong Recreational Users Hypothetical Child Residents Hypothetical Adult Residents Hypothetical Lifelong Residents
	Subsurface Soil	Industrial Workers Adolescent Trespassers Child Recreational Users Adult Recreational Users Lifelong Recreational Users Hypothetical Child Residents Hypothetical Adult Residents Hypothetical Lifelong Residents	Construction Workers Industrial Workers Adolescent Trespassers Child Recreational Users Adult Recreational Users Lifelong Recreational Users Hypothetical Child Residents Hypothetical Adult Residents Hypothetical Lifelong Residents
Paved Soil	Surface Soil	Hypothetical Child Residents Hypothetical Lifelong Residents	Industrial Workers Child Recreational Users Lifelong Recreational Users Hypothetical Child Residents Hypothetical Adult Residents Hypothetical Lifelong Residents
	Subsurface Soil	Hypothetical Child Residents Hypothetical Lifelong Residents	Industrial Workers Child Recreational Users Lifelong Recreational Users Hypothetical Child Residents Hypothetical Adult Residents Hypothetical Lifelong Residents

Source: RI for Site 8 NUSC Disposal Area (Tetra Tech 2010)

Comment 15: Page 4-5, Section 4-3, Comparison of Concentrations to Exposure Point Concentrations Used in the Human Health Risk Assessment.

This section of the report notes how risk at the site compares to various scenarios, residential, construction, etc. Please be advised that the residential and recreational scenarios are equivalent under RIDEM Regulations. Therefore, exceedances of residential should also be considered exceedances of recreational.

Response: Comment noted. The text has been clarified accordingly.

Comment 16: Page 4-5, Section 4-3, Comparison of Concentrations to Exposure Point Concentrations Used in the Human Health Risk Assessment.

The report notes the actual risk values or the ranges for exposure to the various media. Please indicate whether the quoted ranges are cumulative or represent individual contaminants. Under RIDEM Regulations, the cumulative range should be evaluated. If this was not done please provide this information in the response to comments.

Response: The SRI has been clarified to indicate that the risk ranges stated in this section are cumulative.

Comment 17: Page 4-9, Section 4-5, Summary.

This section contains a table delineating which scenarios exceed EPA acceptable risk range. Please include in this table or a separate table depicting exceedances of RIDEM acceptable risk range (10^{-5} cumulative, 10^{-6} individual, HQ of 1) employing RIDEM RES-DEC for soil and groundwater standards. In addition RIDEM TPH criteria must also be employed.

Response: See the responses to Comments #12, #13, and #14.

Comment 18: Page 5-1, Section 5-1 Sediment, 3rd paragraph.

The report states that carbon disulfide was eliminated as it is a common laboratory contaminant. As you are aware, typically the information from field blanks and other source of QA information is normally used in the process of determining whether a suspect laboratory contaminant is due to lab contamination. Please perform this assessment and discuss the results in the report why this is or is not a lab contaminant.

Response: There are two places in the SRI where chemical detections are considered laboratory artifacts (carbon disulfide is mentioned on page 5-1 and 2-butanone is mentioned on page 5-2). Both of these compounds (and others) were detected in laboratory blanks during the SRI. Carbon disulfide was detected in laboratory blanks associated with SDG-WE19-2 and SDG WE19-10 and 2-butanone was detected in laboratory blanks associated with SDG-WE19-3. The data validation reports have been added as an appendix to the draft final SRI report.

Comment 19: Page 6-3, Section 6-4, Risk Assessments, 1st Paragraph.

The report states that the unacceptable risks were identified for different exposure scenarios in the Phase I RI and the Supplemental RI; however, the COPC would remain the same. The FS and the ROD will develop remedies based upon the exposure scenarios. An acceptable remedy for a construction worker may not be acceptable for residential exposure. As such, independent of whether the COPC would remain the same if an unacceptable exposure scenario has been identified in the Supplemental RI, please carry forth all risk receptors through the CERCLA process including the ROD.

Response: Concur. The FS will identify remedies that are protective of the receptors for which risk is identified, as determined by exceedence of the risk-based cleanup goals and ARARs.

Comment 20: Page 6-3, Section 6-4, Risk Assessments, last paragraph.

The report notes that COCs were identified in the Supplemental RI were not identified as COCs in the Phase I RI even though they fall within the same range of concentrations. Please elaborate in more detail in the text why these COCs fall out of the COPCs screening process since a few COCs reviewed by this Office are above the screening criteria and MCLs.

Response: The constituents detected during the SRI at concentrations that were within the concentrations evaluated in the RI and risk assessment, and that were not selected as COPCs in the RI, will also not be retained as COPCs based on the SRI data. Section 6.4 has been revised to indicate that 1,1,1-TCA and 1,1-DCE were detected at concentrations above the RI data range, and were retained as COPCs in the SRI. The other four constituents were not.

Comment 21: Page 6-4, Section 6-5, Refinements of COPCs; 1st paragraph, Tables 6-1-6-6.

The report notes that certain contaminants of concern were eliminated based upon a comparison to background data (average and max). Please include a section in the Supplemental RI describing how this assessment was performed.

Based upon a review of the data it appears that certain contaminants which were rejected based upon background should have been retained. For example, the observed maximum concentration of arsenic at the site was 122 ppm. The maximum background value was 71 ppm (also be advised RIDEM does not consider the background data set with 71 ppm as appropriate for a background study) and the average concentration was 16 ppm for the site and 11 ppm for background. Despite the site concentration being higher than the employed background concentration arsenic was not retained as a contaminant of concern. Also, the maximum and average site concentration for chromium was 103 ppm and 17 ppm while the background corresponding values were 28 ppm and 13 ppm. Please include arsenic and chromium as contaminants of concern and review the background analysis conducted on the other contaminants and provide the requested information on how the background assessment was performed in the response to comments.

Response: The discussion in Section 6.5 explaining the COPC refinement has been clarified. It should be noted that this refinement step is usually performed during the PRG development process in the FS, but was included in this SRI to help expedite the FS. The process is limited to the following steps: COPCs identified in the RI were compared to (1) the target risk value calculated from the risk assessment, and (2) to an appropriate background concentration (note that there is no available groundwater background used). The representative site concentration was selected as the 95% UCL of the available data (including both the RI and the SRI data). It is agreed that the soil and sediment background values also should be 95% UCL values to assure consistency with comparison, and Tables 6-2 and 6-3 have been revised accordingly.

An updated statistical evaluation has been performed for arsenic and chromium with respect to soil types (see Attachment A). Arsenic in type "Se" soil was found to be consistent with background levels. Arsenic in type "PmB" soils and chromium in both "Se" and "PmB" soils were found to exceed background levels. Therefore, these constituents have been retained as COCs in the respective areas. As noted in the response to Comment #11, a map of the soil types for the NUSC complex has been added to the SRI (Figure 4-1).

Comment 22: Page 6-4, Section 6-5, Refinements of COPCs, 2nd and 3rd paragraphs, Table 6-1.

The arsenic concentration in the groundwater was reported at a maximum of 503 and a mean of 34.8 µg/l. The background maximum arsenic concentration was 24.7 and a mean of 9.82 µg/l, respectively. The report concludes that the observed arsenic at the site is not the result of a CERCLA release. The site was a landfill which received industrial and hazardous waste from the Navy base, as such a release is attributable. Please remove this conclusion and retain arsenic as a contaminant of concern in the groundwater.

Response: Regarding arsenic (and manganese) in groundwater, it is acknowledged that the release at Site 08 may have produced a chemical environment that resulted in elevated concentrations of arsenic and manganese in the groundwater as a secondary effect (i.e., mobilization of arsenic and manganese from soil to groundwater). Therefore, as agreed at the April 14, 2011 technical meeting, arsenic and manganese will be considered COCs that resulted from a secondary release at Site 08. The Remedial Action to be conducted for the primary release may mitigate the chemical environment that causes the mobilization of arsenic and manganese and an active remedy for arsenic and manganese may not be necessary. Given the site activity and use (e.g., industrial area with no drinking water wells), arsenic and manganese may be addressed through groundwater monitoring and interim land use controls supporting the overall Remedial Action rather than through direct treatment.

Comment 23: Page 6-4, Section 6-5, Refinements of COPCs; 2nd paragraph, Tables 6-3 & 6-5.

The foot notes for these tables state that sediment samples were compared to background soil values. Please be advised that sediment samples should have been compared to background sediment samples not soil samples. Please conduct this assessment and modify the report accordingly.

Response: The footnote was in error and has been corrected. The background data provided are sediment data from upgradient sediment sample stations (Tetra Tech, 2006).

Comment 24: Page 6-4, Section 6-5, Refinements of COPCs; 2nd paragraph, Table 6-4.

Table 6-4 foot note 1 states that there is no record of a CERCLA release of pesticides at the site. The Navy does not have manifest, bills of ladening, etc. documenting what was disposed of at this known disposal site. This cannot be used to state that observed contamination was not related to site activities. Further, the statement that pesticides "are likely from anthropogenic sources" exclusive of site activities is speculative and cannot be substantiated. Please remove this statement from the foot note and any other section in the report.

Response: The Navy maintains that the pesticides found in the fish tissue at the NUWC pond are not present as a result of disposal of pesticides at the site. The concentrations and distribution of pesticides measured in the soil, groundwater, and sediment, as documented in the RI, indicates no release of pesticides. The presence of pesticides in fish is likely either from heavier pesticide usage at the site pond compared to the reference ponds, or is a result of differences in the fish themselves (older or larger fish sampled at NUWC pond than the reference ponds: fishing is restricted at NUWC, but the reference ponds are open to fishing and, as such, the fish at NUWC would tend to have more time to accumulate more pesticides over time). Because the soil, groundwater, and sediment data show insignificant pesticide concentrations and an absence of hot spots, it would be difficult to justify a remedy for pesticides in fish tissue if there is no source of these contaminants to target. Therefore, as discussed at the April 14, 2011 technical meeting, the footnote has been revised to read: "the data distribution does not suggest disposal or releases of pesticides at the site other than normal past use at and upgradient of the site".

Comment 25: Page 6-4, Section 6.5, Refinements of COPCs; Tables 6-1-6-6.

Due to the fact that concentrations in surface water samples of certain organics and metals exceeded criteria in the Phase I RI, please discuss in this report the risk evaluation of surface water for the site.

Response: The SRI has been amended to indicate that because there were no identified risks associated with surface water, there were no COPCs identified in the RI, and no further COPC refinement is required.

Comment 26: Page 6-4, Section 6.5, Refinement of COPCs; Tables 6-1-6-6.

The report proposes eliminating COCs if the site wide average concentration is below the screening benchmarks (EPA RSL or RIDEM-DEC/leachability). Please use the maximum and/or reasonable maximum in lieu of the average concentration in determining which COCs are carried forth in the process. Please modify the report accordingly.

Response: The 95% UCL is the appropriate value to be used for this refinement step. If there are insufficient numbers of samples in a data set, then a 95% UCL is not calculated and the maximum value was used instead.

Comment 27: Page 6-4, Section 6.5, Refinement of COPCs; Tables 6-1&6-6.

The report proposes eliminating chromium because the oxidation state may not be in the more toxic form. The concentration of chromium is well above MCLs and as the oxidation state is not known it cannot be rejected, based upon the assumption that it may be in the less toxic form. Similarly, manganese is proposed to be eliminated due to toxicity and source uncertainties. Please include chromium and manganese as COCs, to be carried through the PRG process.

Response: Although the maximum chromium value (868 ug/L) is well above the MCL (100 ug/L), it is noted that the 95%UCL (212 ug/L) and the average concentration (101 ug/L) are more consistent

with the MCL. However, as discussed at the April 14, 2011 technical meeting, chromium will be retained as a COC in groundwater (conservatively assumed to be present as Cr^{+6}) unless/until future sampling demonstrates that it is sufficiently present in the less toxic, trivalent form Cr^{+3} to reduce the calculated risks. If confirmed to be present in the trivalent form, then it is anticipated that chromium would be removed from the COC list.

Regarding manganese in groundwater, see the response to Comment #22.

Comment 28: Page 6-4, Section 6-5, Refinements of COPCs; 2nd paragraph, Tables 6-1-6-6.

These tables contain a selection of COCs which will be forwarded into the PRG process. The tables note that contaminants which exceed the 10^{-5} criteria will be retained for PRGs. In accordance with Section 4-1 of this document and in accordance with RIDEM Regulations, please include in the PRG process all COCs which exceed the 10^{-6} criteria and/or the HQ of 1. In accordance with CERCLA, where there is a difference between the values, either the RIDEM criteria or the EPA RSL (which ever is more conservative) will be employed in this process.

Please be advised that since there is a known risk at this site, in accordance with CERCLA, RIDEM Site Remediation Regulation must be listed and employed in the screening process, as ARARs in these tables and in the text (RIDEM direct exposure, leachability, TPH, groundwater, and surface water criteria). Finally, the cumulative risk for each scenario cannot exceed RIDEM Regulations of 10^{-5} therefore, as a final step in the elimination of COCs, the cumulative risk of the proposed COCs for elimination must be combined with the retained COCs to evaluate whether an exceedance of 10^{-5} occurs.

Response: In the draft SRI, the Navy proposed that site COCs should include all COPCs that exceed target risk values that are based on a cancer risk of 1E-5 and a HQ of 1.0, as long as they do not exceed background concentrations and as long as the representative site concentrations (95% UCL) of these COPCs exceed the target risk value (if a maximum value was used to calculate the risk, the 95% UCL of the data may not exceed this value). In accordance with Navy and EPA policies, only the EPA RSLs are used in the risk calculations. RIDEM criteria, because they are ARARs, are compared to the target risk values, and the lower of the two may be selected as the PRG. This approach helps to eliminate constituents that are not truly part of the CERCLA release at the site. Inclusion of a large list of COCs may unnecessarily restrict the remedial alternatives. As discussed at the April 14, 2011 technical meeting, RIDEM's regulations are presented in the SRI for informational purposes. ARARs will be further considered during the development of PRGs in the FS.

Comment 29: Page 6-4, Section 6.5, Refinement of COPCs, Table 6-4.

The report proposes the elimination of COCs found in fish tissue due to the oxidant state of chromium, the lack of documentation that a particular contaminant was disposed of at the site (manifest, bills of ladening, etc), and the position that the PCBs found in the fish could not be attributed to sediments. Due to the fact that the oxidation state of chromium was never measured and this site was a known disposal area please retain chromium as a COC. In regards to PCBs bioaccumulation, please demonstrate that the observed concentrations in the various media would not result in the levels observed in the fish, and as such the concentrations observed in the fish are due to other sources.

Response: Chromium has been removed from Table 6-4 as it was not identified as a COPC in fish tissue during the RI (per Table 6-38 of the RI and as noted by EPA in their Specific Comment #23 on the SRI). Regarding PCBs, footnote 4 has been deleted. However, PCBs and pesticides were not identified as COCs in site soil or groundwater. Because pesticides are present in background sediment and were not detected at high concentrations in site soil, the distribution of pesticides in site sediment appears to be consistent with normal historical use of pesticides in wetland areas. The site pond would be an accumulation point for historic spraying in the upgradient wetlands and would affect the pond fish accordingly. Similarly, pond sediment would be expected to accumulate PCBs from upgradient areas over time. As noted in response to Comment #24, fish in

Deerfield Pond may be expected to accumulate greater quantities of pesticides and PCBs because fishing is restricted at NUWC, compared to the reference ponds where fishing tends to remove the older, larger fish.

Comment 30: Page 6-4, Section 6.5, Refinement of COPCs, Table 6-5.

The report proposes eliminating a number of COCs, which were being retained in the Phase I RI, (such as PAHs, pesticides, etc) based upon no documented evidence of a CERCLA release and comparison to background. As you are aware of the site is a known disposal area which received a wide variety of hazardous waste (manifests and bills of ladening are not available). As such, it is inappropriate to state the there is no evidence of a CERRCLA release for this site. Also, it does not appear that the background analysis was conducted using appropriate media (background soil samples were used for sediment comparison instead of using background sediment samples). Please retain COCs previously identified in the Phase I RI for the FS/PRG process.

Response: Regarding the COPC refinement process, please refer to the response to Comment #21. Regarding pesticides, please refer to the response to Comment #24. Regarding sediment background, please refer to the response to Comment #23. The footnotes in Table 6-5 have been revised to clarify the background data set that was used for each media.

Further, an updated statistical evaluation has been performed for arsenic and chromium in stream sediment which demonstrates that the detected concentrations of these two constituents in stream sediment are consistent with background conditions (see Attachment A).

Comment 31: Page 6-4, Section 6.5, Refinement of COPCs, Table 6-5.

The approach employed for selecting COCs for sediments in regards to ecological risk needs further refinement in regards to the use of background values and analysis of data. These issues may be resolved in the PRG process. Please include in the report to be carried to the PRG process the COCs (including TPH) which exceeded the screening values.

Response: Regarding the process of the refinement, please refer to the response to Comment #21. Regarding Table 6-5 (ecological COPCs), a Probable Effects Concentration quotients (PEC-quotient), or similar approach, may be considered during the PRG development of the FS in order to capture the chemicals with the best association with toxicity (as discussed at the April 14, 2011 technical meeting). TPH was not included in the Chapter 6 tables because it was not identified as a COPC in the risk assessments; however, TPH may be addressed during the PRG development in the FS as a chemical-specific ARAR.

Comment 32: Page 6-4, Section 6.5, Refinement of COPCs, Table 6-6.

The following contaminants were listed as "Chemicals Retained as Chemicals of Concern" in the Phase I RI in Table 6-38; however, they are not included in Table 6-6:

Soil:	Arsenic, Naphthalene, Total Aroclors; "Carcinogenic PAHs" should be listed instead of "Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, and Indeno(1,2,3cd)pyrene"
Groundwater:	Bromomethane, Chloroform, Benzo(b)fluoranthene, Dieldrin, Aluminum, Antimony, Arsenic, Barium, Beryllium, Chromium, Copper, Iron, Manganese, Thallium and Zinc
Sediment:	Arsenic and Carcinogenic PAHs

Please retain these COCs forward to the FS/PRG stage for further evaluation.

Response: The purpose of Tables 6-1 through 6-5 is to eliminate the constituents that do not exceed background or acceptable risk-based values from the list of COCs being carried forward to the FS for PRG development. Table 6-6 has been updated in accordance with the responses to RIDEM and EPA comments.

TABLE 1
ANALYTICAL RESULTS (DETECTIONS IN SOIL), 11/22/2010
SITE 8, NUSC DISPOSAL AREA
NAVAL STATION NEWPORT, RHODE ISLAND

SAMPLE ID	Benchmarks		B179-SB2-0001-NOV2010	B179-SB2-0204	B179-SB2-0204-D	B179-SB2-0204-AVG	B179-SB3-0001-NOV2010	B179-SB3-0406
LOCATION ID			B179-SB2	B179-SB2	B179-SB2	B179-SB2	B179-SB3	B179-SB3
SAMPLE DATE			11/22/10	11/22/10	11/22/10	11/22/10	11/22/10	11/22/10
TOP DEPTH			0 FT	2 FT	2 FT	2 FT	0 FT	4 FT
BOTTOM DEPTH			1 FT	4 FT	4 FT	4 FT	1 FT	6 FT
SACODE		RIDEM	NORMAL	ORIG	DUP	AVG	NORMAL	NORMAL
SUBMATRIX		RES	SS	SB	SB	SB	SS	SB
QC TYPE	EPA RSL	DEC	NM	NM	FD	NM	NM	NM
VOLATILES (UG/KG)								
1,1,1-TRICHLOROETHANE	8700000	540000	2.4 U	2.1 J	0.64 J	1.37 J	2.5 U	0.49 J
2-BUTANONE	2.8E+07	1E+07	12 U	54 J	14 UJ	30.5 J	12 U	11 U
ACETONE	6.1E+07	7800000	38 U	260 J	19 UJ	135 J	52 U	18 UJ
TOTAL CHLORINATED VOCS			2.84 UJ	2.1 J	0.64 J	1.37 J	2.96 UJ	0.49 J
SEMIVOLATILES (UG/KG)								
ACENAPHTHENE	3400000	43000	19 J	5.8 J	6.6 J	6.2 J	6.5 J	6.2 J
ACENAPHTHYLENE	3400000	23000	12 UJ	11 UJ	9.7 J	7.6 J	6.8 J	11 UJ
ANTHRACENE	1.7E+07	35000	64	2.8 J	1.8 J	2.3 J	4.3 J	2.7 J
BENZO(A)ANTHRACENE	150	900	170	16 J	19 J	14.5 J	27	16 J
BENZO(A)PYRENE	15	400	100	13 J	9.3 J	11.2 J	24	13 J
BENZO(B)FLUORANTHENE	150	900	160	17 J	14 J	15.5 J	31	17 J
BENZO(G,H,I)PERYLENE	1700000	800	51	5.4 J	4.1 J	4.75 J	15 J	5.8 J
BENZO(K)FLUORANTHENE	1500	900	46	4.8 J	12 U	5.4 J	10 J	5 J
CHRYSENE	15000	400	130	8.1 J	5.2 J	6.65 J	20 J	8.1 J
DIBENZO(A,H)ANTHRACENE	15	400	12 J	11 U	12 U	11.5 U	11 U	11 U
FLUORANTHENE	2300000	20000	490	21 J	11 J	16 J	43	19 J
FLUORENE	2300000	28000	25 J	11 UJ	10 J	7.75 J	10 J	9.8 J
HIGH MOLECULAR WEIGHT PAHS			1610 J	106 J	69.7 J	87.8 J	240 J	108 J
INDENO(1,2,3-CD)PYRENE	150	900	47	6 J	3.3 J	4.65 J	14 J	5.7 J
LOW MOLECULAR WEIGHT PAHS			388 J	18.5 J	34.8 J	26.6 J	65.6 J	31.7 J
PHENANTHRENE	1700000	40000	280	9.9	6.7 J	8.3 J	38	13 J
PYRENE	1700000	13000	400	15 J	9.8 J	12.4 J	56	18 J
TOTAL CARCINOGENIC PAHS-HALFND	15		665 J	70.4 J	56.8 J	63.6 J	132 J	70.3 J
TOTAL CARCINOGENIC PAHS-POS	15		665 J	64.9 J	44.8 J	54.8 J	126 J	64.8 J
TOTAL PAHS			1990 J	125 J	104 J	114 J	306 J	139 J
PESTICIDES/PCBS (UG/KG)								
4,4'-DDD	2000		2 U	1.9 U	2.1 U	2 U	3.6 J	1.8 U
4,4'-DDE	1400		3.2 J	0.36 J	0.38 J	0.37 J	0.89 J	0.37 J
4,4'-DDT	1700		1.6 J	1.9 U	2.1 U	2 U	1.2 J	1.8 U
TOTAL DDD/DDE/DDT			4.8 J	0.36 J	0.38 J	0.37 J	5.69 J	0.37 J
METALS (MG/KG)								
ALUMINUM	77000		13100	13400	11800	12400	10200	9980
ARSENIC	0.39	7	4.2	5	4.4	4.7	3.6	4.7
BARIUM	15000	5500	26.9	25.1	23	24.2	23.6	20.2
BERYLLIUM	160	0.4	*0.43 J*	*0.45*	0.38 J	*0.415 J*	0.35 J	0.34 J
CALCIUM			766	923	751	837	1170	900
CHROMIUM	0.29		13.3	16.2	12.5	14.4	9.9	7.9
COBALT	23		6.1	8.5	7.1	7.8	6.2	4.2
COPPER	3100	3100	10.1	12.5	10.2	11.4	11.1	8.1
IRON	55000		15100	21400	16900	19200	15700	13700
LEAD	400	150	11.3	11.6	15	13.3	11.8	7.9
MAGNESIUM			2190	3440	2480	2960	2470	1660
MANGANESE	1800	390	142	198	146	172	229	159
MERCURY	5.6	23	0.03 J	0.008 J	0.008 J	0.008 J	0.02 J	0.008 J
MOLYBDENUM	390		0.25 J	0.2 J	0.2 J	0.2 J	0.21 J	0.23 J
NICKEL	1500	1000	11.7	15.9	12.9	14.4	11.4	8
POTASSIUM			418	427	357	392	756	661
SELENIUM	390	390	0.38 J	0.61 U	0.43 J	0.368 J	0.69 U	0.35 J
SILVER	390	200	5.1	0.35 UJ	0.16 J	0.168 J	0.4 UJ	0.31 UJ
SODIUM			77.3 J	62.3 J	66.1 J	64.2 J	101	127
THALLIUM		5.5	0.08 J	0.06 J	0.06 J	0.06 J	0.06 J	0.08
VANADIUM	390	550	21.2	21.2	16.9	19	14.2	12.5
ZINC	23000	6000	32.8	41.8	34.7	38.2	87.7	27.9

Note: PGDN was non-detect.

Dark Shading - Exceeds RSL; Bold/Italic - Exceeds DEC; Light Shading - Detected; U - Not Detected;
J - Quantitation is approximate; R - Rejected; NA - Not Analyzed

ATTACHMENT A
Background Comparisons
May 2011

Introduction

The comparative statistical method was used to compare arsenic and chromium soil and stream sediment data from Site 08, NUSC Disposal Area to the appropriate Newport background data set. The comparative method utilizes several statistical techniques to compare site and background data. For the soil evaluations, the site data were compared to the background data of the same soil type. The soil types that were found at Site 08 along with their abbreviations are listed below:

non-hydric Pittstown silt and loam (PmB)
non-hydric Stissing silt and loam (Se)

The comparison of the site data with the background data involved a graphical evaluation and a hypothesis test comparing the mean/median concentrations. The graphical evaluation consisted of visual inspection of boxplots, normal probability plots, and histograms. The graphical displays are presented at the end of the section. The statistical packages R version 2.9.2 and Pro UCL version 4.1 were used to conduct the statistical evaluations. The final conclusions for Site 08 soil and stream sediment background comparisons are presented in Tables A-1 and A-2, respectively.

Statistical Techniques

Boxplots show the central tendency, degree of symmetry, range of variation, and potential outliers of a data set. The data set is shown as a rectangular box that represents the middle 50 percent of the data. The upper value of the box represents the 75th percentile and the lower value of the box represents the 25th percentile. The median is represented by the middle line in the box. Box plots for the same analyte were plotted on the same graph. The plots were visually inspected to see which data sets look similar and which ones differed. Particular attention was paid to see if the median from one data set fell within the 75th and 25th percentile range of the other data sets.

Probability plots are a useful first step for visually comparing two data sets in a single graph. If the site and background distributions were exactly identical, the plotted values would lie on a straight line through the origin. Deviations from this line show the differences between the two distributions. If the site and background distributions are similar, then the scattering of the two data sets will be mixed. If there is grouping of the two data sets, then data sets are most likely different.

If the graphical evaluation described above could not determine that the site data are above or below the background data, then an appropriate hypothesis test comparing the mean/median concentration was conducted. The Two Sample T-test, Wilcoxon Rank Sum test, Gehan test, the Two Sample Proportion Test, Quantile Test, and Slippage Test were used to determine if the site data are greater than the background data. A five percent significance level was used for all the hypothesis tests.

The Two Sample T-Test tests for a difference between two populations means when it can be assumed that the data are approximately normally distributed or sample sizes are large enough (m and n at least 30) and the data are all detected. If the variances of the two data sets are not equal than the Two Sample T Test with unequal variance was computed. The null and alternative hypotheses were:

H_o: Site Average ≥ Background Average + Background Standard Deviation
H_A: Site Average < Background Average + Background Standard Deviation

The Wilcoxon Rank-Sum (WRS) nonparametric test is used to test for a difference between median concentrations between two independent populations. The WRS test was used when the data were not normally distributed and there were less than three reporting limits if non-detected concentrations were present. The null and alternative hypotheses were:

H_o: Site Median ≥ Background Media + Background Standard Deviation
H_A: Site Median < Background Median + Background Standard Deviation

The Gehan nonparametric test is used to test for a difference between median concentrations between two independent populations. The Gehan test can be used when the background or site data sets contain multiple non-detects with different reporting limits. The Gehan test was used when the nondetects had more than three reporting limits. The null and alternative hypotheses were:

H_o: Site Median ≥ Background Media + Background Standard Deviation
H_A: Site Median < Background Median + Background Standard Deviation

The Quantile test is used to identify the differences in the right tails of the site and background distributions. This may be regarded as detecting if the values in the right-tail of the site population are greater than the right-tail of the background distribution. If the quantile test found the right tail of the site data to be larger than the right tail of the background data it was concluded that the site concentrations are greater than background. The null and alternative hypothesis were:

H_o: Right Tail of Site Data Set ≤ Right Tail of the Background Data Set
H_A: Right Tail of the Site Data Set > Right Tail of the Background Data Set

The Slippage test is used to test for a shift to the right in the extreme right-tail of the site versus the background concentrations. This is equivalent to asking if a set of the largest values of the site distribution are larger than the maximum value of the background distribution. If the slippage test found the extreme right tail of the site data to be larger than the background data it was concluded that the site concentrations are greater than background. The null and alternative hypothesis were the same as for the quantile test.

Summary of Graphical Evaluation Surface Soil

Arsenic PmB
The boxplots show that the site arsenic concentrations are similar to the background arsenic concentrations. This similarity can be seen by the site arsenic median concentration falling between the arsenic background median and 75th percentile. There are three site outliers that are shifted above the background maximum concentration. The normal quantile-quantile (Q-Q) plot shows a mixing of the two data sets throughout the majority of the combined data set; however, the largest five concentrations are from the site data set. The overlapping histograms also show that the two data sets are similar with the exception of the five largest site concentrations. The similarity of the majority of the two data sets can be seen by the background histogram falling within the first bin of the site histogram. Based on the visual examination it appears that the majority of the Site 08 arsenic concentrations from PmB soils are similar to the background arsenic PmB soils; however, there may be some Site 08 samples that are not representative of background conditions (five largest concentrations).

Arsenic Se
The boxplots show that the site arsenic concentrations are similar to the background arsenic concentrations. This similarity can be seen by the site arsenic median concentration falling between the arsenic background median and the 75th percentile. There are two site outliers that are shifted above the background maximum concentration. The normal Q-Q plot shows a mixing

of the two data sets throughout the majority of the combined data set; however, the largest concentration is from the site data set and is elevated above the rest of the combined data set. The overlapping histograms also show that the two data sets are similar with the exception of the largest site concentration. The similarity of the majority of the two data sets can be seen by the two histograms having similar ranges of concentrations and both being skewed right. Based on the visual examination it appears that the majority of the Site 08 arsenic concentrations from Se soils are similar to the background arsenic Se soils however there may be one Site 08 sample that is not representative of background conditions (largest concentrations).

Chromium PmB

The boxplots show that the site chromium concentrations are shifted slightly above the background chromium concentrations. This shift can be seen by the site chromium median concentration being greater than the chromium background 75th percentile. The normal Q-Q plot shows a slight separation of the data sets; more of the Site 08 concentrations fall in the upper tail while more of the background concentrations fall in the lower tail. The overlapping histograms also show that the site chromium concentrations are shifted above the background concentrations. The background histogram appears to be a subset of the Site 08 histogram. In each of the plots, the maximum Site 08 concentration falls well above the rest of the concentrations (site or background). Based on the visual examination, it appears that the Site 08 chromium concentrations from PmB soils are shifted slightly above the background chromium PmB soils.

Chromium Se

The boxplots show that the site chromium concentrations are shifted slightly above the background chromium concentrations. This shift can be seen by the site chromium median concentration being greater than the chromium background 75th percentile. There are also three site potential outliers that are elevated above the background data set. The normal Q-Q plot shows a slight separation of the data sets; more of the Site 08 concentrations fall in the upper tail. The overlapping histograms have a similar shape. Based on the visual examination, it appears that the Site 08 chromium concentrations from Se soils are shifted slightly above the background chromium Se soils.

Summary of Graphical Evaluation Stream Sediment

Arsenic

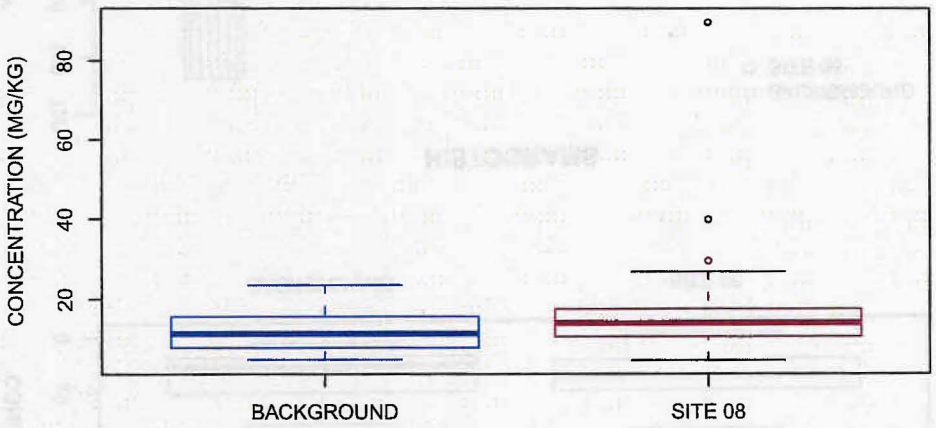
The boxplots show that the site sediment arsenic concentrations are similar to the background concentrations. This similarity can be seen by the median concentrations being roughly equal. The normal Q-Q plot shows that the arsenic Site 08 and background concentrations are similar. The similarity of the two data sets is show by the mixing of the two data sets throughout and the rough linearity of the plot. The overlapping histograms are both roughly bell shaped and have similar ranges of concentrations indicating that the two data sets are similar. Based on the visual examination, it appears that the Site 08 arsenic sediment concentrations are similar to the background arsenic concentrations.

Chromium

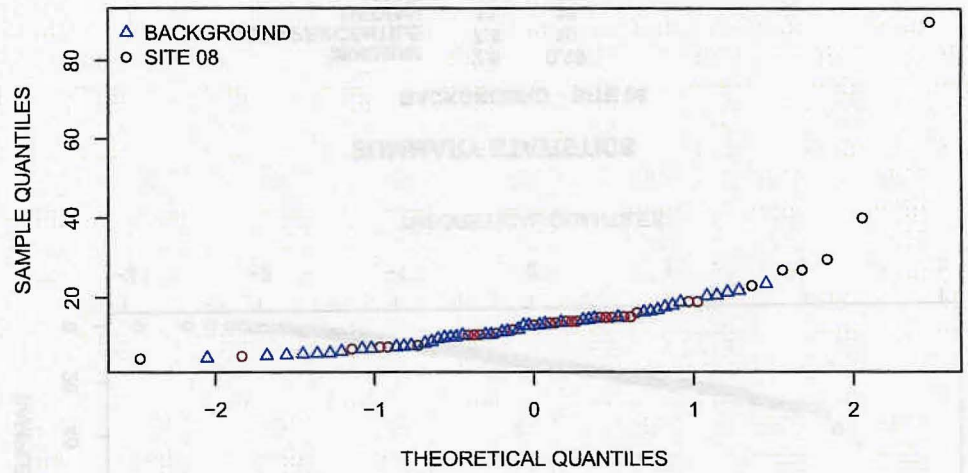
The boxplots show that the site sediment chromium concentrations are similar to the background concentrations. This similarity can be seen by the Site 08 median concentration falling between the background 25th percentile and the median concentration. The normal Q-Q plot shows that the chromium Site 08 and background concentrations are similar. The similarity of the two data sets is show by the mixing of the two data sets. The overlapping histograms are both roughly bell shaped and have similar ranges of concentrations indicating that the two data sets are similar. Each of the three plots indicate that there is one background concentration that is elevated above the rest of the data sets (Site 08 or the remaining background concentrations). Based on the visual examination, it appears that the Site 08 chromium sediment concentrations are similar to the background chromium concentrations.

ARSENIC PmB SOIL GRAPHICAL DISPLAYS
SITE 08, NUSC DISPOSAL AREA
NAVAL STATION NEWPORT, RHODE ISLAND
FIGURE 1 OF 4

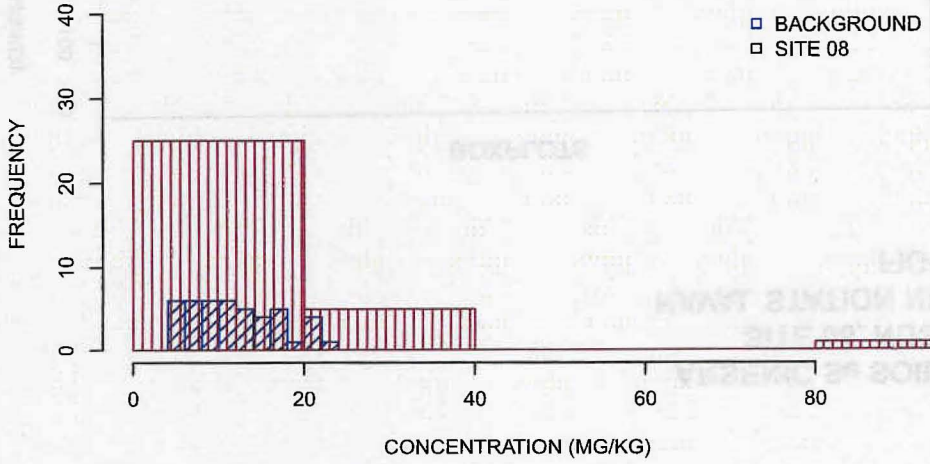
BOXPLOTS



NORMAL Q-Q PLOT



HISTOGRAMS



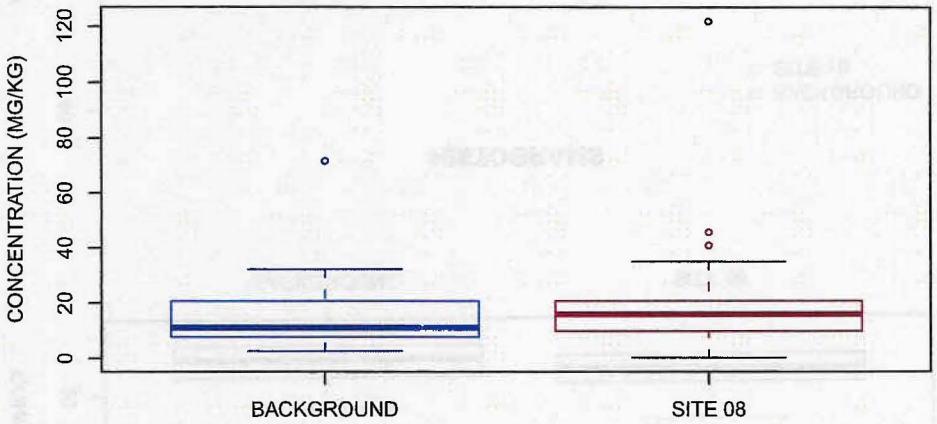
SUMMARY STATISTICS

	BACKGROUND	SITE 08
MINIMUM	4.7	4.5
25TH PERCENTILE	7.8	11
MEDIAN	11	14
MEAN	12	17
75TH PERCENTILE	15	18
MAXIMUM	24	90

UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON-DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

ARSENIC Se SOIL GRAPHICAL DISPLAYS
SITE 08, NUSC DISPOSAL AREA
NAVAL STATION NEWPORT, RHODE ISLAND
FIGURE 2 OF 4

BOXPLOTS



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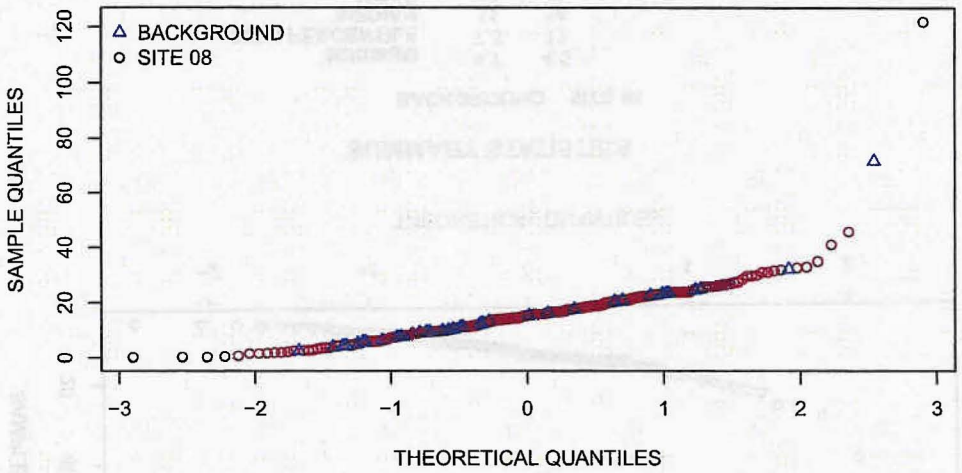

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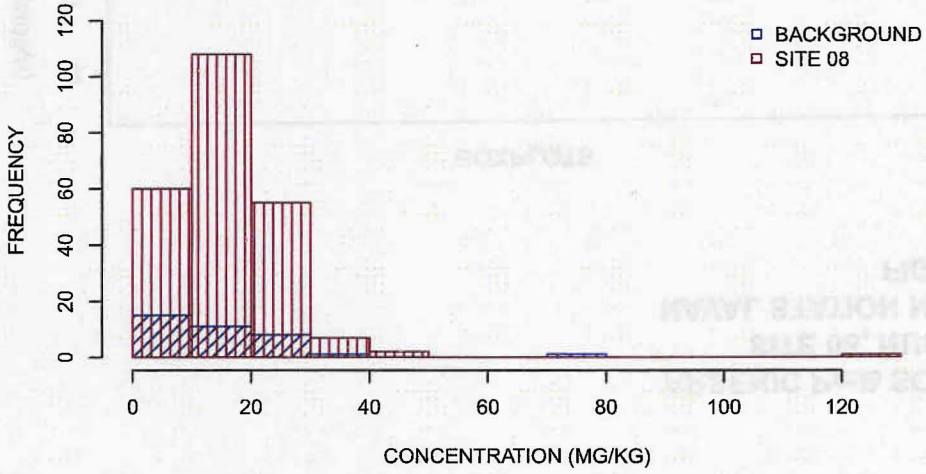


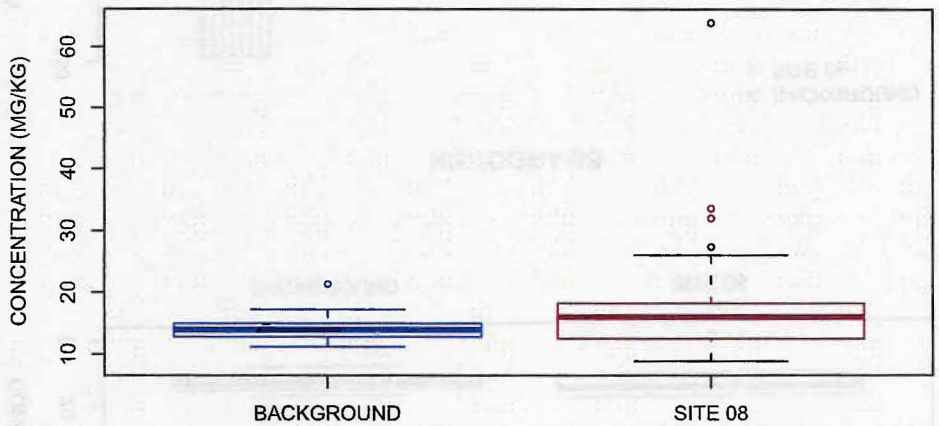
SUMMARY STATISTICS

	BACKGROUND	SITE 08
MINIMUM	2.6	0.19
25TH PERCENTILE	7.8	10
MEDIAN	11	16
MEAN	15	16
75TH PERCENTILE	21	21
MAXIMUM	72	120

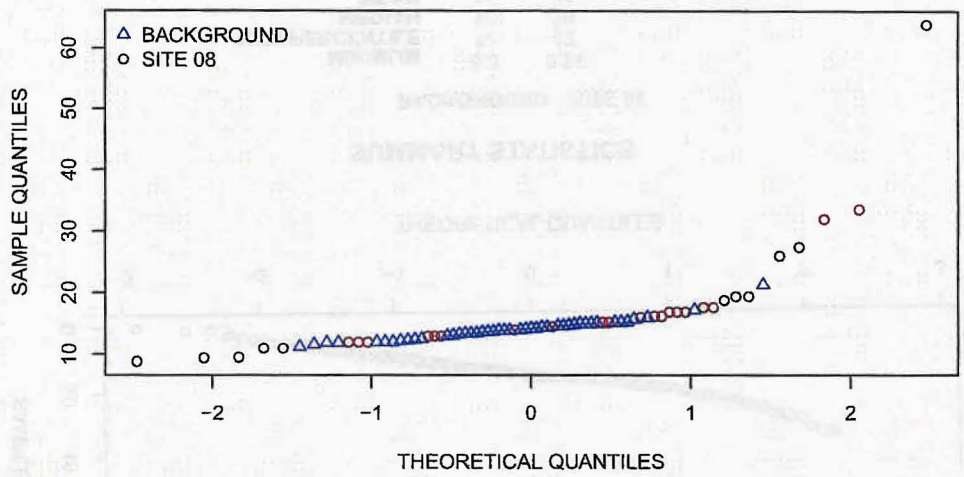
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON-DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

CHROMIUM PmB SOIL GRAPHICAL DISPLAYS
SITE 08, NUSC DISPOSAL AREA
NAVAL STATION NEWPORT, RHODE ISLAND
FIGURE 3 OF 4

BOXPLOTS



NORMAL Q-Q PLOT



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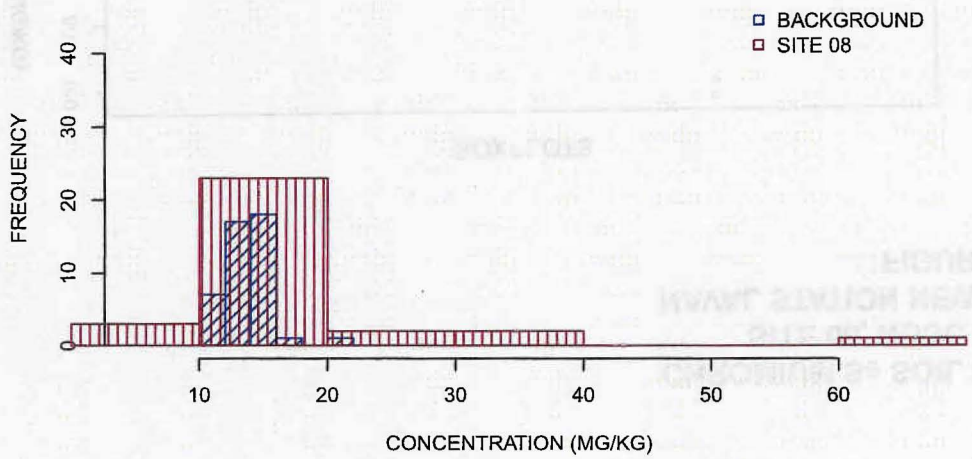


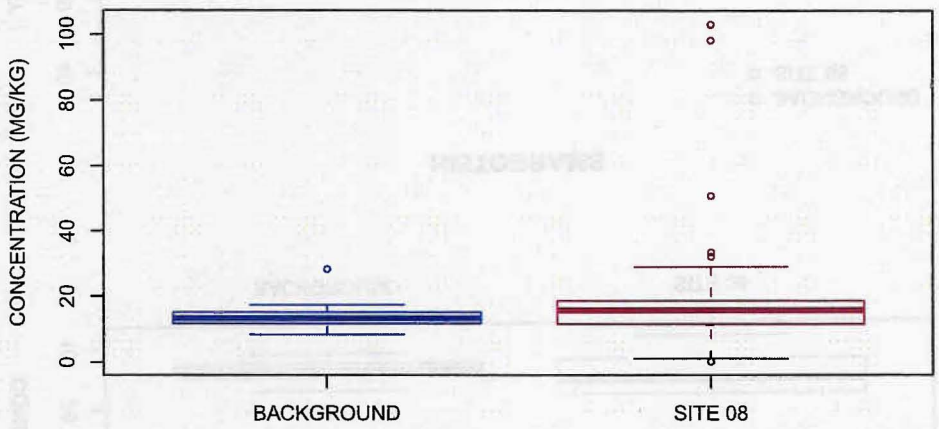
SUMMARY STATISTICS

	BACKGROUND	SITE 08
MINIMUM	11	8.8
25TH PERCENTILE	13	12
MEDIAN	14	16
MEAN	14	18
75TH PERCENTILE	15	18
MAXIMUM	21	64

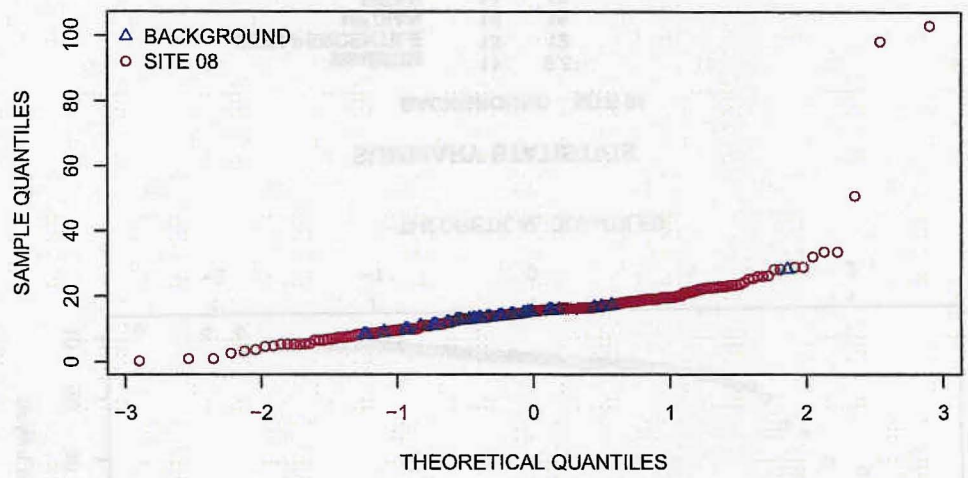
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON-DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

CHROMIUM Se SOIL GRAPHICAL DISPLAYS
SITE 08, NUSC DISPOSAL AREA
NAVAL STATION NEWPORT, RHODE ISLAND
FIGURE 4 OF 4

BOXPLOTS



NORMAL Q-Q PLOT



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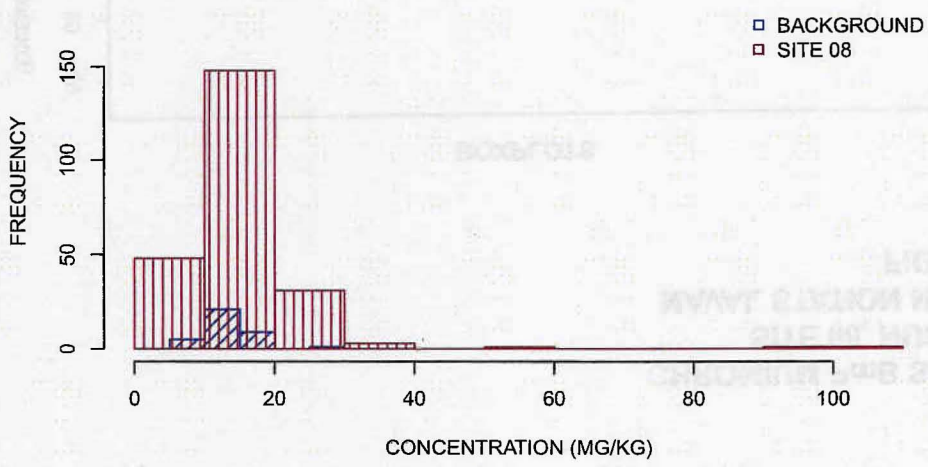


SUMMARY STATISTICS

	BACKGROUND	SITE 08
MINIMUM	8.3	0.24
25TH PERCENTILE	12	12
MEDIAN	13	16
MEAN	14	16
75TH PERCENTILE	15	19
MAXIMUM	28	100

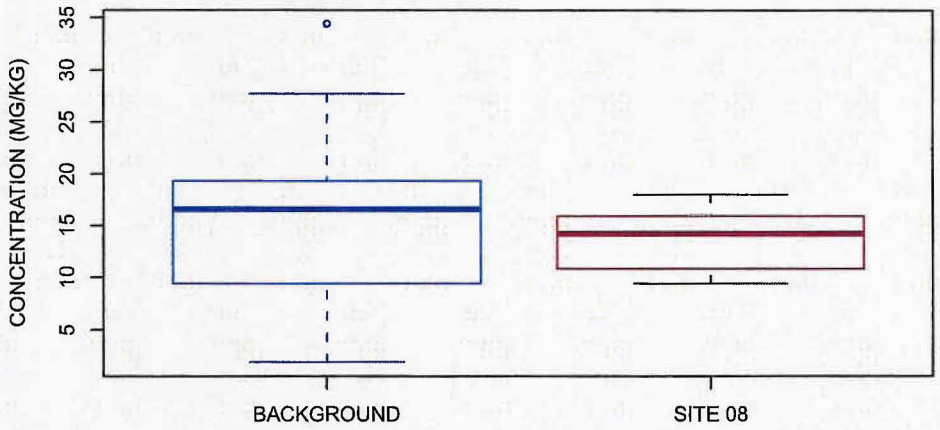
UNITS ARE MG/KG
1/2 DETECTION LIMIT USED FOR NON-DETECTS
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

TABLE A-1
SOIL BACKGROUND COMPARISONS
SITE 08, NUSC DISPOSAL AREA
NAVAL STATION NEWPORT, RHODE ISLAND

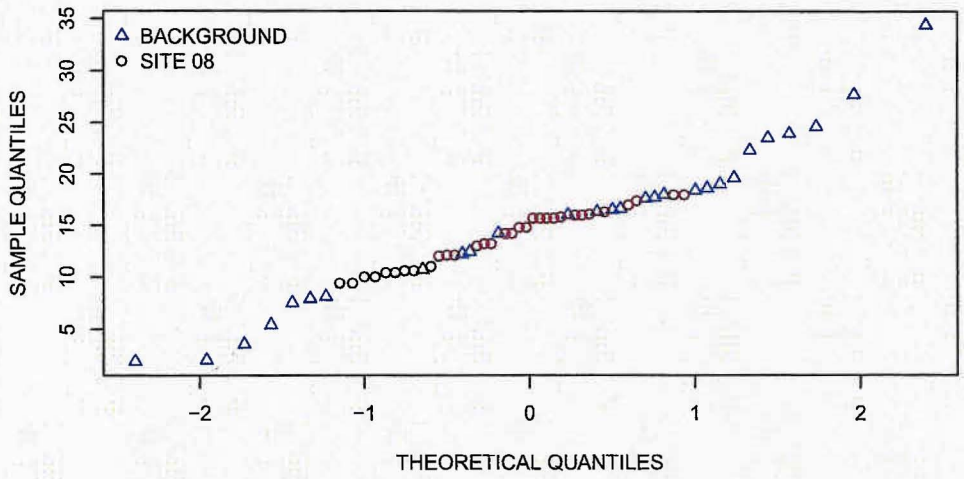
Soil Type	Parameter	Site FOD	Background FOD	Total FOD	Site Maximum Detected Concentration	Site Maximum NonDetect Concentration	Background Maximum Detected Concentration	Background Maximum Nondetect Concentration	Site Distribution	Background Distribution	Hypothesis Test	p-value	Quantile Test	Slippage Test	Conclusion
PmB	ARSENIC	31 / 31	44 / 44	75 / 75	90	--	23.5	--	Nonparametric	Normal	WRS	0.0397	Site Greater Background	Site Greater Background	Site Greater Background
	CHROMIUM	31 / 31	44 / 44	75 / 75	64	--	21.3	--	Nonparametric	Nonparametric	WRS	0.517	Site Greater Background	Site Greater Background	Site Greater Background
Se	ARSENIC	233 / 233	36 / 36	269 / 269	122	--	71.7	--	Nonparametric	Nonparametric	WRS	7.75E-10	Site Within Background	Site Within Background	Site Within Background
	CHROMIUM	233 / 233	36 / 36	269 / 269	103	--	28.2	--	Nonparametric	Nonparametric	WRS	0.0236	Site Within Background	Site Greater Background	Site Greater Background

ARSENIC SEDIMENT GRAPHICAL DISPLAYS
SITE 08, NUSC DISPOSAL AREA
NAVAL STATION NEWPORT, RHODE ISLAND
FIGURE 1 OF 2

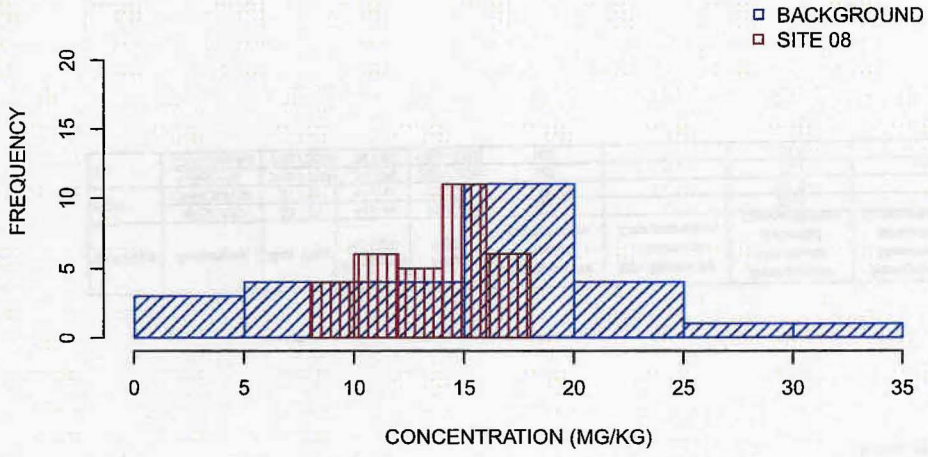
BOXPLOTS



NORMAL Q-Q PLOT



HISTOGRAMS



SUMMARY STATISTICS

	BACKGROUND	SITE 08
MINIMUM	1.9	9.4
25TH PERCENTILE	10	11
MEDIAN	17	14
MEAN	16	14
75TH PERCENTILE	19	16
MAXIMUM	34	18

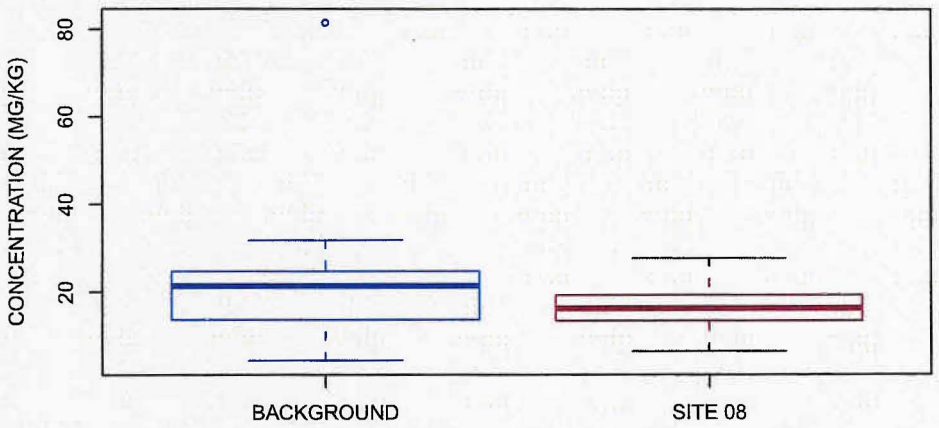
UNITS ARE MG/KG

1/2 DETECTION LIMIT USED FOR NON-DETECTS

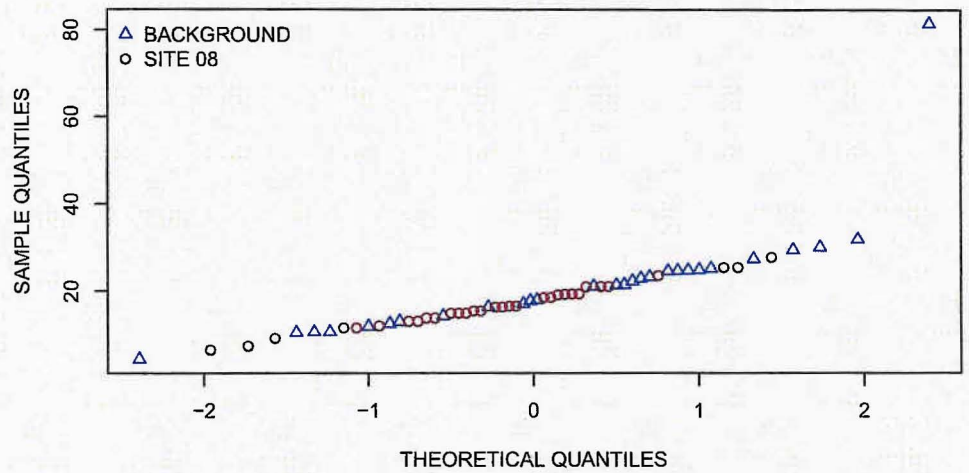
SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

CHROMIUM SEDIMENT GRAPHICAL DISPLAYS
SITE 08, NUSC DISPOSAL AREA
NAVAL STATION NEWPORT, RHODE ISLAND
FIGURE 2 OF 2

BOXPLOTS



NORMAL Q-Q PLOT



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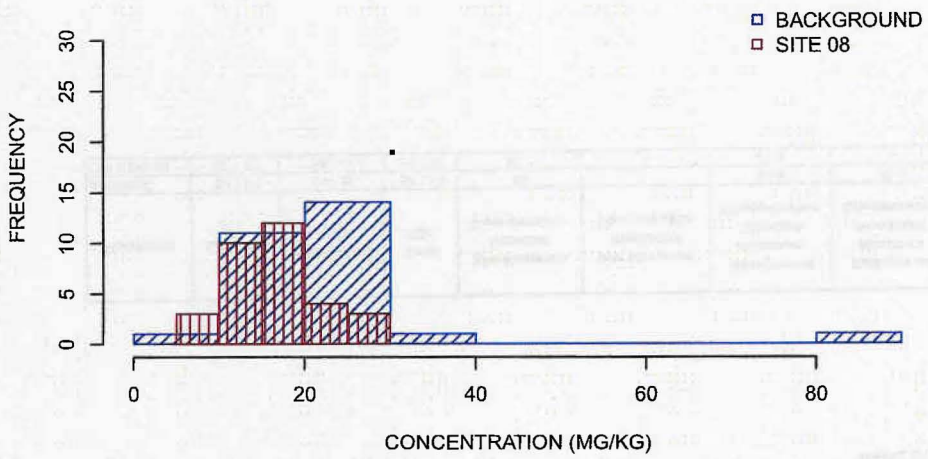

SUMMARY STATISTICS

	BACKGROUND	SITE 08
MINIMUM	4.4	6.5
25TH PERCENTILE	14	14
MEDIAN	21	16
MEAN	22	17
75TH PERCENTILE	25	19
MAXIMUM	82	28

UNITS ARE MG/KG

1/2 DETECTION LIMIT USED FOR NON-DETECTS

SUMMARY STATISTICS ROUNDED TO TWO SIGNIFICANT FIGURES

TABLE A-2
SEDIMENT BACKGROUND COMPARISONS
SITE 08, NUSC DISPOSAL AREA
NAVAL STATION NEWPORT, RHODE ISLAND

Parameter	Site FOD	Background FOD	Total FOD	Site Maximum Detected Concentration	Site Maximum NonDetect Concentration	Background Maximum Detected Concentration	Background Maximum Nondetect Concentration	Site Distribution	Background Distribution	Hypothesis Test	p-value	Quantile Test	Slippage Test	Conclusion
ARSENIC	32 / 32	24 / 28	56 / 60	18	--	34.4	10.8	Normal	Normal	Gehan	4.10E-07	Site Within Background	Site Within Background	Site Within Background
CHROMIUM	32 / 32	28 / 28	60 / 60	27.7	--	81.5	--	Nonparametric	Nonparametric	WRS	1.92E-10	Site Within Background	Site Within Background	Site Within Background