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NAS PENSACOLA
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May 21, 2008

Patty Whittemore
OPG6
NAVFACSOUTHEAST

NAS Jacksonville Building 103
Jacksonville, FL 32212

Re: Draft Remedial Investigation Report for Site 45 (Building 603 Lead Site), Naval Air Station Pensacola, Florida

Dear Ms. Whittemore,

The Department has completed the technical review of the above referenced document dated June 2007 (received June 12, 2007). Please note that the University of Florida (U of F) provided comments on the risk assessment portion of this report that have been integrated into the comments listed below; a copy of the original comments from U of F are attached. The Department's comments are listed below:

1. **General Comment:** The report defines surface soil as zero to one foot below land surface (bls) and subsurface soil as greater than one foot bls. Chapter 62-780, FAC defines surface soil as soil located from zero to two feet bls. Please review this issue and address it in the final Remedial Investigation (RI).

2. **General Comment:** Tetra Tech has two different scenarios for the "hypothetical future resident" for groundwater. The Department does not distinguish between groundwater ingestion under residential and industrial scenarios. Also, The Department calculates Groundwater Cleanup Target Levels for carcinogenic compounds based on a $1x10^{-6}$ risk of cancer. Please review this issue and address it in the final RI.

3. **General Comment Section 4:** NAS Pensacola is using the Residential Soil Cleanup Target Levels (SCTLs) as the screening levels for this site. The Department would like to also propose using the industrial SCTLs as the screening values for this site if it could be

restricted to industrial use only. If NAS Pensacola does decide to use this option, land use controls for soil would be necessary.

4. **Table 4-2, NAS Pensacola Background Values for Groundwater:** The Florida Marine Surface Water Cleanup Target Level for mercury should be 0.025. Please add this value to the table in the final version of the RI.

5. **General Comments on Figure 4-4, Monitoring Well Locations with Groundwater Concentrations Exceeding GCTLs:**

   a. Additional monitoring wells will need to be installed at this site to delineate groundwater contamination both vertically and horizontally. The Department requires this prior to approving any remedial alternative for this site. If Pensacola is considering monitored natural attenuation as the remedial alternative for this site specific conditions listed in Rule, 62-780.700, FAC will need to be met prior to approval of this remedy.
   b. Monitoring wells (PEN-45-05D, PEN-45-07D, PEN-45-11D and PEN-45-13D) all have aluminum groundwater contamination that exceeds the Natural Attenuation Default Criteria (NADC) of 2000 ug/l for Aluminum at this site. This situation will need to be discussed further prior to approval of an Monitored Natural Attenuation remedy for this site.

6. **General comments on Tables 4-5, Organic Analytical Results for Soil and Table 4-6, SPLP Analytical Results Compared to Groundwater Criteria:**

   a. The list of Contaminants of Potential Concern (COPCs) in surface soil for Leachability to groundwater ($SCTL_{GW}$) is incomplete. Benzo(a)anthracene and benzo(a)fluoranthene (Table4-5) exceed their $SCTLs_{GW}$. These chemicals were dropped as COPCs for leachability without explanation and remain of concern for surface soil. Aluminum, iron, lead and manganese (Table 4-6) exceed site-specific background and their $SCTLs_{GW}$ based on SPLP.
   b. The list of COPCs in subsurface soil for leachabiltiy to groundwater is incomplete. Aluminum, cadmium, iron, lead and xylenes (Table 4-6) exceed site-specific background and $SCTLs_{GW}$ based on SPLP. These constituents remain of concern for leachability in subsurface soil.
   c. Table 4-5 does not include Florida GCTLs for α–chlordane. Although Florida does not have specific criteria for α–chlordane, it does have SCTLs for total chlordane. Since no other chlordanes were detected in soil at this site, the SCTLs for α–chlordane would be equal to those for total chlordane (residential SCTL = 2.8 mg/kg industrial SCTL = 14 mg/kg and the SCTL for leachability to groundwater = 9.6 mg/kg. Please insert this new data into Table 4-5 and any other applicable sections in this report.
   d. The BAP Equivalent totals calculated in this table are not correct, all of the contaminants listed below need to be included, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene, in this calculation. The table that lists these constituents is, "Final Technical Report: Development of Cleanup Target Levels (CTLs) For Chapter 62-777, F.A.C.", dated February 2005, on page 62 in Table 20, "Toxic Equivalency Factors for

Carcinogenic PAHs". Attached is a copy of the work sheet that explains how to complete this calculation. . Please review this issue and address it in the final RI.

http://www.dep.state.fl.us/waste/categories/wc/pages/ProgramTechnicalSupport.htm#Calculators

7. **General Comments on Table 4-7, Analytical Results of Groundwater Sampling and Criteria Exceedances :**

   a. This table does not include Florida GCTLs for α–chlordane or y-chlordane. As stated in a previous comment, Florida has criteria for total Chlordane (GCTL = 2 ug/l). The sum of the detected chlordanes in groundwater should not exceed this value.
   b. Please include the correct nomenclature to identify whether or not the monitoring well is deep or shallow in this table. Please review this issue and address it in the final RI.

8. **Sections 6 and 7 General Comments:**

   a. The report states that the Site is primarily covered in asphalt so the soil-to-air inhalation pathway is not considered significant and is not considered further. Although soil may not constitute a significant percentage of the site, 100% of the inhaled fugitive dusts will originate from soil. The inhalation pathway may not constitute a significant portion of the risk, but it is relevant and should remain in the risk assessment evaluation.
   b. We recommend adding the incidental ingestion of the groundwater to the construction worker scenario due to the likely exposure to shallow groundwater during construction activities.
   c. An exposure frequency of 30 d/y for the site maintenance worker (based on professional judgment) seems low given the Pensacola area climate. Some documentation from NAS Pensacola regarding the expected frequency of grounds keeping and maintenance events for this part of the base will be important in helping to justify this exposure assumption.
   d. Adult and adolescent recreational users and trespassers were assumed to be exposed to on-site soil for 45 d/y based on professional judgment. Although 45 d/y may be an appropriate exposure frequency for a trespasser, it is low for recreational scenarios at the Site 45.
   e. It is assumed that the grounds maintenance worker will spend at least part of the day outdoors. Therefore we recommend using the United States Environmental Protection (USEPA) default outdoor worker soil ingestion rate of 100 mg/d for this scenario (USEPA 2002).
   f. Future adult recreational users/trespassers under the same conditions as the adolescent (95th percentile value for soccer players in moist conditions) have a skin adherence factor for 0.08 mg/cm2 (USEPA 2004). We recommend changing the adult skin adherence factor to reflect the same conditions as the adolescent.
   g. The IEUBK Model for lead was used to assess exposure to lead in children from groundwater. The average groundwater lead concentration (11 ug/l) was used as the exposure point concentration in the model. Receptors are usually exposed to groundwater from only one well. Averaging contaminant concentrations across wells would not accurately represent potential exposure scenarios. The exposure point

concentration for lead in groundwater should be the maximum detected concentration (59.5 ug/l).

9. **Table 6-9, Comparison with SCTLs for Leachability to Groundwater and Csat Limits-Sub Surface Soil and Table 6-13, Comparison with SCTLs for Leachability to Groundwater and Csat Limits-Subsurface Soil:** The site specific SCTLs for leachability to groundwater determined by SPLP should be included in both of these tables.

10. **Page 6-60:** States the 95% UCL is *"...a representation of the upper limit that potential receptors would be exposed to over the entire exposure period"*. The 95% UCL is an upper limit on the mean concentration receptors would be exposed to, not the upper limit of the exposure concentration.

11. **General Comments Table 7-1, Occurrence, Distribution and Selection of Ecological COPCs for Surface Soil:**

    a. The USEPA Region 4 surface soil screening value for benzo(a)pyrene is 0.1 mg\kg. The Table should be changed to reflect this value.
    b. An ecological soil screening level was developed for total PAHs in June 2007. This new value (1.1 mg\kg) is based on protection of mammals exposed to high molecular weight PAHs and is very similar to the US EPA Region 4 screening value of 1 mg/kg. Please include this new data in the applicable sections in the final version of RI for this site.
    c. An ecological soil screening level was derived for manganese (220 mg/kg) for the protection of plants) in April 2007. Manganese should be added to this table.

12. **Section 8, Conclusions:** The Department agrees with the proposal to remove the soil contaminated with Lead and PAHs proposed in this section. However, the amount of soil to be removed is yet to be determined. The Department would like to re-evaluate this situation after the comments in this letter have been resolved.

13. **Appendix I:** The Department has reviewed the background study for soils and we do not concur with the conclusions determined by this analysis. Please review the attached comments from the U of F dated February 11, 2008. The Department will be open to discuss this study after the comments from U of F have been addressed.

If I can be of any further assistance with this matter, please contact me at (850) 245-8998.

Sincerely

Tracie Bolanos

Tracie L. Bolanos
Remedial Project Manager

JJC JJC ESN ESN
Enclosures
by ESN

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February 11, 2008

Ligia Mora-Applegate
Bureau of Waste Cleanup
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399

Re: Statistical Analysis of Arsenic Data for Soil, NAS Pensacola Site 45

Dear Ms. Mora-Applegate:

Attached please find the results of our statistical analysis of soil arsenic concentrations at NAS Pensacola Site 45, which includes a comparison of site concentrations with site-specific natural background levels. The results show that site arsenic concentrations in soil are significantly higher than background for the two uppermost soil horizons.

Please let me know if you have any questions regarding this analysis.

Sincerely,

Stephen M. Roberts, Ph.D.

Statistical Comparison of Site versus Background Arsenic Concentrations in Soil
NAS Pensacola, Site 45

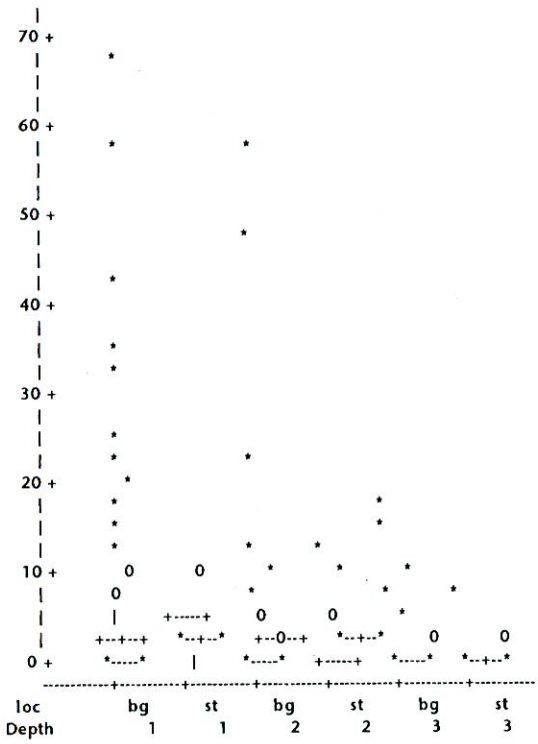
An analysis was conducted to determine whether arsenic concentrations in soil at Site 45, NAS Pensacola are significantly different from site-specific background. A very large data set with arsenic background concentrations at varying depths is available for this site. The data set for arsenic concentrations in soil on the site is much smaller, but still of sufficient size to support a statistical comparison with background data.

Initially a non-statistical evaluation was completed, comparing the maximum arsenic concentration on-site with the lower of the maximum background concentration or twice the mean background concentration over each depth interval.

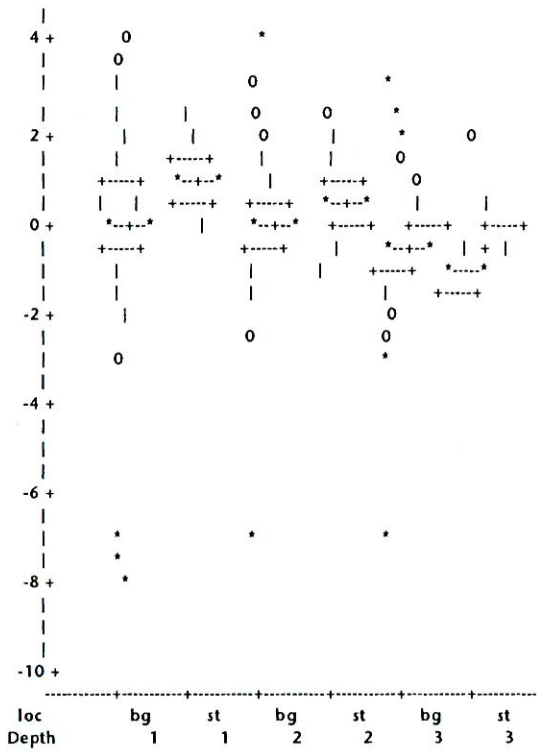
Depth	Maximum Site Concentration (mg/kg)	Maximum Background Concentration (mg/kg)	Two Times Mean Background (mg/kg)	Lower of Maximum or Two Times Mean Background (mg/kg)	Does Site Exceed Background?
0 - 0.5'	10.6	66.3	5.8	5.8	Yes
0.5 - 2'	11.4	57.3	3.2	3.2	Yes
2 - 4'	6.3	17.5	2.6	2.6	Yes

Site arsenic values exceed background in the non-statistical comparison for all three depth intervals (0-0.5', 0.5-2', 2-4'). In view of complexities in the data (substantial differences in the sample size with depth and location), the statistical analysis was referred to Dr. Linda Young, Professor of Statistics at the University of Florida. The results of her analysis and conclusions are presented as follows.

Below are side-by-side box plots of the background and site arsenic levels at each of the three depths. Notice that there are higher individual observations of arsenic levels in the background at each of the three depths as compared to the site. However, it appears that, at least for the first depth, the average of arsenic values at the site is greater than that of the background.

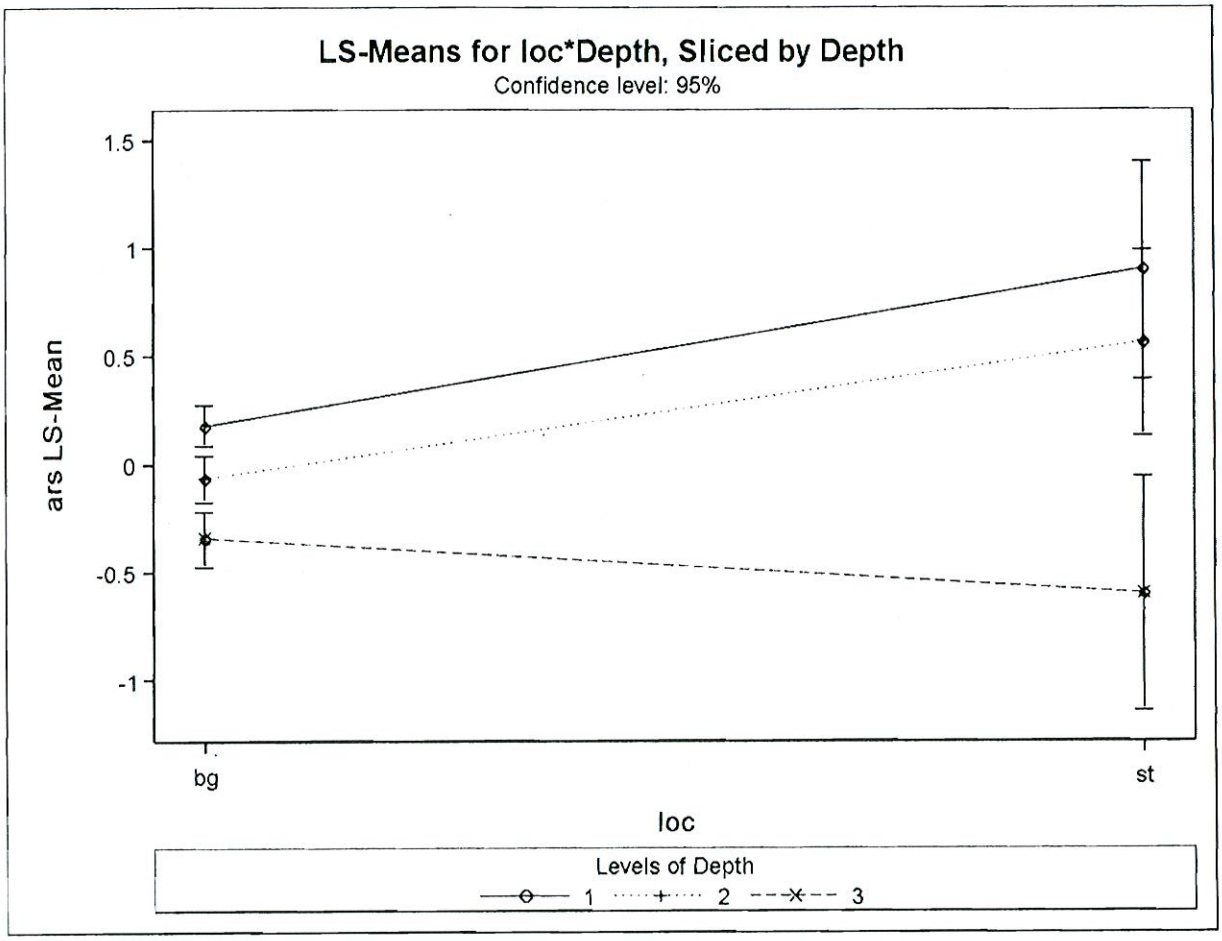


From the box plots above, it is clear that the distributions of arsenic values are positively skewed. Below are the box plots of the logarithm of the arsenic values for the three depths for the background and site. Because the distributions are roughly symmetric, the analysis will be conducted assuming that the natural logarithms of the arsenic values are normally distributed.

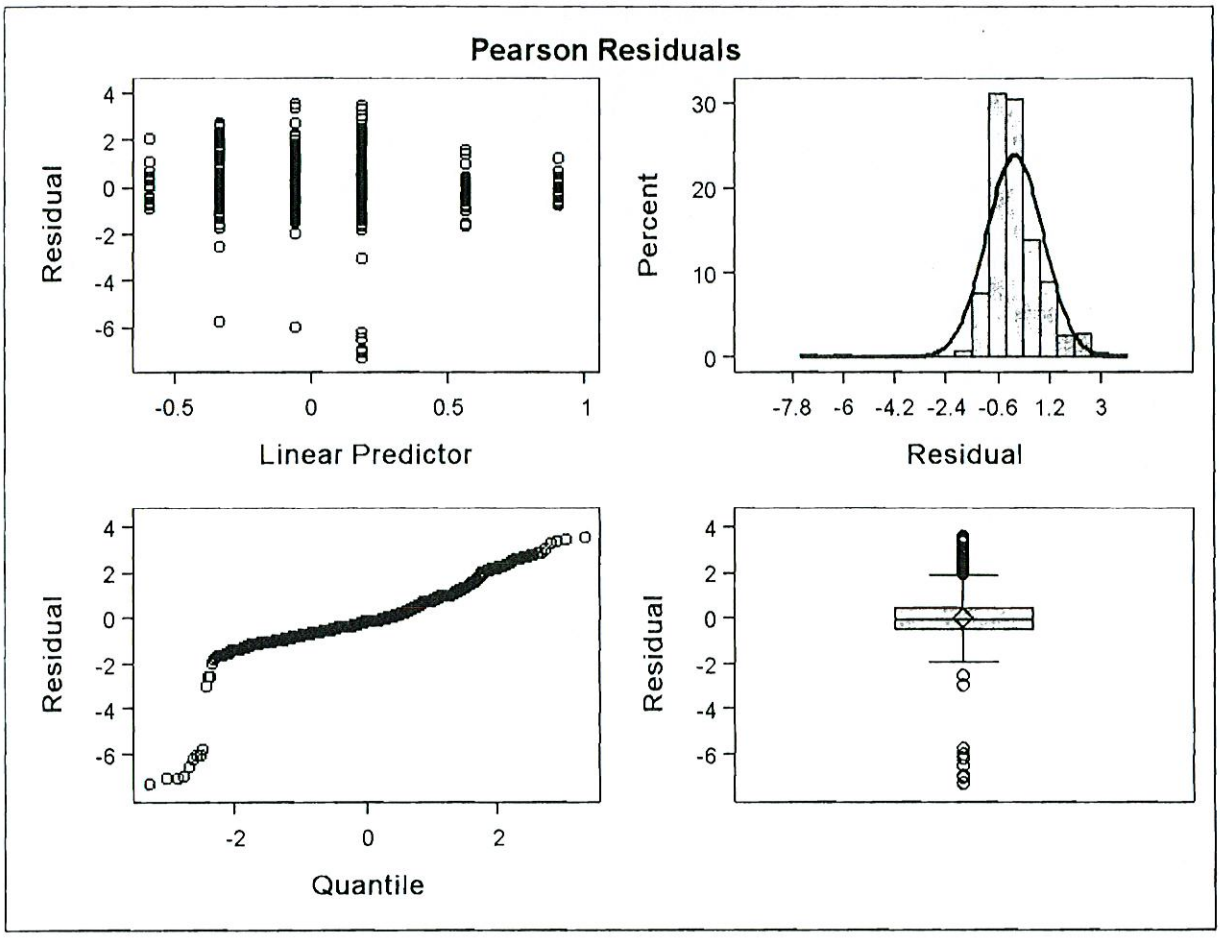


Below are the results of the analysis of variance. Notice that there is a significant location*depth interaction. To provide insight into this interaction, the means, on the log scale, are displayed in the next figure.

Type III Tests of Fixed Effects				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Location	1	1338	5.93	0.0150
Depth	2	1338	14.27	<.0001
Location*Depth	2	1338	3.87	0.0211


LS-Means for loc*Depth, Sliced by Depth
Confidence level: 95%
ars LS-Mean
1.5
1
0.5
0
-0.5
-1
bg
st
loc
Levels of Depth
1
2
3

The plots below are diagnostic plots of the residuals. Although there are a few residuals that are outliers, the plots support the validity of the analysis.



The estimated means for each depth at the background and site are displayed below. These have been transformed to the original scale.

Location	Depth	Mean	Standard Error
Background	1	1.20233	0.05938
Background	2	0.94020	0.05199
Background	3	0.71287	0.04664
Site	1	2.54439	0.66349
Site	2	1.79780	0.39434
Site	3	0.57266	0.16245

For each depth, the background and site arsenic levels were compared. These must be done on the log scales. The results clearly indicate that the site mean arsenic level is significantly greater than the background arsenic level for depths 1 ($p = 0.0061$) and 2 ($p = 0.0052$), but not for depth 3 ($p = 0.3713$).

Depth	Location	Location	Estimate	Std Error	t-Value	DF	p-Value
1	Background	Site	-0.72	0.26	-2.75	1338.0	0.0061
2	Background	Site	-0.63	0.22	-2.80	1338.0	0.0052
3	Background	Site	0.26	0.29	0.89	1338.0	0.3713

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October 3, 2007

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Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Remedial Investigation Report for Site 45, NAS Pensacola

Dear Ms. Mora-Applegate:

At your request we have reviewed the *Remedial Investigation Report for Site 45 (Building 603 Lead Site), Naval Air Station Pensacola, Pensacola, Florida.* Our review focused on the risk assessment. This document was prepared by Tetra Tec NUS, Inc. and is dated June 2007. Site 45 is located to the west of Site 18 over Former Building 107 and part of Former Building 1 and now consists primarily of an asphalt parking lot. No known source of contamination has been identified for this Site. The report summarizes the nature and extent of contamination present in surface soil, subsurface soil, and groundwater. It also includes both human health and screening level ecological risk assessments for current and future receptors. We have the following comments regarding the risk assessment:

1. The report defines surface soil as zero to one foot below land surface (bls) and subsurface soil as greater than one foot bls. Chapter 62-780, FAC defines surface soil as soil located from zero to two feet bls and subsurface soil as greater than two feet bls.

2. The report states that the Site is primarily covered in asphalt so the soil-to-air inhalation pathway in not considered significant and is not considered further. Although soil may not constitute a significant percentage of the Site, 100% of the inhaled fugitive dusts will originate from soil. The inhalation pathway may not constitute a significant portion of the risk, but it is relevant and should remain in the risk assessment evaluation.

3. We recommend adding the incidental ingestion of groundwater to the construction worker scenario due to the likely exposure to shallow groundwater during construction activities.

4. An exposure frequency of 30 d/y for the site maintenance worker (based on professional judgment) seems low given the Pensacola area climate. Some documentation from NAS Pensacola regarding the expected frequency of

groundskeeping and maintenance events for this part of the base will be important in helping to justify this exposure assumption.

5. Adult and adolescent recreational users and trespassers were assumed to be exposed to on-site soil for 45 d/y based on professional judgment. Although 45 d/y may be an appropriate exposure frequency for a trespasser, it is low for recreational users. We recommend using an exposure frequency of 200 d/y for the recreational scenario. This value has been used by the FDEP for recreational scenarios at other sites.

6. It is assumed that the grounds maintenance worker will spend at least part of the day outdoors. Therefore, we recommend using the US EPA default outdoor worker soil ingestion rate of 100 mg/d for this scenario (US EPA, 2002).

7. Future adult recreational users/trespassers under the same conditions as the adolescent (95th percentile value for soccer players in moist conditions) have a skin adherence factor of 0.08 mg/cm^2 (US EPA, 2004). We recommend changing the adult skin adherence factor to reflect the same conditions as the adolescent.

8. The IEUBK Model for lead was used to assess exposure to lead in children from groundwater. The average groundwater lead concentration (11μg/L) was used as the exposure point concentration in the model. Receptors are usually exposed to groundwater from only one well. Averaging contaminant concentrations across wells would not accurately represent potential exposure scenarios. The exposure point concentration for lead in groundwater should be the maximum detected concentration (59.5 μg/L).

9. The list of COPCs in surface soil for leachability to groundwater ($SCTL_{GW}$) is incomplete. Benzo(a)anthracene and benzo(b)fluoranthene (Table 4-5) exceed their $SCTLs_{GW}$. These chemicals were dropped as COPCs for leachability without explanation and remain of concern for surface soil. Aluminum, iron, lead, and manganese (Table 4-6) exceed site-specific background and their $SCTLs_{GW}$ based on SPLP. These constituents also remain of concern for surface soil.

10. The list of COPCs in subsurface soil for leachability to groundwater is incomplete. Aluminum, cadmium, iron, lead, and xylenes (Table 4-6) exceed site-specific background and their $SCTLs_{GW}$ based on SPLP. These constituents remain of concern for leachability in subsurface soil.

11. The list of COPCs in groundwater is incomplete. Sodium (Table 4-7) exceeds its GCTL (a secondary standard) and should be added as a COPC for groundwater.

12. Page 6-60 states the 95% UCL is "...a representation of the upper limit that potential receptors would be exposed to over the entire exposure period". The 95% UCL is an upper limit on the <u>mean</u> concentration receptors would be exposed to, not the upper limit of the exposure concentration.

13. In Table 4-2, the Florida Marine Surface Water Cleanup Target Level for mercury should be 0.025 μg/L.

14. Table 4-5 does not include Florida SCTLs for α-chlordane. Although Florida does not have specific criteria for α-chlordane, it does have SCTLs for total chlordane. Since no other chlordanes were detected in soil at this Site, the SCTLs for α-chlordane would be equal to those for total chlordane (residential SCTL = 2.8 mg/kg, industrial SCTL = 14 mg/kg, and SCTL for leachability to groundwater = 9.6 mg/kg).

15. Table 4-7 does not include Florida GCTLs for α- or γ-chlordane. As stated in the previous comment, Florida has criteria for total chlordane (GCTL = 2μg/L). The sum of the detected chlordanes in groundwater should not exceed this value.

16. The site-specific SCTLs for leachability to groundwater determined by SPLP should be included in Tables 6-9 and 6-13.

17. Comments concerning Table 7-1:

    a. The US EPA Region 4 surface soil screening value for benzo(a)pyrene is 0.1 mg/kg. The Table should be changed to reflect this value.

    b. An ecological soil screening level was developed for total PAHs in June 2007. This new value (1.1 mg/kg) is based on protection of mammals exposed to high molecular weight PAHs and is very similar to the US EPA Region 4 screening value of 1 mg/kg.

    c. An ecological soil screening level was derived for manganese (220 mg/kg for the protection of plants) in April 2007. This value should be added to the Table. Manganese remains a COPEC at this Site.

    d. The Canadian Soil Quality Guidelines (2006) recommends using a soil screening value of 0.1 mg/kg for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene for the protection of the environment and human health. This value is the same as the US EPA Region 4 surface soil screening value for benzo(a)pyrene. Based on Site concentrations, these constituents are COPECs.

18. The statistical evaluation for comparison of on-site arsenic concentrations to background is ongoing. Therefore, our comments do not include the geochemical analysis for identification of inorganic contamination in soil attached as Appendix I in this report.

Please let us know if you have any questions regarding this review.

Sincerely,

Stephen M. Roberts, Ph.D.

Leah D. Stuchal, Ph.D.

References:

US EPA (2002) *Supplemental guidance for developing soil screening levels for superfund sites.* Solid Waste and Emergency Response. OSWER 9355.4-24.

US EPA (2004) *Risk Assessment guidance for superfund volume I: Human health evaluation manual (Part E, supplemental guidance for dermal risk assessment).* Office of Superfund Remediation and Technology Innovation, Washington, DC.