

M00263.AR.000790  
MCRD PARRIS ISLAND  
5090.3a

EMAIL OF TRANSMITTAL AND U S EPA REGION IV COMMENTS ON U S NAVY RESPONSE  
TO COMMENTS ON SAMPLING AND ANALYSIS PLAN FOR MUNITIONS RESPONSE  
PROGRAM SITES MCRD PARRIS ISLAND SC  
1/7/2010  
U S EPA REGION IV

**From:** [Llmas.Lila@epamail.epa.gov](mailto:Llmas.Lila@epamail.epa.gov)  
**To:** [Sladic, Mark](mailto:Sladic, Mark)  
**Cc:** [Annie Gerry](mailto:Annie.Gerry); [Churchill, Peggy](mailto:Churchill, Peggy); ["Cook, Charles CIV NAVFAC SE <charles.cook2>@navy.mil](mailto:Cook, Charles CIV NAVFAC SE <charles.cook2>@navy.mil); [heber.pittman](mailto:heber.pittman); [mac.mcrae](mailto:mac.mcrae); [Meredith Amick](mailto:Meredith.Amick); [Pat Franklin](mailto:Pat.Franklin); [Priscilla Wendt \(E-mail\)](mailto:Priscilla.Wendt (E-mail)); [tim.harrington \(email\) \(timothy.j.harrington@usmc.mil\)](mailto:tim.harrington (email) (timothy.j.harrington@usmc.mil)); [Tom Dillon \(E-mail\)](mailto:Tom.Dillon (E-mail)); [Zimmerman, Greg](mailto:Zimmerman, Greg); [Blanken, Michelle](mailto:Blanken, Michelle); [Basinski, Ralph](mailto:Basinski, Ralph)  
**Subject:** Re: MCRD Parris Island MRP SI SAP RTC and path forward  
**Date:** Thursday, January 07, 2010 1:37:26 PM  
**Attachments:** [RTC MCRD MRP UFP SAP D1 EPA FINAL COMMENTS 12\\_4\\_09 - EPA Feedback.doc](#)  
**Importance:** High

---

Hi Folks,

Here is EPA's feedback on the MRP RTC.

Mark, Call me with questions. I can be reached today on my cell phone - 770-856-5808 and would be happy to discuss the few small things which might impact field work. I assume the team is out in the field, but presumable doing grubbing, etc.

Lila

-----"Sladic, Mark" <Mark.Sladic@tetrattech.com> wrote: -----

To: Annie Gerry <GerryAM@dhec.sc.gov>, "Churchill, Peggy" <Peggy.Churchill@tetrattech.com>, "Cook, Charles CIV NAVFAC SE" <charles.cook2@navy.mil>, "David M. Scaturo (E-mail)" <scaturdm@dhec.sc.gov>, heber.pittman <darrel.pittman@usmc.mil>, joe.bowers <bowersjb@dhec.sc.gov>, Lila Llamas/R4/USEPA/US@EPA, mac.mcrae <mmcrae@TechLawInc.com>, Meredith Amick <AmickMS@dhec.sc.gov>, Pat Franklin <pat.franklin@mail.com>, "Priscilla Wendt (E-mail)" <wendtp@dnr.sc.gov>, Stacey French <FRENCHSL@dhec.sc.gov>, "tim.harrington (email) (timothy.j.harrington@usmc.mil)" <timothy.j.harrington@usmc.mil>, "Tom Dillon (E-mail)" <Tom.Dillon@noaa.gov>, "Zimmerman, Greg" <Greg.Zimmerman@tetrattech.com>  
From: "Sladic, Mark" <Mark.Sladic@tetrattech.com>  
Date: 12/04/2009 02:18PM  
Cc: "Blanken, Michelle" <Michelle.Blanken@tetrattech.com>, "Basinski, Ralph" <Ralph.Basinski@tetrattech.com>  
Subject: MCRD Parris Island MRP SI SAP RTC and path forward

Good afternoon everyone:

Please see attached RTC for EPA and SCDHEC review comments on the MC and MEC SAPs. The most significant item that might require some additional discussion is the resolution of the geophysics study. We intend to use modern, up to date equipment for the geophysics surveys. However, the maximum effective depth that this equipment can register does have limitations, that unfortunately do not always match up optimally with potential munitions penetration depths. This is not an issue exclusive to MCRD, the equipment specified, or the application. We may need to be careful about how we interpret a geophysics study that provides less information than we hope for, but there are not a lot of viable options (either technical or cost) to improve the performance. We believe that any other remaining issues will be relatively minor.

Based on our experience at other sites, we believe the information collected will support an appropriately complete SI analysis and documentation.

In order to support the mandatory 30 September 2010 submittal date for the final SI Report, it is necessary to expedite field mobilization. We propose to field mobilize in January. A specific date will be determined after Team concurrence, based on staff schedules.

Please review the attached RTC and let us know if you identify any obstacles to a January mobilization, cognizant that data collection issues are critical, but that data interpretation issues can still be resolved (if any) during or after field mobilization. The two attached spreadsheets support responses to DHEC comments. Thanks.

**Mark Sladic, P.E. | Project Manager**

Direct: 412.921.8216 | Main: 412.921.7090 | Fax: 412.921.4040

[mark.sladic@tetrattech.com](mailto:mark.sladic@tetrattech.com)

Tetra Tech NUS, Inc

661 Andersen Drive Foster Plaza 7 | Pittsburgh, PA 15220 | [www.ttnus.com](http://www.ttnus.com)

PLEASE NOTE: This message, including any attachments, may include privileged, confidential and/or inside information. Any distribution or use of this communication by anyone other than the intended recipient is strictly prohibited and may be unlawful. If you are not the intended recipient, please notify the sender by replying to this message and then delete it from your system.

[attachment "SCDHEC Comment 8.xls" removed by Lila Llamas/R4/USEPA/US]  
[attachment "SCDHEC Comment 18.xls" removed by Lila Llamas/R4/USEPA/US]  
[attachment "RTC MCRD MRP UFP SAP D1 EPA FINAL COMMENTS 12\_4\_09.doc" removed by Lila Llamas/R4/USEPA/US]  
[attachment "RTC MCRD MRP UFP SAP SCDHEC 12\_4\_09\_.doc" removed by Lila Llamas/R4/USEPA/US]

**Reviewer:** Lila Llamas, USEPA Region 4

**Document:** Draft SAP for MRP Site Inspections at Eight Munitions Response Sites

**Date:** 11/13/2009

**MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) UFP SAP  
VOLUME II OF II**

**GENERAL COMMENTS:**

**1. Listing MMRP Sites in the FFA**

In accordance with agreements between the U. S. Environmental Protection Agency (EPA) and the Department of Defense (DOD) and in accordance with EPA Headquarters policy, please submit the necessary paperwork to add these eight Military Munitions Response Program (MMRP) sites to the Federal Facilities Agreement (FFA). This can be accomplished through a change page submittal and request for approval.

**Response:** NAVFAC is still working with EPA and SCDHEC to address this concern. However, inclusion of the MRP sites in the FFA is not necessary for UFP-SAP approval.

**EPA:** The SAP may proceed without resolution to this comment, however, EPA would like to see evidence that NAVFAC is working to address this concern. Please provide a plan and schedule for addressing this concern before proceeding with the SAP. (Note: Resolution of this same issue has been an ongoing action item for the Navy, as well as Tier II, with no progress to date, therefore the request for a plan and schedule for resolution to this comment.)

**2. MEC Investigations in Sediment**

EPA understands a study has been conducted by the University of South Carolina (USC) for MCRD wherein expended rounds were searched for in sediments within the impact areas of ranges. Summarize the results/findings/recommendations of this study. Discuss how the results could apply to MEC investigations in sediment areas of these ranges. Compare results of current ranges with the potential for fate and transport of much more historical rounds in sediment at the UXO sites. Modify this SAP to account for the application of these results as appropriate. Address this within the MEC CSMs for estimated penetration depths, vertical boundaries, and actual sample depth/location in the sampling rationale (WS 10, 11, and 17) for those UXO sites which have sediment impact areas.

**Response:** The sediment characterization study targeted small arms munitions projectile impact areas and associated MC resulting from small arms training. One of the sites addressed in this UFP-SAP, UXO 2 Rifle Range at Ballast Creek, is a small arms range. Therefore, the results of this study will be applicable to UXO 2; however, UXO 2 is not an MEC site and is not included in the MEC SAP. The other sites addressed in the MEC SAP which have sediment impact areas, UXOs 4, 5, and 6, are artillery ranges and; therefore, the results of this study would not be applicable to these types of ranges.

EPA: See feedback to RTC # 21 where this study is discussed more fully. Please make modifications to the SAP for MEC investigation here in Volume II of II as appropriate, based on the final resolution to comment #21, Volume I of II RTCs.

### 3. Land Use Controls

It appears that in several cases the limits of the survey equipment are not sufficient to investigate to the estimated penetration depth. In other cases, certain aspects/areas of the site investigation have been deferred. For each UXO site where either of these is the case, please explain how this is consistent with the decision rules which result in No Further Action (NFA). Please keep in mind that Land Use Controls (LUCs), including Base Master Plan and/or deed notices, pavements left as a cover, etc. are considered actions under CERCLA and would trigger the need for a Record of Decision (ROD), etc. Otherwise, revise the Decision Rules as appropriate.

Also, there are several places in the text which mention LUCs and begin to describe them. Under CERCLA, requirements for LUCs are made in the ROD, and the specific design/details of the necessary LUCs are defined in a LUC RD.

#### Response:

The Site Inspection (SI) is used to gather field data about each site. This data includes concentrations of munitions debris (MD) on the surface and subsurface anomalies which are indicators of target areas. If MEC/MPPEH or MD are located on the surface at any site, or subsurface anomalies that are suspect for MEC at any site are located, that site will be recommended for further investigation during the RI. During the RI/FS and removal actions the capabilities of the geophysical equipment is taken into consideration and if necessary intrusive investigations will be conducted in lifts, (X feet per lift) until the target depth of the investigation is reached. If the maximum penetration depth of a munition is four feet, and the geophysical equipment can only see the item down to two feet, the first two feet will be investigated and cleared, and then removed. The geophysical mapping will be redone and the next two feet will be investigated and cleared.

Study Goal 2 in Worksheet 11 will be revised as shown below:

Determine whether surface MEC debris or subsurface anomalies indicate the presence of suspect MEC/MPPEH within the surveyed areas. If present, then return to the surveyed areas for further investigation of potential MEC/MPPEH during an RI. **If no surface MEC or MPPEH are present, and no anomalies indicate the presence of subsurface MEC/MPPEH within the surveyed areas, then no further investigation is required.** In this case, Project Team will evaluate the need to investigate other areas, including areas of greater depth within the surveyed area if investigation depth was not sufficient for projected penetration depth, as well as those areas which have been deferred and/or not surveyed in this investigation. Under either circumstance, continue to investigate the site for the presence of MC in the surveyed areas during the SI (presented in the UFP-SAP for MC).

The MEC decision rules in Worksheet 11 will be revised as shown below:

"If the detector-aided surface surveys and land/aquatic geophysical investigation indicates that no suspect surface MEC and subsurface anomalies are present, then no further investigation of the site at this depth for MEC is required in the areas surveyed and the Project Team will evaluate the need to investigate deeper and/or other areas of the site which may have been deferred and/or not investigated. If suspect MEC is observed on the surface or if subsurface anomalies exist, then return to the site to further investigate the suspect surface MEC or MEC debris and subsurface anomalies during an RI."

The comment concerning LUCs is noted; based on the results of these investigations, remedial alternatives will be evaluated in other documents. The evaluation will include consideration of LUCs as a component of the remedy.

EPA: EPA offers the above text changes to address concerns pertaining to insufficient depth of investigation and deferred areas.

4. **Worksheet #3 – Distribution List and Other Applicable Worksheets**

Please correct the heading to match the Worksheet number (change "6" to "3").

A review of the Sampling and Analysis (SAP) Worksheet #3 – Distribution List on Page 15 of 135 indicate that some of the project roles (i.e., geophysical contractor, senior Unexploded Ordnance (UXO) supervisor, UXO quality control specialist, UXO safety officer, etc.) have yet to be determined (TBD). To ensure completeness and accuracy, revise the Draft Sampling and Analysis Plan for Munitions Response Program Site Inspections at Eight Munitions Response Sites dated September 2009, Volume II of II, Appendix A, herein referred to as the Uniform Federal Policy Sampling and Analysis Plan (UFP SAP) for Munitions and Explosives of Concern (MEC) by updating the TBD designation in the relevant worksheets of the final revision by identifying the appropriate staff personnel/contractors as needed.

**Response:** The header on Worksheet 3 will be changed from "6" to "3".

All field personnel and subcontractors will be identified as part of the site mobilization task; these personnel will be required to sign Worksheet 4 before field work begins. The UFP-SAP will be finalized prior to identification of these personnel; change pages including this information and the signatures will be provided during site mobilization. Information will be added to Worksheet 4 to describe this procedure and the signed Worksheet 4 will be added to the Project File as will be indicated in Worksheet 29.

EPA: Response is acceptable as long as the Final UFP-SAP includes the necessary changes to the document as indicated in the response.

**MEC UFP SAP SPECIFIC COMMENTS:**

5. **MEC Executive Summary, Pages 7 - 10 of 135**

Please make any necessary changes based on the remainder of comments on this document.

**Response:** Revisions will be made as necessary.

6. **Executive Summary, Aerial Bombing Target at Southern Tidal Flats (UXO 08), Pages 9 of 135 and 10 of 135**

The third sentence in the Aerial Bombing Target at Southern Tidal Flats (UXO 08) subsection in the Executive Summary discusses that rusty sheet metal debris apparently from 100-pound bombs has been found in this area. The practice bombs are displayed in Volume I, Appendix B-4: Technical Site Information, Appendix A, Ordnance Technical Data Sheet, Page A-8. It should be noted that the rusty sheet metal debris is Munitions Debris (MD), and not MEC. The text should clarify the rusty sheet metal debris is MD.

**Response:** The text within both the MC and MEC SAPs will be revised to clarify that the rusty sheet metal present at UXO 8 is munitions debris (MD) and not MEC.

**EPA:** Response is acceptable as long as the Final UFP-SAP includes the necessary changes to the document as indicated in the response.

7. **Worksheet #6 – Communication Pathways, Pages 20-22 of 135**

Please add EPA to the Responsible Affiliation, Name, number, and Procedure text columns in the four rows where the Navy and SCDHEC RPMs are listed.

**Response:** EPA will be added to the rows of Worksheet 6 where SCDHEC is listed.

8. **Worksheet #9 – Project Scoping Session Participants Sheet, Page 31 of 135**

There is no material on the included CD for Appendices B-2, B-3, or B-5. Please include the referenced information.

**Response:** Appendix B (B-1, B-2, B-3, B-4, and B-5) is included on the CD in the MC portion of the SAP (Volume I). The CD included in the MEC portion, Volume II, of the SAP includes only Attachments 1 and 3.

**EPA:** If the final SAP is to be issued in two volumes, for ease of public review, please either include the Appendix information in the empty files on the CD included in each particular volume, or remove the empty files from the CD in order to avoid confusion, or add language within the currently empty files which would direct the reader to the other CD.

9. **Worksheet #10 – CSM Summary and Problem Definition for UXO 3, Section 10.2.1.1 and 10.2.2, Pages 36-37 of 135**

In the scoping session an action item was taken to obtain construction documents for the parade deck. The expectation was the documents might show what work had been done in the area during construction with respect to excavation, regrading, and/or fill which would have reasonably resulted in the removal of any remaining bombs, as well as provide information on construction material which might interfere with the investigation. It was also suggested to take cores to determine what modifications have been made to the subsurface, as another approach. Obtain what information you can and include a brief discussion of it in section 10.2.1.1. Be sure to speak to work done in the top 2 feet of the original grade at the time this was an active range, as well as what

fill has been added to obtain the current grade. Acceptance of the decision rule in Section 11.1.4 is reserved until this information is presented.

In section 10.2.2, add another paragraph which states the paved portion of the site is being deferred until investigation of the unpaved areas is complete.

**Response:** To date, information regarding construction of the parade deck has not been identified. If acquired, information will be added to the SI, and the Project Team will evaluate the need to investigate the paved areas of the site.

EPA: Response is partially acceptable. If information is obtained, it should be included as indicated. However, in lieu of the written documentation, EPA suggests a core or two in the parade deck area to determine what was done to reach the current grade based on the cores' geologic information. This can be addressed now, or in support of making the decision regarding the paved areas later.

Also, commit to adding the requested paragraph in Section 10.2.2 pertaining to deferral of the paved area investigation.

10. **Worksheet #10 – CSM Summary and Problem Definition for UXO 4, Figure 10-2, Figure 17-2, and Sections 10.3.1.1, 10.3.1.2, 10.3.1.3, and 10.3.2, Pages 38-40 of 135**

Section 10.3.1.1 describes 9 firing points, of which three are concrete (B, H, and R). Figure 10-2 indicates firing points B, H, and R, as well as A, C, D, E, F, and L. However, in Figure 17-2, points D, F, H, and L are not being surveyed. In section 10.3.1.1, please further clarify which firing points specifically are considered part of this UXO site, and of those which are to be investigated and which are not. For those included in this range but not being investigated, explain why. For those not being investigated, please explain when and where they will be investigated.

In Section 10.3.1.2 explain how deep excess complete rounds might have been buried at the firing points.

And in Section 10.3.2 add a paragraph which identifies which firing points are not being investigated and are therefore being deferred.

Don't forget to address General Comment #2 here, and in WS 11 and 17.

**Response:** There were 9 firing points associated with UXO 4. There is no reason to expect that munitions were buried at any of these firing point, but rather that they were "tossed or thrown" away and, if present, are expected to be near the surface. The firing points that are proposed for investigation (A, B, C, E, and R) are in undeveloped, undisturbed areas. The other firing points (D, F, H, and L) are located in developed, disturbed areas and; therefore, munitions are no longer expected to be present in these areas. Firing points, D, F, H, and L will not be investigated during the SI and are not deferred to future phases of investigation at this site.

Additionally, UXO 4 is an artillery range; therefore, the results of the small arms range sediment characterization study are not applicable to this site.

EPA: Make your argument for exclusion of firing points D, F, H, and L for MEC investigation in the text of 10.3.1.1. Reconcile the difference in the text language of

10.3.1.2 and this response with respect to the potential for complete rounds to have been buried at the firing points versus “tossed or thrown away”.

See feedback to general Comment #2 RTC here.

This response does not yet offer justification for not investigating these firing points for MC. Please address this in Volume I of II, paragraphs 10.5.1.1, 10.5.1.2, 10.5.1.3, and 10.5.2 as appropriate. Be sure to address the potential for MC releases at the firing points, whether or not the disturbances in these areas would have fully mitigated any unacceptable levels of MC at the firing points, and whether or not exposure pathways would potentially be complete. Once this is done, if the result calls for these firing points to be investigated for MC, although not investigated for MEC, explain how the MC sampling will be designed since there will be no MEC detection to drive sampling locations, and revise the remainder of Volume I of II to address these other firing points or alternatively, state that these firing points are being deferred and specify when they will be addressed (with which UXO site).

11. **Worksheet #10 – CSM Summary and Problem Definition for UXO 5 and 6, Section 10.4.1.3, Pages 41-42 of 135**

Don't forget to address General Comment #2 here and in WS 11 and 17.

**Response:** UXO 5/6 is an artillery range; therefore, the results of the small arms range sediment characterization study are not applicable to this site.

EPA: See feedback for General Comment #2 RTC.

12. **Worksheet #10 – CSM Summary and Problem Definition for UXO 8, Section 10.6.1.3, Page 47 of 135**

Don't forget to address General Comment #2 here and in WS 11 and 17.

**Response:** UXO 8 is an aerial bombing target; therefore, the results of the small arms range sediment characterization study are not applicable to this site.

EPA: See feedback for General Comment #2 RTC.

13. **Worksheet #11 - Section 11.2.1, Identify the Goal of the Study at UXO 04, 05 and 06, Page 51 of 135**

In bullet #3, the statement is made, “If sufficient data have been collected for this purpose, then stop collecting data.” “Sufficient data” has not been defined nor approved. EPA will expect the amount of investigation as described in Worksheet 17 will be completed.

**Response:** The amount of MEC investigation as described in Worksheet 17 will be completed. Any deviation to the planned investigation, such as inaccessible site conditions, will be described in the SI report.

EPA: Remove or modify the subject text.

14. **Worksheet #11 - Section 11.2.3, Define the Boundaries of the Study, Vertical Boundaries for Surveys at UXO 04, 05 and 06, Page 53 of 135**

Reconcile the vertical boundary of land based MEC investigation at 3' bgs with the CSM expected penetration depths of 5-10' bgs. It appears the limits of the survey equipment are insufficient to address the expected penetration depths to their fullest. Please explain why. Modify the rationale in Worksheet 17 as well if need be.

The last sentence in the Vertical Boundaries for Surveys at UXO 04, 05, and 06 subsection in Section 11.2.3 indicates the vertical boundary for the aquatic surveys is expected to be to the bottom (sediment/surface water interface) of the waterways. However, most heavy ordnance expected on these sites will most certainly sink below the sediment/surface water interface and be resting in more cohesive soils below as will the seeded surrogate items noted in the ITS Survey Procedure, Aquatic Based on Page 82 of 135 in Section 17.6, Instrument Test Strips. It is recommended the marine magnetometer chosen for aquatic surveys is effective to 3-feet below the sediment/surface water interface of the waterways, or even lower if the USC range study results indicate so.

**Response:** The terrestrial and aquatic geophysics surveys planned were designed with depth in mind. Estimated penetration depths are presented in the SAP; however, actual penetration depth ranges for the munitions at these sites are unknown. Generally, the terrestrial geophysical sensors can typically detect projectile MEC to a maximum depth of 11 times its diameter (for individual munitions 20mm or larger). Concentrations (multiple items) can be detected deeper. The aquatic geophysical sensors are similar in detection distance, but with the aquatic sensor there will be somewhat less detection "depth" because of the greater distance of the sensor to the waterway bottom as compared to the distance of a terrestrial sensor to the ground surface. This greater distance is necessary in order to keep the aquatic sensor safe from potential snags or bottoming the sensor out on the waterway bottom. Although it may be unlikely that individual munitions items can be detected in aquatic areas where munitions may have penetrated a few feet or more into the sediment, or in terrestrial areas where the ground surface may have been built up with fill material, concentrations of munitions items may be detectable if penetration depths or ground surface elevation buildup are not too severe. While geophysical methods and equipment have limitations and individual items or concentrations of items at these sites may be buried too deep for detection, the geophysical surveys will provide information to a certain detection distance or depth.

Bathymetric information on the aquatic sites is not known at this time; however, given the nature of the sites, shallow water depth is expected in the waterways at UXOs 4, 5, and 6. Attempts will be made to maintain the position of the underwater magnetometer as close as 2 feet above the waterway bottom using bottom information that will be acquired during surveying. An exact magnetometer height above the waterway bottom cannot be guaranteed because the waterway bottom is variable and the magnetometer will have to be raised and lowered during surveying to compensate for the bottom change. Remaining at least 2 feet above bottom is critical to reduce the risk of bottoming out or snagging the sensor on the waterway bottom, an obstruction within the waterway channel, or a potential MEC item. One potential MEC that may be located at the aquatic sites is a 75mm artillery projectile; its typical maximum detection distance according to the USACE's 11x rule is approximately 3.5 feet (or 2.5-foot depth below ground surface when using a land sensor about 1-foot above the ground surface);

therefore, the height of the underwater magnetometer above the waterway bottom is integral to the effectiveness of the geophysical survey. A concentration of potential munitions items can be detected at a greater depth than a single munitions item; however, the detection depth limitation is noted, and it is noted that munitions items of interest could be located below the detection depth limit of the survey. This potential limitation is intrinsic in these methods.

The Vertical Boundaries for Surveys at UXO 04, 05, and 06 subsections in Section 11.2.3 text will be revised to refer to the estimated penetration and detection depths presented in Worksheet 20.

EPA: Response is partially adequate. It is recommended that the surrogate items placed at the bottom of the waterway during the aquatic ITS seeding be given enough time to settle on the bottom to ensure as much downward migration as possible.

Otherwise, see feedback to RTC # 3 to be applied here.

15. **Worksheet #11 - Section 11.2.4, Develop the Analytical Approach for UXO 04, 05 and 06, Page 53 of 135**

After reconciling the vertical boundary of land based MEC investigation (see comment above) if the limits of the survey equipment remain insufficient to address the expected penetration depths to their fullest, justify the decision rule which indicates if no MEC are found, then no further investigation of the site for MEC is required.

Also justify the same decision rule if not all firing ranges are investigated.

**Response:** Refer to response to comment 3.

EPA: Refer to feedback to RTC # 3.

16. **Worksheet #11 - Section 11.3.3, Define the Boundaries of the Study, Vertical Boundaries for Surveys at UXO 7 and 8, Pages 56 - 57 of 135**

During the scoping session, MCRD recommended extending the site boundary to be more elliptical. Please explain why the recommendation was made and how the current investigation boundary addresses that.

Reconcile the UXO 7 vertical boundary of land based MEC investigation at 2' bgs with the CSM expected penetration depths of 2' bgs plus fill in the developed golf course area. It appears the limits of the survey equipment are insufficient to address the expected penetration depths to their fullest. Please explain why. Modify the rationale in Worksheet 17 as well if need be.

Reconcile the UXO 8 vertical boundary of land based MEC investigation at 2' bgs with the CSM expected penetration depths of 3 – 10' bgs for 100 lb. bombs. It appears the limits of the survey equipment are insufficient to address the expected penetration depths to their fullest. Please explain why. Modify the rationale in Worksheet 17 as well if need be.

**Response:** There is no documentation to justify extending and/or changing the UXO 7

site boundary; however, the MEC investigation area has been expanded from that proposed in the Pre-Draft SAP to include more coverage.

Refer to response to comment 14 concerning estimated penetration and detection depths.

EPA: Explain why MCRD made the recommendation and how that has been addressed, regardless of the existence of documentation. It was understood that MCRD used process knowledge to raise concerns, rather than documentation.

See feedback to RTC # 3 and 14.

17. **Worksheet #11 - Section 11.3.4, Develop the Analytical Approach for UXO 7 and 8, Page 57 of 135**

EPA understands that prior to the golf course construction, some MEC were found during an archeological dig in the nearby area, so the presence of MEC below the golf course would seem to be a real potential (or could be documented as removed). And since evidence of bomb debris is still present today at UXO 8, the potential seems real there as well. After reconciling the vertical boundary of land based MEC investigation (see comments above) if the limits of the survey equipment remain insufficient to address the expected penetration depths to their fullest, justify the decision rule which indicates if no MEC are found, then no further investigation of the site for MEC is required.

**Response:** Refer to responses to comments 3 and 14.

EPA: Refer to feedback for RTC # 3 and 14.

18. **Section 17.4, UXO Detector-Aided Surface Survey, Suspect MEC/MPPEH, Page 74 of 135**

The text in the second paragraph in the subsection Suspect MEC/MPPEH subsection of Section 17.4 indicates every effort will be made to identify each suspect MEC item encountered. However, a similar discussion was not presented or described for suspect MEC recorded during the aquatic survey. Tetra Tech NUS, Inc. should offer a plan to confirm or deny anomalies in the water as a means to evaluate the MEC quantities in the firing ranges of UXO 04 and UXO 06.

**Response:** Section 17.4 describes procedures for the land-based detector-aided surface surveys, the aquatic surveys proposed during the SI are geophysical surveys. A process to confirm or deny potential MEC anomalies in the aquatic areas of the subject sites would be very difficult to implement, and is beyond the scope for an SI level investigation. Potential SI level investigation options for this type of process might include use of visual, video, and sonar inspection. Visual inspection or video inspection options are expected to have very limited effectiveness because of clouded water clarity/turbidity in these waterways. Side scan sonar would also be of limited use because small targets (such as those of interest) are hard to differentiate with this type of data. Also, sediment cover could render sonar ineffective in these cases. The aquatic survey areas are a small percentage of the overall survey area for the sites, and a geophysical survey using a magnetometer is the standard method to survey these areas for the SI level investigation.

EPA: Response is adequate as long as the anomalies identified during the aquatic survey are further investigated to confirm or deny potential MEC during the RI. If not, the anomaly will be assumed to be suspect MEC.

19. **Section 17.4, UXO Detector-Aided Surface Survey, Planned MEC Field Program for Field Artillery East Shrapnel Range (UXO 05 and UXO 06), Page 77 of 135 and Figure 17-3.**

Site UXO 6 has a very small-designated area for the Limited Meandering Path UXO Detector-Aided Surface Survey with the caveat "in dry accessible areas". In the spring of 2009, this area was proposed for geophysical survey with possible aircraft support. The outlined sweep areas detailed in Figure 17-3, Field Artillery East Shrapnel Range – UXO 5 / UXO 6 MEC Investigation Area, of dry accessible areas only covers roughly 10 percent (%) of the UXO 06 footprint along with an unspecified area of aquatic survey which does not guarantee a good representation of the impact area. The text in the second paragraph on Page 77, Planned MEC Field Program for Field Artillery East Shrapnel Range (UXO 05 and UXO 06), Survey Rationale, states "...actual accessibility to survey these areas will need to be determined in the field. Additional areas may be added (where possible) if the UXO team observes indications of potential impact area target locations or suspect MEC areas...". Ensuring coverage of 50% of UXO 06 by either land or aquatic surveys would give a much better representation of this impact area. Please modify the text to specify a combined coverage of 50% will be targeted.

**Response:** Little is known about site accessibility by foot and instrument at this very large tidal marsh site. While aquatic areas may not traverse potential target areas, they are spread out across the impact area. Given the very large size and the accessibility restrictions of the site, the SI results will likely be limited to less than 50% coverage; however, proposed survey methods will be attempted in up to 50% of these areas (as accessible).

EPA: Response is Adequate: It is understood that currently there is uncertainty in the accessibility of land to survey by foot. Additionally, the actual waterways where the aquatic surveys will be performed are not known. However, by ensuring as much of UXO 06 as possible is surveyed (land and aquatic) increases the certainty that potential impact area(s) have been surveyed. As such, a better representation of the impact area(s) is provided and an overall increased confidence in the geophysical survey results and interpretations. When possible, conduct geophysical surveys on land by foot at all accessible dry areas, especially during low tide. Conduct aquatic surveys in as many waterways as possible, especially during high tide.

Sufficiency of the surveys will be considered in the revised decision criteria (see feedback to RTC # 3).

**MUNITIONS CONSITUENTS (MC) UFP SAP  
VOLUME I OF II**

**GENERAL COMMENTS:**

**20. Listing MMRP Sites in the FFA**

In accordance with agreements between the U. S. Environmental Protection Agency (EPA) and the Department of Defense (DOD) and in accordance with EPA Headquarters policy, please submit the necessary paperwork to add these eight Military Munitions Response Program (MMRP) sites to the Federal Facilities Agreement (FFA). This can be accomplished through a change page submittal and request for approval.

**Response:** NAVFAC is still working with EPA and SCDHEC to address this concern. However, inclusion of the MRP sites in the FFA is not necessary for UFP-SAP approval.

EPA: The SAP may proceed without resolution to this comment, however, EPA would like to see evidence that NAVFAC is working to address this concern. Please provide a plan and schedule for addressing this concern before proceeding with the SAP. (Note: Resolution of this same issue has been an ongoing action item for the Navy, as well as Tier II, with no progress to date, therefore the request for a plan and schedule for resolution to this comment.)

**21. MC Investigations in Sediment**

EPA understands a study has been conducted by the University of South Carolina (USC) for the Marine Corps Recruit Depot (MCRD) wherein expended rounds were searched for in sediments within the impact areas of ranges and samples were taken to identify contaminant levels associated with the rounds located. Summarize the results/findings/recommendations of this study with respect to MC. Discuss how the results could apply to MC investigations in sediment areas of these ranges. Compare results of current ranges with the potential for fate and transport of much more historical releases to sediment at the UXO sites. Modify this SAP to account for the application of these results as appropriate. Address this within the MC CSMs for estimated depths, the boundaries of the study and actual sample depth/location in the sampling rationale (WS 10, 11, and 17) for those UXO sites which have sediment impact areas.

**Response:**

***Summary of USC Report results/findings/recommendations:*** The sediment characterization study targeted small arms ranges/munitions projectiles. One of the sites addressed in this UFP-SAP, UXO 2 Rifle Range at Ballast Creek, is a small arms range. Therefore, the results of this study would be applicable to this site. The other sites addressed in the MC SAP which have sediment impact areas, UXO 4, 5, and 6, are artillery ranges and; therefore, the results of this study would not be applicable to these types of ranges.

This characterization study also referenced a USACE study which identified lead as the primary MC associated with small arms ranges and further concluded that no elevated lead concentrations were noted in sediments deeper than 3 feet below ground surface in

wetland environments.

During the USC study, surface sediment samples were collected in channel locations from the 0- to 12-inch depth interval and in marsh locations from the 0- to 6-inch and 6- to 12-inches depth intervals. Subsurface sediment samples were collected from depths of 12-to 24-inches, 24- to 36-inches, and 36- to 48-inches. Samples were analyzed by XRF for lead, zinc, copper, iron, manganese, and antimony; five percent of these samples were submitted to a fixed-base laboratory for confirmatory analysis.

Several overall trends were noted during the USC investigation:

- Copper concentrations were most frequently elevated relative to background concentrations, followed by lead and then zinc. This was found to be consistent with the Army Small Arms Training Range Environmental Best Management Practices (BMPs) Manual, which indicated that lead and copper had the lowest potential for mobility due to their relatively low solubility in soil and in which zinc was described as highly mobile in soil. Copper concentrations were found to be higher in jackets of projectiles while lead concentrations were higher in the cores. (Please clarify – Is this the core of the projectiles or the sediment cores?) The majority of the projectiles that were found during the field investigation were whole with jackets in various states of deterioration.
- Metals concentrations were found to be higher in intertidal marsh locations than within the tidal creek channels.
- Metals concentrations generally decrease with increasing depth.

This study also found that elevated SEM/AVS values were present within the depths of either 0- to 6-inches below ground surface or 6- to 12-inches below ground surface, indicating that the metals potentially bioavailable are near the surface. The study further stated that the metals in the subsurface sediments are not likely to be bioavailable if these sediments are exposed at a future time, assuming that reducing conditions persist. The XRF data indicated that elevated concentrations of metals in sediment (lead, copper, and zinc) appeared to occur as localized hot spots, with no apparent concentration gradients that would suggest transport away from a point source of contamination.

A preliminary human health screening conducted as part of the study indicated that potential risks from direct contact with sediment under a recreational scenario were not a concern. The preliminary ecological risk screening indicated that impact to receptors exposed to sediments were possible to those with limited mobility but that the potential for population-level impacts to upper trophic level receptors was low due to the isolated nature of elevated concentrations and because these receptors would have greater mobility.

The preliminary sediment transport evaluation indicated that significant resuspension and offsite transport of MC from the interior of the intertidal marsh was unlikely. However, metals that were adsorbed to fine-grained sediments within or adjacent to the tidal channels could be transported offsite due to erosion and transport by tidal currents or by wave action.

Overall, the study concluded that impacts from range activities appeared to be localized and did not pose a risk to human and ecological receptors. Offsite transport of sediment-associated metals is likely to be limited to the areas within or adjacent to tidal channels.

**Discussion:** Soil and sediment samples are proposed for collection from areas surrounding the concrete target foundations at UXO 2. The sampling design is biased towards areas most likely to be contaminated. Samples will be collected from 0- to 12-inch below ground surface in soil and 0- to 6-inches below ground surface in sediment. All samples will be analyzed for lead. This approach is consistent with the USC report which found that lead was the primary MC associated with small arms ranges, that metals concentrations decreased with depth, that potentially bioavailable metals would be found near the surface, and that contamination was found to be localized in areas where contamination was suspected to be highest. No apparent concentration gradients were found that would suggest transport away from a point source of contamination.

The results, findings, and recommendations of the USC report will be discussed in Worksheets 10 and 17, as appropriate for UXO 2, in the MC SAP.

EPA: EPA appreciates the sharing of this information and finds it quite helpful in supporting the MRP investigation approach. However, this response still leaves a few questions:

- 1) In the study summary above it is stated that "Copper concentrations were the most frequently elevated relative to background, followed by lead and then zinc." Reconcile this with the statement in the discussion that the USC study found that "lead was the primary MC...". EPA recognizes that copper may not often present unacceptable risks, but if present at certain levels it may. Modify text as appropriate.
- 2)

Also, can we not go a step further to apply some of these findings to other sediment UXO Sites? Although the study was conducted on a small arms range, can we make a professional judgment to extrapolate the data with respect to disposition of slightly larger artillery? E.g. Can we use professional judgment to assume that if the same contaminants are released from different artillery, fate and transport, bioavailability, etc. of those contaminants within the same type of environmental conditions (intertidal marshlands as opposed to tidal creek areas) may be similar if deposited at nearly the same depths? (Although the heavier artillery might be expected to be deeper, our study area of concern is still in the surface sediments.) Please explain if the objectives of the study were expressed in any way to provide for this type of application of the findings. Please explain if the researchers involved in this study could support any such application of their findings. If so, add some discussion to the CSMs and fate and transport sections for the other UXO sediment sites.

Formatted: Indent: Left: 0"

## **22. Land Use Controls**

It appears that in several cases the depth of the sampling is not sufficient to be representative of potential MC presence at the estimated penetration depth. In other cases, certain aspects/areas of the site investigation have been deferred. For each UXO site where either of these is the case, please explain how this is consistent with the decision rules which result in No Further Action (NFA). Please keep in mind that Land Use Controls (LUCs), including Base Master Plan and/or deed notices, pavements left as a cover, GW or residential use restrictions, etc. are considered actions under CERCLA and would trigger the need for a Record of Decision (ROD), etc. Otherwise, revise the Decision Rules as appropriate.

Also, there are several places in the text which mention LUCs and begin to describe them. Under CERCLA, requirements for LUCs are made in the ROD, and the specific design/details of the necessary LUCs are defined in a LUC RD.

**Response:** MC sampling at UXO sites, UXOs 2, 4, 5, and 6, is biased toward areas most likely to be contaminated; therefore, contamination, if present, should be detected. MC samples at UXO 2 will be located in areas near the concrete target foundations while MC samples at UXOs 4, 5, and 6, will be located based on results of the MEC investigation and will be biased toward locations where surface MEC/MPPEH, MD, or subsurface anomalies indicative of buried munitions are detected.

MC samples are not proposed for collection at UXOs 3, 7, and 8 during this SI and may be recommended for collection during future investigations only if surface MEC/MPPEH, MC, or subsurface anomalies indicative of buried munitions are detected at these sites.

EPA: (Resolution to feedback on RTC # 3 may impact this as well.)

Generally, human and ecological receptors that use these sites would be exposed to, and risk would be evaluated from, intervals of 0- to 1-foot bgs for surface soil and 0- to 6-inches bgs for sediment. Proposed depth of collection for samples was designed to meet typical risk exposure scenarios.

EPA: For the following decision rules, also see feedback on RTC # 3 and # 21 above and adjust as appropriate.

The decision rules for these sites will be revised and will be, for UXO 2:

“If the fixed base laboratory lead concentration in all samples from the top 6 inches of UXO 02 sediment and the top one foot of UXO 02 soil, targeted toward the most contaminated locations and as shown on Figure 10.2 are less than the PAL, then no further investigation of lead, or any other MC metals associated with the types of munitions used at this site, in sediment or soil is required at this site; otherwise, further characterization of contamination and associated risks from exposure to the contamination will be conducted at this site.”

For UXOs 4, 5, and 6:

“If fixed base laboratory lead and explosives concentrations in all sediment samples collected from the top 6 inches of sediment and all surface soil samples collected in the top one foot of soil, that are biased toward most likely contaminated locations are less than the PALs, then no further investigation of these MC in sediment or soil is required at this site; otherwise further investigation of the site will continue during an RI.”

The comment concerning LUCs is noted; based on the results of these investigations, remedial alternatives will be evaluated in other documents. The evaluation will include consideration of LUCs as a component of the remedy.

**23. Investigation for MC in Concentrations High Enough to Pose an Explosive Hazard vs. at Levels of Concern for the Environment**

The text in the second paragraph of the Executive Summary states "...and MC in high enough concentrations to pose an explosive hazard." The text does not indicate that the munitions constituents (MC) should be addressed further to determine possible soil & water contamination from the same (repeated in Volume II of II). The current definition is: **Munitions constituents (MC)** – Any material originating from Unexploded Ordnance (UXO), Discarded Military Munitions (DMM), or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 U.S.C 2710(e)(3)). The Draft Sampling and Analysis Plan for Munitions Response Program Site Inspections at Eight Munitions Response Sites dated September 2009, Volume I of II, Text and Appendices B through D for MC should be revised to address this issue.

**Response:** The sentence referenced refers to what constitutes MEC, which includes MC in high enough concentrations to pose an explosive hazard. A sentence will be added to the MC SAP Executive Summary to define MC as described above.

**EPA:** Response is acceptable as long as the Final UFP-SAP includes the necessary changes to the document as indicated in the response.

#### 24. **Investigation of Groundwater**

During the scoping meeting it was agreed that the UFP SAP would make an argument for or against the need for GW sampling at each UXO. Please do so. If the decision is to be made after the UFP SAP is implemented, justify sufficiency of currently planned data to make GW investigation decisions in soils investigation areas (e.g. describe depth to GW at each soils investigation area, describe fate and transport potential of MC since time of discharge at each soils investigation area, compare to soils data depth/location design, provide other pertinent arguments, as well as the toxicity and persistence information already provided in the SAP.)

**Response:** This SI sampling program was designed to determine the presence or absence of contamination. The sampling is biased towards areas most likely to contain contamination, if present. At the Parris Island MRP sites, contamination would be expected to be present in soil and sediment as applicable to each site. If contamination is present, the data that are collected during the SI, will provide some information regarding the extent of contamination. Sample contaminant concentrations that exceed PALs could result in further investigation or a response action. Further investigation may include groundwater sampling if the Project Team decides that this evaluation is needed. The water table in the MCRD Parris Island area usually ranges from 0 to 10 feet below ground surface (bgs) and is most commonly found at a depth of 3 feet bgs. The direction of groundwater flow in the upper portion of the shallow surficial aquifer is generally toward the nearest surface water body, such as a pond, river, or tidal creek. This additional groundwater information will be added to Worksheet 10.

**EPA:** The response does not sufficiently argue for or against gw sampling, in that it does not speak to the fate and transport of more soluble contaminants. While it may be intuitively obvious that less soluble/mobile contaminants will be present in the soils/sediments being sampled, the argument does not support the assumption that nothing of concern is in the gw. The state has fairly clearly stated their concerns and requirements for gw sampling to support an NFA determination. Otherwise, LUCs may be a solution in lieu of technical arguments or sample results. There does not appear to be consensus on this issue, and there appears to be conflicts with decision rules in this

SAP.

**25. Background Data Set**

Worksheet #9 shows action items from the scoping meetings which required Tetra Tech to review the background data set for Site 3 and propose if it is appropriate for use at the UXO sites. The presentation has not been made outside of this document. Therefore, please justify the use of the background data set for each UXO herein.

**Response:** The background data set for Site 3 will not be used for screening during this SI, and will be removed from worksheets in the MC SAP.

**26. Worksheet #3 – Distribution List and Other Applicable Worksheets**

A review of the Sampling and Analysis (SAP) Worksheet #3 – Distribution List, on Page 19 of 142 indicate that the project roles (i.e., field operations leader (FOL) MC) have yet to be determined (TBD). To ensure completeness and accuracy, revise the UFP SAP for MC by updating the TBD designation in all of the relevant worksheets of the final revision by identifying the appropriate staff personnel as needed.

**Response:** All field personnel and subcontractors will be identified as part of the site mobilization task; these personnel will be required to sign Worksheet 4 before field work begins. The UFP-SAP will be finalized prior to identification of these personnel; change pages including this information and the signatures will be provided during site mobilization. Information will be added to Worksheet 4 to describe this procedure and the signed Worksheet 4 will be added to the Project File as will be indicated in Worksheet 29.

EPA: Response is acceptable as long as the Final UFP-SAP includes the necessary changes to the document as indicated in the response.

**SPECIFIC COMMENTS:**

**27. MEC Executive Summary, Pages 8 - 12 of 135**

Please make any necessary changes based on the remainder of comments on this document.

**Response:** Revisions will be made as necessary.

**28. Worksheet #6 – Communication Pathways, Pages 22-24 of 142**

Please add EPA to the Responsible Affiliation, Name, number, and Procedure text columns in the three rows where the Navy and SCDHEC RPMs are listed.

**Response:** EPA will be added to the rows of Worksheet 6 where SCDHEC is listed.

**29. Worksheet #10 – Problem Definition, Site History, and Background - UXO 1, Section 10.2**

Worksheet #9 shows action items from the scoping meetings which required Tetra Tech to add additional information concerning the existence/non-existence of UXO 1. However, the SAP indicates additional information will not be provided until the SI Report. Therefore, EPA reserves the right to require an investigation of UXO 1 if the additional data indicates the need. Additionally, when presenting the information, be sure to address the accuracy of the interviewee's other recollections in comparison to UXO 1. Also, be sure to include aerial photographs of the Weapons Battalion HQ and/or the old indoor pool if possible.

**Response:** The comment is noted. Maps presented in the Archive Search Report which depict the area where UXO 1 was supposedly located will be presented in the SI Report. If aerial photographs are located, they will also be presented in the SI Report.

30. **Worksheet #10 – CSM and Problem Definition for UXO 2, Section 10.3.1.1 and 10.3.1.2**

Worksheet #9 shows consensus decisions that state the UXO 2 site boundary will need to be adjusted to account for no stop/no berm for bullets and may need to be revised based on the orientation of the range/firing line and results of the SI. Please explain what adjustments have been made for these factors and how the sampling design has been modified to generate data to support these adjustments.

Furthermore, explain why there is no expectation that rounds may have fallen short of the targets, on dry land, given spent rounds were sited near the targets. Otherwise, add soil samples to investigate the upland area just above the targets and well above high tide lines. Consider whether or not an upland surface survey would be beneficial to determine if this need exists, even though the rounds would not be considered MEC. If so, please add this to the plan.

And finally, don't forget to address the USC Range study here and in worksheets 11 and 17 to justify the depth of the investigation.

**Response:** A revised site boundary will be presented on all UXO 2 figures, along with the Archive Search Report boundary. This revised site boundary will encompass the concrete target foundations and will estimate a location for the firing line based on the reported length of the range. Five soil samples will be added to the sampling design at UXO 2. These samples will be located upgradient/upland of the concrete target foundations in order to determine if rounds may have fallen short of the targets. A discussion of the USC report will be presented in Worksheet 10 and 17 of the MC SAP as appropriate.

**EPA:** Ensure that all applicable sections of the SAP are updated to address these changes.

31. **Worksheet #10 – CSM and Problem Definition for UXO 3, Section 10.4.1.1**

Worksheet #9 shows action items from the scoping meetings which required MCRD to obtain construction documents for the parade deck. See comments on the MEC SAP which may also apply here.

**Response:** Refer to response to Comment 9.

EPA: Refer to feedback to RTC # 9 and 3.

**32. Worksheet #10 – CSM and Problem Definition for UXO 4, Section 10.5**

Don't forget to address the USC Range Study results here and in worksheets 11 and 17 to justify the depth/location of the investigation. Also, reconcile the investigation depth with the expected penetration depth from the CSM.

**Response:** Refer to responses to Comments 21 and 22.

EPA: Refer to feedback to RTC # 21 and 22.

**33. Worksheet #10 - Section 10.6.1.2, Potential or Known Sources of MEC and MC Contamination, MC Presence, Page 55 of 142**

The text in the subsection MEC Presence of Section 10.6.1.2 indicates that antimony and arsenic, if present, would be spatially correlated with lead because they are associated with the lead in the bullets. However, this statement refers to small arms bullets versus possible Mk 1 shrapnel rounds which contain a charge of melted resin which holds 270 lead balls suspended within it. These balls average 42 to the pound, 270 totaling 6 pounds, 7 ounces per round. As such, it is recommended that the text in this section be revised to describe the 75mm rounds.

Additionally, reconcile the CSM in Volume I of II stating an expected penetration depth of 5-10 feet, while Volume II does not mention this depth. After reconciliation, modify remainder of SAP as appropriate.

Don't forget to address the USC Range Study results here and in worksheets 11 and 17 to justify the depth/location of the investigation.

**Response:** The text will be revised to refer to shrapnel rounds. The composition of lead balls present in shrapnel rounds would be similar to bullets. Antimony would be added as a hardening agent in quantities ranging from 0.1 to 2 percent while arsenic would be naturally present in lead at trace levels (0.001 to 0.05%). Therefore, antimony and arsenic, if present, would be spatially correlated with lead and would be present at much lower concentrations.

EPA: Response is acceptable as long as the Final UFP-SAP includes the necessary changes to the document as indicated in the response.

The estimated penetration depths for these types of munitions, as presented in the Range Identification and Preliminary Range Assessment Report, is 4.9 to 9.8 feet below ground surface for whole rounds. This information will be added to Section 10.4.1.2 of the MEC SAP. Refer to response to Comment 21 concerning the USC Study.

EPA: Refer to feedback on RTC # 21.

**34. SAP Worksheet #15 – Reference Limits and Evaluation Table, Page 83 of 142**

In cases where PAL references other than the R-RSL and a Region 4 Screening value was used, explain why.

**Response:** Numerous human health and ecological soil screening criteria were evaluated (as presented in Appendix B-2) including USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites – Residential Soil (R-RSL), Region 4 and Region 5 Ecological Soil Screening Levels, and Ecological Soil Screening Levels. All of the soil screening criteria were evaluated and the most stringent screening number was chosen and included in Worksheet 15 as the PAL.

35. **SAP Worksheet #17 – Sampling Design and Rationale, Field Artillery East Shrapnel Range (UXO 06), Page 91 of 142**

The text in the Field Artillery East Shrapnel Range (UXO 06) section on Page 91 of 142 states that the exact number of samples to be collected will be determined in the field and will be based on accessibility and the results of the Munitions and Explosives of Concern (MEC) investigation. The UFP SAP for MEC, Volume II of II, Section 17.4, UXO Detector-Aided Surface Survey, Suspect MEC/MPPEH, on Page 74 of 135 indicates that every effort will be made to identify each suspect MEC item encountered. However, a similar discussion was not presented or described for suspect MEC recorded during the aquatic surveys. Tetra Tech NUS, Inc. should offer a plan to confirm or deny anomalies in the water as a means to evaluate the MEC quantities in the firing ranges of UXO 04 and UXO 06. This evaluation should include a discussion on how the number of MC samples to be collected is impacted based on the aquatic survey of MEC.

**Response:** Refer to response to Comment 18 for a discussion of a plan to confirm or deny anomalies in the water. Anomaly avoidance techniques will be implemented during all MC sampling; therefore, if anomalies are identified, samples will be collected in the area of the anomaly, but not at the exact location. If anomalies are not identified in the water, MC samples will still be collected from within the waterways surveyed. Samples will be approximately evenly spaced along the waterways that were surveyed, up to the maximum number of samples proposed for collection at each site.

**EPA:** Response is adequate as long as the anomalies identified during the aquatic survey are further investigated to confirm or deny potential MEC during the RI. If not, the anomaly will be assumed to be suspect MEC.

36. **SAP Worksheet #18.4 – UXO 6 Sampling Locations and Methods/SOP Requirements. Page 103 of 142**

In the MEC SAP, EPA has requested that 50% of the area be investigated. Please increase the number of samples planned here to be similar, proportionately speaking, to UXO 4.

**Response:** Refer to response to Comment 19 concerning the percentage of area to be investigated at UXO 6. The total number of samples at UXO 4 versus UXO 5/6 that will be analyzed at the fixed-base laboratory is similar. All firing points that are located in undeveloped, accessible areas will be sampled at both UXO 4 and UXO 5. At UXO 5, there is only 1 firing point, while at UXO 4 there are a total of nine firing points, of which five will be sampled. In the impact areas at these ranges, 16 samples will be collected for fixed-base analysis at UXO 6 while between 10 and 16 samples will be collected for fixed-base analysis at UXO 4. Field screening (XRF screening) will be conducted at UXO 4, and based on the results of the field screening, the FOL will determine how

many and which samples will be sent to the fixed-based laboratory. Field screening will not be conducted at UXO 6 due to site conditions of the impact area, marshy and predominantly inaccessible by foot.

EPA: Refer to feedback on RTC # 3, 10, and 19. Justify not sampling for MC at the other firing points, etc.