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MCRD PARRIS ISLAND  
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LETTER AND COMMENTS FROM U S EPA REGION IV REGARDING DRAFT FINAL  
REMEDIAL INVESTIGATION WORK PLAN FOR MUNITIONS RESPONSE PROGRAM (MRP)  
AND UNEXPLODED ORDNANCE SITES (UXO) 2 THROUGH 8 MCRD PARRIS ISLAND SC  
3/16/2012  
U S EPA REIGON IV



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4  
ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

March 16, 2012

**CERTIFIED MAIL**  
**RETURN RECEIPT REQUESTED**

Naval Air Station, JAX  
Navy Facilities Engineering SE  
Installation Restoration, SC IPT  
Attn: Mr. Charles Cook  
PO Box 30  
North Ajax Street, Bldg 135  
Jacksonville, FL 32212-0030

AND

Commanding General  
Marine Corps Recruit Depot  
Natural Resources & Environmental Affairs Office  
Attn: Ms. Lisa Donohoe  
PO Box 5028  
Parris Island, SC 29905-9001

Dear Mr. Cook and Ms. Donohoe:

The U.S. Environmental Protection Agency (EPA) has completed its review of the Draft Final (D2) Remedial Investigation Work Plan (RIWP) supporting the Munitions Response Program (MRP) investigation of Unexploded Ordnance Sites (UXOs) 2 through 8, Marine Corps Recruit Depot (MCRD), Parris Island, South Carolina, January 2012 (D2 - Three Volumes). Where EPA refers to the "RIWP", this means the entire collection of documents.

It should be noted that although the RIWP title indicates the investigation of UXO2 is included, in actuality, it is not fully addressed. The investigation for UXO1, UXO2, and UXO4 Rocket Range Subarea have been planned for under a separate document entitled Work Plan for the Expanded Site Inspection (ESI) for UXO1, UXO2, and Rocket Range UXO4 Subarea (February 2012). This document and the plan for investigating these sites will be reviewed separately. A letter indicating the results of that review by EPA will be forthcoming. If the investigation for all or any of these sites produces data which EPA is willing to approve as being sufficient to delineate the nature and extent of contamination and sufficient for use in a risk assessment, then the results of the investigation should be captured in an RI Report. Otherwise, an SI Report should be generated.

EPA submitted comments on the draft RIWP which identified concerns, some of which required specific changes to the document, and others which allowed the Navy to respond in a manner which addressed EPA's concern while allowing for the Navy/MCRD to start this phase of the investigation as desired, recognizing that additional investigation and sampling may be required by EPA before the RI can be completed. In general, the Navy/MCRD has addressed EPA's comments and properly incorporated changes to the RIWP. However, a few responses to EPA's comments were unacceptable. Additionally, certain changes to the document are still required in order to obtain EPA's approval. Finally, EPA needs to clarify certain expectations. The unacceptable responses, additional required changes, and clarified expectations have been identified in the conditions for approval attached hereto.

EPA appreciates the hard work that has gone into planning for the remedial investigation and analysis of site conditions at these six UXO sites (UXO 3-8). EPA expects change pages for the document as necessary in accordance with the conditions for approval. Once those change pages have been submitted reflecting the required changes, the Navy/MCRD may consider the document approved, thereby addressing the remedial investigation work plan for UXO5 and UXO8; with UXO3 being addressed to a limited extent as called for in the work plan, UXO4 being addressed with the exception of the UXO4 Rocket Range Subarea and vast marsh areas which are not accessible; UXO6 being addressed to the very limited extent as called for in the work plan, also due to extensive inaccessible marsh areas; and UXO 7 being addressed with potentially vast vertical investigation gaps due to excessive fill. The investigations of UXOs 3, 4, 6, 7, and 8 will apparently have extensive vertical investigation gaps as well due to limitations of geophysical investigation equipment as compared to the maximum penetration depth of projectiles. As a result, remedial decisions using the data generated by this RIWP will only be for those portions of the site which were fully investigated. Remedial decisions, likely requiring actions, will have to be made for those portions not fully investigated based on the nature of the site. The decisions will likely require these uninvestigated portions of the site to be addressed either through extrapolation where appropriate, the use of Land Use Controls, Interim Remedial Decisions status, and/or any combination of these as appropriate.

Alternatively, if the Navy and/or MCRD disagree with the conditions for approval attached hereto, dispute should be implemented via written notice on behalf of the Navy and/or MCRD. EPA is available for consultation during this process if the Navy and/or MCRD are unclear with respect to the conditions for approval. Please feel free to call with any questions you may have. I can be reached at 404-562-9969.

Sincerely,



Lila Llamas  
Senior RPM  
Federal Facilities Branch  
Superfund Division

Attachment

cc: Meredith Amick, SCDHEC  
Peggy Churchill, TtNus

**EPA CONDITIONS FOR APPROVAL  
REMEDIAL INVESTIGATION WORK PLAN FOR  
UNEXPLODED ORDNANCE (UXO) Sites 3 through 8, MCRD, PARRIS ISLAND, SC**

**EPA CLARIFICATIONS FOR THE ADMINISTRATIVE RECORD:**

1. UXO1 is not being investigated under this Remedial Investigation Work Plan (RIWP). Rather, a Site Inspection (SI) is being planned for under an Expanded SI Work Plan (ESIWP), which may or may not produce data which will suffice as an RI investigation. All comments pertaining to UXO1 will be made in response to the submittal of that document on the corresponding review schedule.
2. Although mentioned in the RIWP, further investigation of UXO2 is being planned for under an ESIWP, which may or may not produce data which will suffice as an RI investigation. All comments pertaining to UXO2 will be made in response to the submittal of that document on the corresponding review schedule.
3. A new subarea in UXO4 was recently discovered. Therefore the investigation of this area, the UXO4 Rocket Range subarea, is being planned for under an ESIWP which may or may not produce data which will suffice as an RI investigation. All comments pertaining to this portion of UXO4 will be made in response to the submittal of that document on the corresponding review schedule. Until this area has been fully investigated and produced RI level data, the RI for UXO4 cannot be considered complete.
4. During scoping meetings for addressing the SI and RI phases of the CERCLA process at UXO Sites 1 through 8, the theoretical maximum penetration depths for munitions fired on the sites and the instrument capabilities limitations (depth to which subsurface surveys are effective) for the geophysical survey equipment being used were discussed. The penetration depth exceeded the effective survey depth in most cases at most sites, resulting in a vertical data gap. The RIWP calls for intrusive investigation which may fill some of the gap in areas where it is applied.

Similarly, data gaps exist between survey transects which are spaced at distances greater than the effective width of the survey equipment. Survey transect spacing has reportedly been designed to ensure that distinct regions of concentrated munitions presence can be defined, but not to identify all anomalies within the site boundaries.

Additional surveys and intrusive actions may be planned for in the remediation phase if sites are found to require remediation. However, this information will not be available at the time remedial decisions are being made. Therefore these gaps have to be accounted for and considered during remedial decision making. Site specific concerns are highlighted as follows:

- UXO3 as depicted in RIWP figures is covered by the parade ground. A small grassy area adjacent to the target area is being investigated, to ensure no munitions or range

related debris is present. However, investigation of the target site itself is not being conducted.

- UXO4 is being investigated, however vast areas of marsh within the impact zone are inaccessible, and therefore only the limited area of navigable waterways is being investigated. Both the land and the waterways will likely have vertical data gaps. Survey transects are spaced far apart, and therefore data gaps may exist between transects. This may be sufficient for locating dense areas of anomalies in the RI, but not for clearing the area of concern in all areas investigated within the site boundaries. Additionally, the lower boundary of the impact zone does not encompass the full extent of the distance munitions may have traveled. Finally, UXO4 Rocket Range subarea is being investigated separately, pending plan review and approval.
- The exact location of UXO5 is unknown.
- UXO6 is being investigated, however vast areas of marsh within the impact zone are inaccessible, and therefore only the limited area of navigable waterways is being investigated. UXO6 encompasses very little dry land. Both the land and the waterways will likely have vertical data gaps. Survey transects are spaced far apart, and therefore data gaps may exist between transects. This may be sufficient for locating dense areas of anomalies in the RI, but not for clearing the area of concern in all areas investigated within the site boundaries. Additionally, the lower boundary of the impact zone does not encompass the full extent of the distance munitions may have traveled.
- UXO7 is located in a developed golf course. Much disturbance of the soils reportedly occurred during construction. Various depths of fill material were placed on the site. Therefore vertical data gaps are likely. Data gaps may exist between survey transects, but to a much lesser extent at this site as planned.
- UXO 8 is located in a tidal flat area. The entire site is being investigated; however, SI data indicates the actual location of the target area may not be where originally anticipated. Also, tidal action may have moved munitions around. Therefore, the exact extent of the site boundary is unknown. Additionally, vertical and horizontal data gaps may exist.

Based on these site conditions, the investigation plans submitted, limitations of instruments, inaccessibility of site areas, etc. remedial decisions being made will apply to the areas being investigated, to the extent they are investigated. The Navy may present evidence or arguments which may clear some areas of concern. However, it is likely at a minimum these sites will need Land Use Controls (LUCs), and the remedy decisions may be considered interim until technology is available to clear the sites, or both.

5. The Munitions and Explosives of Concern (MEC) investigation, Part 1, is intended to delineate the nature and extent of munitions as a source of contaminants and potential safety hazards. The investigation is designed according to a system which uses basic

background information about a site and the munitions used on site, along with information about the capabilities and limitations of technical equipment, to ensure that distinct regions of concentrated munitions presence can be defined, but not to identify all anomalies within the site boundaries. However, the investigation is not being applied to all portions of the site; therefore EPA is hesitant to accept that the design will ensure all distinct regions of concentrated munitions presence can be defined. Furthermore, there has been no evidence provided to indicate these were not historically used as ranges (with the exception of UXO1) or that a range clearance has been performed. Consequently, EPA will keep this in mind when considering any areas for exclusion from further consideration as part of the MRA based on not finding any physical evidence of munitions use. Alternatively, EPA may call for additional surveys and/or intrusive investigations to be conducted before further consideration.

6. The Munitions Constituents (MC) investigation, Part 2, calls for very limited sampling based on worst case scenario biased samples. However, the plan is being designed without knowing how many distinct regions of concentrated munitions will be detected, and on sites where the targets were most likely relocated frequently. While it may seem obvious that taking a soil sample directly below a buried MEC would be a worst case, there may be areas with extremely dense shrapnel on the surface which may actually have been a greater source for MC leaching than a buried item large enough to be detected with survey equipment. Therefore EPA is hesitant to accept the very limited biased sampling as being sufficient to delineate nature and extent of contamination and to represent an entire exposure unit without having a better sense of the density and distribution of munition sources. Consequently, EPA repeats previous concerns that the number of samples planned will likely be insufficient and additional samples and/or implementation of a VSP/Triad based approach may be required.

**RESPONSES TO EPA COMMENTS WHICH WERE NOT ACCEPTED AS FINAL:**

(These do not require a change page or action for this document at this time.)

7. The following RTCs will be reviewed and considered during review of the ESIWP for UXOs 1, 2, and 4 Rocket Range Subarea: 2a, 2b, 7, 8 (regarding these UXOs), all of 11, 16, 39, 40f, 40g.
8. Comment #18 – While “NAVSEA” (undefined in the response) may not consider fencing, wire, signs, posts, nails, etc. to be “range-related debris” as defined, CERCLA requires remediation of site contaminants which present potential unacceptable risks. If the material is present in waste form and in significant amounts it may be considered a source for site contaminants, and as such EPA may require the material be included and remediated. This decision can be made after a determination that a remedial action is necessary.
9. Comments #22a, b, and c – These areas may require investigation pending review of the results of this RIWP.

10. Comments 41h and i – Based on the information in the response, the groundwater well locations should not be moved. However, additional wells will most likely be required in the areas of highest density of MEC/MPPEH once the MEC portion of the investigation is complete.
11. Comment 41j – EPA’s understanding is that MEC/MPPEH has already been detected at UXO4, therefore sediment samples just off the land areas will not be considered optional. However, EPA recommends the Navy get concurrence on the location of the samples based on the highest density MEC/MPPEH areas found near the marsh, rather than simply locating the samples “near surficial MEC/MPPEH”.
12. Comment 43 and 44 – EPA was not present at the internal project scoping meeting where these decisions were made. EPA has concerns that some of the UXOs are represented by too few samples to generate a sample set truly representative of the entire UXO site. Additionally, EPA is not convinced the samples will be taken based on worse case scenarios. Such limited sampling and biased locations may not be considered sufficient to represent delineation of nature and extent on large sites. Additionally, on such large sites, typically SI results would indicate suspect areas and often the site is divided into smaller decision units within the exposure unit. EPA retains the right to call for this type of site management in the case of the larger sites being addressed in this RIWP. EPA will address these concerns once the result of the MEC investigation is complete. Therefore, additional samples may be required. Additionally, due to the age of the site and the extensive degradation and transport that may have occurred over time, as well as the potential for target areas to have been located anywhere, EPA may require these additional samples be implemented in accordance with VSP/Triad or incremental sampling for contaminants other than explosives.
13. Several responses to EPA General Comments on the Draft SAP Part 2 state that the need for additional sampling will be evaluated and discussed with the Partnering Team after the remedial investigation (RI) analytical results are known. Consequently comments 42b, 42i, 43, and 44 on the Draft SAP Part 2 will be revisited once the RI data have been validated and summarized in support of further discussions for whether a second phase of samples are required.
14. Several responses to EPA General Comments on the Draft SAP Part 2 state that the need for additional sampling will be evaluated and discussed with the Partnering Team after the remedial investigation (RI) analytical results are known. Consequently it is recommended that General Comments 42b, 42i, 43, and 44 on the Draft SAP Part 2 also be revisited once the RI data have been validated and summarized in support of further discussions for whether a second phase of samples are required.

**EPA CONDITIONS FOR APPROVAL WHICH REQUIRE ACTION:**

15. General Comment #6 – For UXO 1, it is still unclear with which UXO site the Rifle Grenade Courts are associated. The information provided pertaining to the Munitions Response Program (MRP) Archive Search Report (ASR) and/or the Preliminary

Assessment (PA) discusses the grenade courts within the site information for Khe Sahn/Range A. However, the Figure INT-3 indicates Range A with a yellow rectangle and the grenade courts with red dots. Red, as used elsewhere on the same figure, indicates the boundaries for current UXO sites being investigated. The text allows for the possibility that UXO1's location has been misinterpreted. Please clarify for the administrative record to which range these grenade courts belong and properly color code/label them accordingly on Figure INT-3 (e.g. if with UXO1, keep them red and add UXO1a; if Range A, color them yellow or green and add a subarea indicator A# as used in the ASR/PA (check for the accurate number to use). **Submit the revised Figure as a condition of approval.**

16. Figure INT-3 – In addition to the condition above, please modify the following: Add a colored dot for firing point R. Indicate the UXO4 Rocket Range Subarea. Clarify the red oblong on top of Inchon/Range E. If this is not part of the current UXO boundaries, please either delete it or change the color and/or move it and properly label it. The blue rectangle to the southeast of Range A is confusing. It appears to create a non-training area inside the training area. Perhaps it was intended to encapsulate the various ranges along that coast. If this was the purpose, perhaps a white line such as that used in the arrows would be less confusing. Please modify or delete the rectangle for clarification. Properly identify the various ranges near Range A as being subareas of A in accordance with the ASR/PA and properly label them as such. **Submit the revised figure as a condition of approval.**
17. General Comment #8 – Since Natural Resource Trustees (NRTs) indicated comments had been incorporated into EPA's comments and/or that they will not be commenting at this time (which might imply they will comment later), EPA needs a record of NRTs' position with respect to satisfaction with the RIWP D2 before considering the document approved. Satisfactory acceptance of UXOs 1, 2, and 4 Rocket Range Subarea may be provided while proceeding through review of the ESIWP. **Provide a record of the NRTs' satisfactory acceptance of the RIWP D2 for at least UXO's 3 through 8 as a condition of approval.**
18. Comment #s 12, 13, 36, and 40 e-g – Comment 12 pertained to a "Sitewide" Eco Risk Assessment (ERA) meaning across all UXO sites as might be encountered within the natural home range area of the species, and therefore did not only apply to UXO2, but also to possibly include UXOs 4, 5, 6, 7, and 8 according to where the home range might apply. The Navy/MCRD's response addressed only contaminant levels at UXO2. EPA's comment allowed for the inclusion of non-site range areas, proportioning of the home range, averaging across a range, etc. as appropriate in an ERA. EPA recognizes the Navy/MCRD's point regarding insectivorous versus carnivorous species, and once the analytical results are in, this indeed may ultimately be determined to be an indicator species for an ERA. However, to be responsive to NRT concerns, to be inclusive, and to document consideration of a wide range of species as potential receptors, including the endangered species known to have inhabited certain areas on MCRD and including a variety of species with various home range sizes, the lists of possible receptors for each UXO in corresponding subsections of Worksheet 10 entitled "Land Use, Receptors, and

Exposure Pathways” should be updated to include the Endangered and Special Status Species identified in Section 10.2.8. **Please submit the updated change pages for these subsections as a condition for approval.**

Furthermore, the Navy/MCRD arguments for or against approaches as a valid means of evaluating ecological risk in an Eco Risk Assessment (ERA) and/or the inclusion or exclusion of certain species should be made in the Baseline Risk Assessment portion of the work plan. Consequently, it has come to EPA’s attention this portion of the RIWP appears to be missing from the RIWP. EPA recognizes that since very little analytical data of any significance is currently available it is difficult to know how to plan for a site-specific BRA at this point, or even at which UXOs one will be necessary. Therefore, in lieu of including the plans for a BRA in this RIWP, EPA will accept presentation of the plan during a scoping session for the RI Report. This should occur after analytical results are available and a determination has been made that the analytical data is sufficient to delineate nature and extent of contamination, but BEFORE the RI Report is drafted and submitted. The Navy/MCRD should plan for this scoping session in their schedule such that this can be accomplished in a meaningful and effective manner while still meeting enforceable deadlines for the RI Report. **Please submit a schedule for scoping and development of the BRA as a condition for approval. Ensure the NRTs are invited to participate and given sufficient notice of the date, time, and place.**

19. Comments #20c and #21d – EPA will attempt to meet requests of expedited review (e.g. 1 or 2 days) of the proposed grid locations. However, the Navy/MCRD should provide notice ahead of time as to approximately when to expect them so that EPA can put the MEC expert on alert and expedited review can be planned for. While the response indicates an expedited review will be “requested”, Worksheet 6 indicates a fixed review time of 1 to 2 business days. Modify Worksheet 6 to indicate an expedited review time of 1 to 2 business days will be requested, as stated in the response to comments. **Submit the revised Worksheet #6 affected page as a condition for approval.**
  
20. Comment 27 – EPA General Comment 27 is correctly addressed with the exception of the Unexploded Ordnance (UXO) Team Separation distance for unintentional detonations during manual operations. Table 17-1 lists the distance as K40<sup>(2)</sup> of the munition with the greatest fragmentation distance (MGFD). Superscript (2) indicates that K40 of the MGFD is used because these items are non-fragmenting and do not have an associated hazardous fragment distance (HFD) or maximum fragment distance (MFD). While this statement is generally correct for some of the sites listed, it is not appropriate for UXO Sites 4, 5, or 6. This is due to the fragmenting nature of the 75-millimeter projectiles fired there. DoDM 6055.09-M-V7, February 29, 2008 (Department of Defense Ammunition and Explosives Safety Standards, Volume 7, Criteria for Unexploded Ordnance, Munitions Response, Waste Military Munitions, and Material Potentially Presenting an Explosive Hazard, states the following:

“V7.E3.7.2.2. Team Separation Distance (TSD). The greatest distance of:  
V7.E3.7.2.2.1. Blast overpressure, as computed by the formula:  $D = 40W^{1/3}$   
[ $D=15.87Q^{1/3}$ ].

V7.E3.7.2.2.2. The appropriate downwind hazard distance for CAs” (chemical agents).

Revise Table 17-1 of RIWP Part 1 to eliminate superscript (2) from the basis column for the UXO Teams in the Manual Site Operations row of UXO Sites 4, 5, and 6. **Submit the revised Table as a condition for approval.**

21. **DECISION RULES** – Decision rules need to be modified as follows:
- a. Decision Rule #1 states this only applies to UXO # 5. However, Incremental sampling is also proposed for any incomplete detonation MEC at other UXOs. Clarify if this should also apply if IS samples are taken in UXOs other than UXO5. **If so, a change page is necessary for clarification.**
  - b. Decision Rule # 2 should indicate the partnering team should be convened to determine if MC contamination has been adequately delineated and if the data is sufficient for completing the RI. If not, then a decision needs to be made if additional data is needed before proceeding to Decision Rule #3.
  - c. Decision Rule #4 – The bullets for each media should be modified to allow for the risk management decisions being made between  $10^{-4}$  and  $10^{-6}$ , rather than recommending no further investigation.

**Submit change pages accordingly as a condition for approval.**

22. General Comment 42b – EPA General Comment 42b requested that at least one groundwater sample should be included at UXO Sites 4 and 5 for the analysis of propellants and other munitions constituents (MC) at firing points. The Navy has included groundwater sampling to address this comment for UXO Site 4. However, there is no explanation why groundwater is not required at Firing Point T at UXO Site 5. The RIWP Part 2 was reviewed and confirmed that groundwater samples are not planned for UXO Site 5. **Provide an explanation why groundwater samples are not planned for UXO Site 5. Otherwise, a sample should be proposed at Firing Point T or explain if groundwater samples are contingent on the results of soil sampling.**
23. Comment 52 – Please ensure that screening levels based on risks of  $10^{-6}$  are used for screening site data. This may require changes to listed screening levels or PALs. **If changes are necessary, submit revised change pages accordingly.**
24. Comment 55 – Specific Comment 55 has been partially addressed and incorporated into the RIWP Part 2. However, additional clarification is warranted. Appendix F, Project Action Limit Backup Tables, was reviewed to evaluate the revisions to the project action levels in response to the comment. Upon review of the table entitled “Parris Island MC UXO Sites 3-8 Human Health Screening Criteria – Groundwater Samples” in Appendix F, two issues were identified as follows:
- i. All entries for the column entitled “EPA Regional Screening Level, Vapor” are “NA.” Since a footnote is not provided, presumably the NA corresponds to “not applicable” which would apply to the metals since metals are not volatile as well as most of the nonvolatile explosives. However, nitrobenzene and 2-nitrotoluene

are considered volatile according to EPA's Vapor Intrusion Guidance (EPA, 2002). Consequently, it is unclear why all entries in this column are "NA." Clarify why EPA Regional Screening Levels (RSLs) for groundwater that are protective of indoor air exposures to nitrobenzene and 2-nitrotoluene have not been calculated following EPA Vapor Intrusion Guidance (EPA, 2002). **This may or may not require a change page.**

- ii. The column entitled "Minimum Criteria" presumably lists the lower of the adjusted EPA RSL or the EPA maximum contaminant level (MCL). However, it appears that an MCL is listed as the minimum criterion even if the MCL exceeds the purely health-based adjusted RSL. This raises a concern that the site groundwater contamination relies on MCLs for delineation rather than purely health-based values as represented by the adjusted RSL. **Correct this table to select the lower of the adjusted RSL or MCL to ensure delineation is based on health-based values and submit the change page.**
25. Comment 58 – The response to EPA Specific Comment 58 states that the Appendix A-3 tables have been revised to replace the Beaufort Background 95% upper ninety fifth confidence limit on the mean values with the arithmetic average values in the "Representative Concentration" column and the values in the "Adjusted Representative Concentration" column have been revised to reflect two times the arithmetic average values. Appendix A-3 could not be located in the RIWP Part 2. However, it appears that the edit discussed in the response to EPA Specific Comment 58 has been appropriately reflected in Appendix F, Project Action Limit Backup Tables. **Ensure that the RIWP Part 2 references Appendix F when discussing the background screening values for soil and sediment to promote clarity in the document and submit change pages.**