TETRA TECH

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Project Number 112G02226

U.S. Environmental Protection Agency - Region II
290 Broadway - 22nd Floor
New York, New York 10007-1866

ATTN: Mr. Adolph Everett, P.E.
Chief, RCRA Programs Branch

Reference: Contract N62470-08-D-1001
Contract Task Order (CTO) JM04
U.S. Naval Activity Puerto Rico (NAPR)
EPA I.D. No. PR2170032703
Final Phase I RFI Report for SWMU 77 [Small Arms Range] and Comment Response Letter

Dear Mr. Everett:

Tetra Tech NUS, Inc., on behalf of the Navy, is pleased to provide you with one hard copy and one electronic copy provided on CD of the Final Phase I RFI Report for Naval Activity Puerto Rico (NAPR) SWMU 77 [Small Arms Range]. Additional distribution has been made as indicated below. Also enclosed please find the response to regulatory comments on the draft version of the subject document.

If you have questions regarding this submittal, please contact Mr. Art Sanford, BRAC PMO SE Remedial Project Manager (RPM) at 843-743-2135.

Sincerely,

Linda Klink

Linda Klink P.E.
Project Manager

LEK/clm

Attachments

cc: Ms. Debra Evans-Ripley, NAVFAC SE (letter only)
Mr. David Criswell, BRAC PMO SE (letter only)
Mr. Mark Davidson, BRAC PMO SE (1 hard copy and 1 CD)
Mr. Art Sanford, BRAC PMO SE (1 hard copy and 1 CD)
Mr. Stacin Martin, NAVFAC Atlantic (1 hard copy and1 CD)
Mr. Pedro Ruiz, NAPR (1 CD)
Mr. Tim Gordon, US EPA Region II (2 hard copies and 2 CDs)
Mr. Carl Soderberg, US EPA Caribbean office (1 CD)
Ms. Wilmarie Rivera, PR EQB (1 hard copy and 1 CD)
Ms. Gloria Toro-Agrait, PR EQB (1 hard copy and 1 CD)
Mr. Felix Lopez, US F&WS (1 CD)
Ms. Brenda Smith, TechLaw, Inc (1 CD)
Mr. James Pastoric, UXO Pro (1 CD)
Ms. Karen Vetrano, TRC Environmental (1 CD)
Mr. Mark Kimes, Baker Environmental (1 CD)
Mr. Darrell Gundrum, NAVFAC SE (1 CD)
Ms. Bonnie Capito (Librarian), NAVFAC LANT (1 hard copy and 1 CD for Admin Record)
File N62470-08-D-1001, CTO JM04, 112G02226 (1 hard copy and 1 CD)

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RESPONSE TO USEPA PROVIDED COMMENTS DATED MARCH 24, 2011
ENCLOSURE 3 (TechLaw, Inc. Comments Dated March 7, 2011)
EVALUATION OF THE OCTOBER 27, 2010 NAVY RESPONSE TO REGULATORY FOLLOW-UP COMMENTS LETTER DATED MAY 27, 2010
ON THE ASSOCIATED SWMU 77 PHASE I RFI SAMPLING AND ANALYSIS PLAN
SWMU 77 – SMALL ARMS RANGE
NAVAL ACTIVITY PUERTO RICO (NAPR), CEIBA, PUERTO RICO

The comments below on the Sampling and Analysis Plan (SAP) address only those evaluations of responses deemed not adequate. The requested revisions will be made to the Phase I RFI Report.

Note that where the comment response provides revised text, text additions are shown in bold italics and deleted text is shown as strikethrough.

GENERAL COMMENT

1. **Comment:** Evaluation of the Response to EPA General Comment 6: The response partially addresses the comment. While it appears that the acceptance criteria from the Department of Defense (DoD) Quality Systems Manual (QSM) for post digest spikes (PDS) was used, the RFI Report does not discuss whether a PDS was necessary (i.e., if matrix spike/matrix spike duplicates [MS/MSDs] did not meet acceptance criteria), and if so, what the PDS results and recoveries were. Revise the RFI Report to clarify if a PDS was analyzed, and if so, provide a brief discussion of the PDS results in the RFI Report.

   Response: The RFI Report has been expanded to provide a brief discussion on the PDS results in Section 3.3 of Appendix H:

   "The concentration of zinc in sample 77RR-SS055-G00.5 was 4 times greater than the amount of zinc added for the MS and MSD analyses of that sample; therefore, the MS and MSD %Rs were not evaluated. The concentration of arsenic in sample 77RR-SS055-G00.5 was 4 times greater than the amount of arsenic added to that sample for MS analysis; therefore, the MS %R was not evaluated. The MSD of arsenic evaluated for sample 77RR-SS055-G00.5 yielded a -214 %R indicating a suppression of the arsenic concentration result due to matrix effects. A post-digestion spike (PDS) of sample 77RR-SS055-G00.5 was analyzed for arsenic and zinc yielding %Rs of 123% and 96%, respectively. The PDS %Rs indicate that any matrix affects on analyte results occurred during the digestion procedures of the analytical process.

   Those MS/MSD measurements that were taken were for the analytes arsenic and zinc; laboratory accuracy based on MS data could not be evaluated for the remaining metals. Soil matrix bias cannot be fully evaluated in the absence of MS/MSD data for metals. Other accuracy data quality indicators such as LCS and calibration recoveries indicated that the laboratory analyses of metals were sufficiently accurate for project data use; however, it cannot be absolutely determined whether soil matrix effects biased results for those metals that do not have corresponding MS/MSD data."

SPECIFIC COMMENT

1. **Comment:** Evaluation of the Response to EPA Specific Comment 13: The response addresses the comment; however, it appears that duplicate results were averaged or rejected when one result was below the project action limit (PAL) and one result was above the PAL. For example, the results for copper from samples 77OB-SS001-G00.5 (128 milligrams/kilogram [mg/kg]) and 77OB-SS001-G00.5-D (12,500 mg/kg) were averaged even though one result is above the PAL of 168 mg/kg. Further, because of the large difference in concentrations between parent and duplicate samples, these results were rejected. Since the greater duplicate concentration is the only copper concentration above the PAL, and this location has the only results above PALs for arsenic, copper, and zinc at the Potential Open Burn/Open Detonation (OB/OD) Subarea, it appears that both results, or the more elevated result, should be considered in the RFI Report. In particular, it should be noted that a limited amount of samples were collected during the Phase I RFI. Additionally, the completeness goal of 95 percent was also not achieved at this area. Therefore, a conservative approach should be taken such that arsenic, lead, copper, and zinc be considered for further investigation at this area during the Full RFI. Additionally, future sampling and analysis plans should not propose averaging results for field duplicates, and should consider the greater of the two results to be conservative. Revise the RFI Report to indicate that arsenic, copper, lead, and zinc be carried through to the Full RFI at the Potential OB/OD Subarea.

   Response: A Full RFI is already recommended for the OB/OD Subarea and Stakeholders will be included in the associated planning effort. The analyte list for MC sampling will be determined during project planning. During the Full RFI, the analyte list for the field program will include those analytes which were detected at concentrations greater than the most relevant health-based screening criterion during the Phase I RFI regardless of background concentration; analysis for all of the small arms range metals (antimony, arsenic, copper, lead, and zinc) will be carried through to the Full RFI. Please see the response to Tech Law General Comment 1 on the RFI Report for associated text revisions.

   Agree that during the Full RFI, duplicate sample results will not be averaged for use in COPC selection, the greater of the two results will be used for COPC selection and during risk evaluation.

RESPONSE TO USEPA PROVIDED COMMENTS DATED MARCH 24, 2011
ENCLOSURE 3 (TechLaw, Inc. Comments Dated March 7, 2011)
DRAFT PHASE I RCRA FACILITY INVESTIGATION REPORT DATED OCTOBER 2010
SWMU 77 – SMALL ARMS RANGE
NAVAL ACTIVITY PUERTO RICO (NAPR), CEIBA, PUERTO RICO

Note that where the comment response provides revised text, text additions are shown in bold italics and deleted text is shown as strikethrough.

GENERAL COMMENTS

1. **Comment:** The human health screening level risk assessment (SLRA) is fundamentally undermined by the chemicals of potential concern (COPC) selection process which includes consideration of site-specific background levels as Project Action Limits (PALs). Based on this approach, areas are pre-screened from further scrutiny based on an evaluation of potential harm that considers only a subset of the relevant constituents. Examples of this approach are provided below, but every instance where this process was employed has not been detailed throughout the assessment of the risk evaluation.

   Metals have not been screened for human health risk in certain subareas, even though concentrations of metals in soil exceed U.S. EPA Regional Screening Levels (RSLs) for residential land use. For example, Section 4.5 indicates that metals were not included in the risk screening for the Rifle Range Subarea because high metals contamination was encountered elsewhere and decision making is "straightforward." However, it is unclear what decisions were made. Revise the RFI Report to clarify why metals were not included in the human health risk screening.

   Further, the Human Health Screening-Level Hazard/Risk Assessment sections indicate that chemicals detected with one concentration exceeding the RSL will be selected as COPCs, and that COPCs will be further evaluated in a human health risk assessment. However, it is unclear why metals were often not identified as COPCs, when concentrations often exceeded RSLs. For example, at the Detonation Area Near Concrete Pad Subarea, arsenic (2.44 milligrams/kilogram [mg/kg]) exceeded the RSL of 0.39 mg/kg, but was not identified as a COPC. Additionally, at the Potential Munitions Trench Subarea, arsenic (1.53 mg/kg) was detected above the RSL, but the text indicates that no COPCs are present at the site because the PALs were not exceeded. It is unclear why RSLs were not used for screening in this case. Revise the RFI Report to clarify why arsenic was not included as a COPC.

   Any environmental constituent detected above the most relevant health-based screening criterion needs to be identified as a site COPC and documented in the SLRA for the purposes of the public record and to ensure these constituents are tracked appropriately through the process (e.g., SLRA → baseline HHRA → Corrective Measures Study, etc.). The risk assessment process is meant to result in a stand-alone document, presenting an analysis of potential contact with all constituents present at levels indicative of the potential to elicit environmental harm. Risk management decisions or the imposition of institutional or land use controls early on in the risk assessment process undermine the baseline assessment and should not be considered in an effort to truncate the scope of the risk assessment. Likewise, the SLRA should not consider screening in comparison to site-specific background levels (in this case, PALs), except to identify this dataset as

appropriate for consideration as a component of a residual risk analysis within the context of the forthcoming baseline HHRA, wherein total risk many be segregated into its components of site-related and non-anthropogenic (i.e., background) risk, for the purposes of supporting defensible risk management decisions. Constituents which are anthropogenic in nature are inappropriate for consideration as "background" constituents, excepting site-specific instances of non-point sources unrelated to site operations (e.g., polynuclear aromatic hydrocarbons representing products of incomplete combustion from automobile exhaust or other non-point source combustion inputs). The concept of nitroglycerin screening as a background constituent, as presented in Section 4.5.1, is inappropriate for the purposes of site management decision-making. Revise the RFI Report to ensure that all constituents detected above health-based screening criteria are identified as site COPCs and are documented in the SLRA.

Response: Navy Background Policy specifies that risk assessments should not be conducted for chemicals that are present at levels less than corresponding background concentrations. Therefore, constituents at concentrations less than or equal to facility-specific background concentrations at NAPR were not included in the human health screening level risk assessment conducted during the Phase I RFI. A Full RFI was recommended for 5 ot the 6 subareas at SWMU 77 and as per Specific Comment 5, the Navy now agrees to recommend a Full RFI for all 6 subareas. During the Full RFI, the analyte list for the field program will include those analytes that were detected at concentrations greater than the most relevant health-based screening criterion during the Phase I RFI regardless of background concentration; analysis for all of the small arms range metals (antimony, arsenic, copper, lead, and zinc) will be carried through to the Full RFI. Furthermore, samples collected during the Phase I RFI and samples collected during the Full RFI will be combined for use in the baseline risk assessment, and, therefore, will be re-evaluated at that time. Any risk that may be present as a result of chemicals that are detected at levels greater than RSLs but less than corresponding background concentrations will be discussed in the uncertainty evaluation of the risk assessment to be conducted in the Full RFI.

Metals COPCs: Metals were not included in the human health screening level risk assessment conducted for the Rifle Range Subarea, Pistol Range Subarea, and Former Pistol Range Subarea because elevated lead (and other metals) concentrations were encountered well above the respective PALs. Based on these elevated lead concentration, these subareas were recommended to proceed to a Full RFI:

Section 4.5 (Rifle Range Subarea), second sentence
"Based on high ~~metals~~ ***lead*** contamination encountered ~~elsewhere~~***in this subarea***, decision making is straightforward ***regarding proceeding to a Full RFI*** and does not require risk screening support regarding metals. ***Human health risks from metals considered COPCs for the Full RFI (antimony, arsenic, copper, lead, and zinc) will be evaluated in the Full RFI in more detail.***" Furthermore, the title and first sentence of Section 4.5 has been revised to indicate that a human health risk screening is being conducted only for organics detected at the Firing Line (also see PREQB Page Specific Comment 10). The title of the sections will be changed to "Human Health Screening-Level Hazard/Risk Assessment ***for Organic Compounds at the Firing Lines.***" The Table of Contents has also been revised accordingly. The 3rd line of the titles of Tables 4-7, 4-8, and 4-9 will also be revised (as well as the Table of Contents): "SWMU 77 – (range subarea name) - ***ORGANIC COMPOUNDS AT*** FIRING LINES"

Section 8.5 (Pistol Range Subarea), second sentence
"Based on high ~~metals~~***lead*** contamination encountered at the berm, decision making is straightforward ***regarding moving forward to a Full RFI*** and does not require risk screening support regarding metals. ***Human health risks from metals considered COPCs for the Full RFI (antimony, arsenic, copper, lead, and zinc) will be evaluated in the Full RFI in more detail.***" Furthermore, the title and first sentence of Section 8.5 has been revised to indicate that a human health risk screening is being conducted only for organics detected at the Firing Line (also see PREQB Page Specific Comment 10). The title of the sections will be changed to "Human Health Screening-Level Hazard/Risk Assessment ***for Organic Compounds at the Firing Lines.***" The Table of Contents has also been revised accordingly. The 3rd line of the titles of Tables 8-4, and 8-5 will also be revised (as well as the Table of Contents): "SWMU 77 – (range subarea name) - ***ORGANIC COMPOUNDS AT*** FIRING LINES"

New Section 9.5 (Former Pistol Range Subarea)
"***Based on high metals contamination encountered in and around the northwest portion of the subarea, decision making is straightforward regarding proceeding to a Full RFI and does not require risk screening support regarding metals. Human health risks from metals considered COPCs for the Full RFI (antimony, arsenic, copper, lead, and zinc) will be evaluated during the Full RFI in more detail.***"

The following revisions have been made to the site-specific recommendations sections and the Executive Summary, as appropriate, to clarify that analysis for all of the small arms range metals (antimony, arsenic, copper, lead, and zinc) will be carried through to the Full RFI:

Section 5.9 (Potential OB/OD Subarea), third paragraph, third sentence and the Executive Summary
"The Full RFI should be coordinated with the MEC/MPPEH Full RFI to collect biased maximum concentration samples if and where subsurface materials are encountered during intrusive investigation that could be sources of contamination, either MC ***(to include metals considered COPCs for the Full RFI: antimony, arsenic, copper, lead, and zinc)*** or non-MC related; ***full*** analyte list to be developed during the Full RFI project planning meeting."

Section 6.9 (Potential Munitions Trench Subarea), third paragraph, third sentence and the Executive Summary
"The Full RFI should be coordinated with the MEC/MPPEH Full RFI to collect biased maximum concentration samples if and where subsurface materials are encountered during intrusive investigation that could be sources of contamination, either MC ***(to include metals considered COPCs for the Full RFI: antimony, arsenic, copper, lead, and zinc)*** or non-MC related; ***full*** analyte list to be developed during the Full RFI project planning meeting."

Section 7.9 (Detonation Area Near Concrete Pad Subarea), second paragraph and the Executive Summary

Note that in accordance with Specific Comment 5, the recommendation for the subarea has been changed from NFA to proceeding to a Full RFI.

"***A Full RFI is recommended with focus on metals considered COPCs for the Full RFI*** ~~No further action (NFA) is recommended~~ ***(antimony, arsenic, copper, lead, and zinc)*** for the Detonation Area Near Concrete Pad Subarea based on Phase I RFI MEC/MPPEH and MC investigation findings discussed above. ***Further sampling is recommended for this subarea during the Full RFI to further characterize and delineate select metals.***"

Section 9.9 (Former Pistol Range Subarea), second paragraph and the Executive Summary

"For MC, the investigation should determine lateral and vertical extent of metals ***considered COPCs for the Full RFI*** (antimony, arsenic, copper, lead, and zinc) contamination ***located*** in and around the northwestern portion of the subarea."

Background: Metals were not selected as COPCs in the screening level risk assessment if they did not exceed background concentrations. Text will be added to Sections 4.5.1, 5.5.1, 6.5, 7.5.1, 8.5.1, and 9.5 to clarify that chemicals were not selected as COPCs if they did not exceed background concentrations:

Section 4.5.1 (Rifle Range Subarea), 5.5.1 (Potential OB/OD Subarea), 7.5.1 (Detonation Area Near Concrete Pad Subarea), and 8.5.1 (Pistol Range Subarea), first paragraph, second sentence

"COPCs ***for the purpose of the Phase I RFI evaluation*** were selected on the basis of the comparison of the maximum detected concentration to ***PALs (which consider*** available screening concentrations and ***background concentrations)***; a chemical is designated as a COPC if the chemical was reported as detected at least once at a concentration greater than the screening concentration ***and the background concentration. A chemical was not designated as a COPC for the purpose of Phase I RFI evaluation if the chemical was reported as detected at least once at a concentration greater than the screening concentration but was not detected at a concentration greater than background concentrations.***"

Section 6.5 (Potential Munitions Trench Subarea)

"Only a preliminary risk screening was conducted for the Potential Munitions Trench Subarea because no PALs were exceeded. As per Table 6-4, it was verified that there are no COPCs for this subarea. ***For the purpose of Phase I RFI evaluation, COPCs were selected on the basis of the comparison of the maximum detected concentration to PALs (which consider available screening concentrations and background concentrations); a chemical is designated as a COPC for the purpose of Phase I RFI evaluation, if the chemical was reported as detected at least once at a concentration greater than the screening concentration and background concentration. A chemical was not designated as a COPC if the chemical was reported as detected at least once at a concentration greater than the screening concentration but was not detected at a concentration greater than background concentrations.***"

New Section 9.5 (Former Pistol Range Subarea) (as per General Comment 3 below), sentences 7 and 8

"For the purpose of the Phase I RFI evaluation, COPCs were selected on the basis of the comparison of the maximum detected concentration to PALs (which consider available screening concentrations and background concentrations); a chemical is designated as a COPC for the purpose of the Phase I RFI evaluation, if the chemical was reported as detected at least once at a concentration greater than the screening concentration and background concentration. A chemical was not designated as a COPC if the chemical was reported as detected at least once at a concentration greater than the screening concentration but was not detected at a concentration greater than background concentrations."

Nitroglycerin: Nitroglycerin was not screened against background concentrations. The text in Section 4.5.1, 7.5.1, and 8.5.1 will corrected to remove mention of background concentrations for Nitroglycerin:

Section 4.5.1 (Rifle Range Subarea), 7.5.1 (Detonation Area Near Concrete Pad Subarea), and 8.5.1 (Pistol Range Subarea), third paragraph
"For surface soil, NG was selected as the only COPC for further evaluation because the maximum detected concentrations exceeded the screening levels based on the RSLs ~~and the background concentration~~. ***(NG does not have a background concentration).***"

2. **Comment:** During the RFI, the only 40-millimeter practice grenade model that was found as projectiles and munitions debris on the range was the M781. The projectiles (grenades) associated with this cartridge do not contain explosives and are considered inert from an explosives safety viewpoint. However, the RFI did not specifically state that this is the only model of 40-millimeter practice grenade fired on the range. As some other types of 40-millimeter practice grenades contain high explosives and can cause serious injury to individuals that may encounter them in an unexploded condition, this potential should be carefully evaluated during the further investigations conducted on the range. Ensure that this is done and that the results state than no model of practice grenade projectile that contains high explosives was employed on the range.

Response: The text in section 4.0 (Rifle Range Subarea) has been clarified as follows:

Section 4.1.2, page 4-2
"However, during this site visit munitions items were observed on the constructed earthen berm/concrete wall and at the toe of the wooded embankment to the rear; items included an intact M781 practice grenade ***(the only model 40-millimeter practice grenade fired at and found at this range, these projectiles do not contain explosives, however, may contain a spotting charge)*** and numerous fragments, smoke grenades, a rifle grenade, an unidentified fin, and a flare."

Section 4-7, page 4-16
(Note that several munitions items were previously present on the ground surface at this berm and grassy strip but were since removed by the FBI prior to initiation of the Phase I RFI work; these items included an intact M781 practice grenade ***(the only model 40-millimeter practice grenade fired on the range, this projectile does not contain explosives, however may contain a spotting charge)***, smoke grenade, a rifle grenade, an unidentified fin, and a flare.)

3. **Comment:** Sections 4.0 – 8.0 of the RFI Report follow the same structure and organization, from Site Background to Recommendations. Section 9.0, SWMU 77-Former Pistol Range Subarea, does not contain an Ecological Screening-Level Hazard/Risk Assessment section or Human Health Screening Level Hazard/Risk Assessment, nor does it explain why these sections are omitted. Also, subsection 9.4, Phase I RFI Data Collection Results, is directly followed by subsection 9.6 Conclusions, without a subsection 9.5. Revise the RFI Report to add an Ecological and Human Health Screening Level Hazard/Risk Assessment subsection to Section 9.0 or explain why this information is not provided. The numbering in Section 9.0 also will need to be amended.

Response: Subsections 9.5, Human Health Screening-Level Hazard/Risk Assessment, and 9.6, Ecological Screening-Level Hazard/Risk Assessment have been added to Section 9.0, as shown below, and the remainder of the Section 9.0 numbering has been amended. The table of contents has also been updated.

New Section 9.5, first paragraph, and New Section 9.6 (Former Pistol Range Subarea):

"9.5 HUMAN HEALTH SCREENING-LEVEL HAZARD/RISK ASSESSMENT

"Based on high metals contamination encountered in and around the northwest portion of the subarea, decision making is straightforward and does not require risk screening support regarding metals. Human health risks from metals (antimony, arsenic, copper, lead, and zinc) will be evaluated during the Full RFI."

9.6 ECOLOGICAL SCREENING-LEVEL HAZARD/RISK ASSESSMENT

"Based on high metals contamination encountered in and around the northwest portion of the subarea, decision making is straightforward and does not require risk screening support regarding metals. Human health risks from metals (antimony, arsenic, copper, lead, and zinc) will be evaluated during the Full RFI."

4. **Comment:** The text states (e.g., Section 5.6 on p. 5-13 or Section 7.6 on p. 7-9): "Upon further examination, the {contaminant} PAL exceedance was based on human health criteria and is not an ecological concern/issue". It is unclear how the exceedance of a PAL which represents a human health criterion is automatically protective of ecological receptors. Clarify this connection and amend the text accordingly.

Response: In both cases (Section 5.6 and Section 7.6), the ecological screening values ***for arsenic*** were greater ***(i.e., less stringent)*** than the PAL (which is based on the more stringent of the human health and ecological screening criteria; however, if facility background concentrations were greater than both human health and ecological screening levels, then the background concentrations was chosen as the PAL) and analyte concentrations did not exceed ecological screening values. See Appendix J for the PAL sources and references. Sections 5.6 and 7.6 have been revised to make this clear.

Section 5.6 (Potential OB/OD Subarea), 2nd sentence
"Upon further examination, the arsenic PAL exceedance was ***selected*** based on human health criteria. ***The ecological screening value is greater (i.e., less stringent) than both the human health screening value and facility background level for arsenic, and arsenic concentrations did not exceed the ecological screening value (18 mg/kg); therefore, arsenic*** ~~and~~ is not an ecological issue. For lead, the PAL was ***selected*** based on facility background concentration; ***the ecological screening level for lead is 11 mg/kg***, and, although not highly elevated at the OB/OD Subarea (74 mg/kg maximum), lead could present an ecological risk."

Section 7.6 (Detonation Area Near Concrete Pad Subarea), 2nd sentence
"Upon further examination, the NG PAL exceedance was ***selected*** based on human health criteria. ***The ecological screening value is greater (i.e., less stringent) than the human health screening value for NG, and NG concentrations did not exceed the ecological screening value; therefore, NG*** ~~and~~ is not an ecological concern."

5. **Comment:** The source of the PALs shown in the frequency of detection tables for each subarea are not referenced, nor are they explained anywhere in the text. Explain the process used to select the PALs for each contaminant and footnote the sources of the PALs in the target tables.

Response: Text is provided in Section 3.7, Data Comparison to Project Limits, to explain the process used to select PALs, additional explanation has been added to this section.

Section 3.7, 1st paragraph, page 3-25
"The screening values project action limits (PALs) used to evaluate the chemical concentrations detected in site media and to decide whether further site investigation is warranted were first developed in Worksheet #15 of the UFP-SAP. For the UFP-SAP, the most stringent PALs were used to ensure the FBL attained project-wide criteria ***(lower of the human health and ecological screening levels)***. Subsequently, the PALs were further refined during report preparation to reflect actual soil type background concentrations, ***if background concentrations were greater than both human health and ecological screening levels, then the background concentration was chosen as the PAL*** (Appendix J ***contains PAL sources and references***). Furthermore, an RSL update became available in ~~May~~***November*** 2010, although none of the subject analyte criteria were revised from that developed for the UFP-SAP."

Additionally, a footnote has been added to all Frequency of Detection Tables (Tables 4-3, 4-5, 5-2, 6-2, 7-2, 8-2, and 9-2):

"***1. Refer to Appendix J for PAL source and reference.***"

6. **Comment:** The RFI Report presents only one PAL for each contaminant but uses it to evaluate both human health and ecological risk. A separate set of ecological PALs need to be presented and used for evaluating ecological risk. The U.S. Environmental Protection Agency's Ecological Soil Screening Levels (EcoSSLs) are available as a source of ecological PALs for the soil samples. Include the EcoSSLs in the RFI Report and use them to screen for ecological risk.

   Response: Appendix J presents all screening criteria utilized to determine PALs; both human health and ecological screening levels were evaluated. The lower of the screening values, unless background levels were greater, was chosen as the PAL. The Ecological Screening-Level Hazard/Risk Assessment presented in each section qualitatively evaluates ecological risk as compared to ecological screening levels presented in Appendix J.

7. **Comment:** The basis for the RSLs that are not the values currently listed in the November 2010 RSL Summary Table is unclear. It is appropriate to utilize secondary effect RSLs, as detailed in one of the RSL supporting intercalc tables, but it would be helpful to the reader to note that the secondary RSLs result from calculating risk or hazard-based ratios and accounting for multiple possible effects. Revise the RFI Report to clarify which RSL values are used in the Risk Evaluation calculations.

   Response: When the report was submitted for regulatory review in October 2010, the current version of the RSL table at the time was May 2010. The RSLs utilized in the risk assessment were, therefore, based on the May 2010 RSL table. The RSLs have since been updated to the November 2010 RSLs and are incorporated into the final version of the report. Moreover, as described in the COPC selection text in Sections 4.5.1, 5.5.1, 7.5.1, and 8.5.1, "One-tenth the RSL is typically recommended by USEPA Region 2 as the COPC screening level for noncarcinogenic chemicals to account for the potential cumulative effects of multiple chemicals affecting the same target organ." The RSLs for non-carcinogenic compounds on Tables 4-7, 5-4, 6-4, 7-4, and 8-4 were divided by 10 as described in the text. All the COPC tables are now footnoted that the November 2010 RSL table is the source of the screening values and that non-carcinogenic values are divided by 10.

8. **Comment:** The text correctly identifies the adjustment to $1/10^{th}$ of a noncarcinogenic RSL for use in initial COPC screening to account for the possible additive effects associated with multiple noncarcinogenic constituents affecting the same target organ or eliciting related effects. However, the hazard ratio example calculations in the text appear to present this adjustment in the form of a value equivalent to 10 times the noncarcinogenic RSL. Revise this approach and correct this apparent discrepancy. In addition, when presenting the simplistic RSL to EPC-based risk ratio approach, it is suggested that the following format be used:

Carcinogenic risk associated with constituent i:
$Risk_i$ @ 10^{-6} = $(EPCI/RSL_i)$*1E-06

Noncarcinogenic hazard associated with constituent y:
$HQ_y = EPC/(RSL_y/10)$

The current format in the text is not transparently clear due to the inclusion of variables and mathematical actions denoted by the same indicator.

Response: The adjusted RSLs were only used for COPC selection; the RSLs as presented in the EPA RSL Table were used for the risk ratios. The equations in Sections 4.5.3, 5.5.3, 7.5.3, and 8.5.3 have been changed to "***RSL***" the reference to "10X RSLs" has been deleted.

9. **Comment:** The use of composite samples in the context of the risk assessment is problematic. Composite samples may be useful as generic presence/absence indicators or for use in field screening, but are inappropriate for use within a risk assessment as the basis for quantitative assessment. For areas under investigation, nature and extent definition should result in a statistically-viable dataset to underpin the follow-on risk evaluation. In instances where a statistically-viable dataset does not result from the supporting investigation, risk assessment must be predicted on the maximum detected concentration. Discrete environmental samples are fundamental to the risk assessment process. Decisions necessarily predicated on the use of composite samples should be flagged as data gaps and addressed appropriately in any forthcoming documentation to support corrective action. Revise the RFI Report to address the issue of using composite samples for risk evaluation.

Response: Samples were collected in accordance with methods/procedures outlined in the associated UFP-SAP. Composite samples were collected in order to account for potential aerial deposition of propellants/explosives onto the soil surface and to collect a sample that is representative of the potentially contaminated soil. Composite samples were limited to NG at the firing points/lines (Rifle Range Subarea, Pistol Range Subarea, and Former Pistol Range Subarea), and explosives at the constructed earthen berm at the Rifle Range Subarea and wooded embankment at the Rifle Range Subarea. RDX was the only explosive detected in composite samples collected from the wooded embankment at the Rifle Range Subarea. RDX was detected at concentrations less than PALs, and; therefore, was not included in the Human Health Risk Screening Evaluation conducted at this subarea. A Human Health Risk Screening Evaluation was not conducted at the Former Pistol Range because of high metals contamination in this subarea which made decision making straightforward; this subarea was recommended for a Full RFI based on metals contamination. Nitroglycerin was not detected in the two composite samples collected from the subarea. Text will be added as the last sentence of Sections 4.5.3 (Rifle Range Subarea) and 8.5.3 (Pistol Range Subarea) to indicate that there is some uncertainty associated with the composite samples used during the risk screening and, where applicable, that discrete samples will be collected during the Full RFI, as warranted.

End of Section 4.5.3 (Rifle Range Subarea):
"The HHRSE for nitroglycerin at the firing lines are based on composite samples; therefore, there is some uncertainty associated with the risks based on these composite samples. Discrete samples will be collected during the Full RFI sampling event at locations where composite samples exceeded the RSL."

End of Section 8.5.3 (Pistol Range Subarea):
"The HHRSE for nitroglycerine at the firing lines are based on composite samples; therefore, there is some uncertainty associated with the risks based on these composite samples. However, none of the composite samples exceeded the RSL."

10. **Comment:** The text indicates that the hazard index does not exceed one; however, individual calculated hazard quotients are often listed as slightly greater than one. For example, the hazard quotient calculated for nitroglycerin at the Pistol Range Subarea is listed as 1.3. It is assumed that such decisions were predicated on rounding of the hazard index to one significant figure before conclusions were made. Revise the RFI Report to clarify the rounding of hazard quotient values. Additionally, it should be noted that for any area where metals were not screened in comparison to health-based benchmarks, decisions about the presence/absence of COPC risk or hazard totals not being above the relevant points of departure (i.e., 1E-06, 1) are flawed and should be revisited, inclusive of all constituents detected above the most relevant health based standards.

Response: The hazard indices for all subareas where risks were calculated are presented after rounding to one significant figure. The individual calculated hazard quotients for all subareas has been revised to present values after rounding to one significant figure. A note will be added to Sections 4.5.3 and 8.5.3 to indicate that the risks presented in these sections do not include risks from metals which, based on high lead (and other metals) concentrations compared with the respective PALs, will be evaluated further in the Full RFI.

Sections 4.5.3 (Rifle Range Subarea) (page 4-14) and 8.5.3 (Pistol Range Subarea) (page 8-8):
"HQs and cancer risks for the hypothetical future resident are summarized below for surface soils. ***Note the screening level risk assessment did not include metals since metal exceedances of PALs indicated an obvious need to proceed to a Full RFI; during the Full RFI, a formal baseline risk assessment will be conducted for all analytes from the combined Phase I RFI data set (revisited) and Full RFI data set."***

11. **Comment:** The approach to the selection of COPCs, as outlined, is predicated on at least one detection in excess of an RSL. This assumes that all analyses were associated with appropriate sensitivity levels. Where appropriate, the SLRA (and any forthcoming iteration of the baseline risk assessment [BLRA]) should discuss treatment of non-detect results, ensuring that sample-specific sample quantitation limits (SQLs) are all sufficiently sensitive in comparison to the most relevant health-based screening concentrations. SQLs are specifically identified for use in this comparison as opposed to method or instrument detection limits. Any constituents with SQLS insufficiently sensitive for

screening purposes must be identified as preliminary COPCs, pending a review of historical operations and known site COPCs, before they can be removed from future consideration and scrutiny. Revise the RFI Report to address the sensitivity levels of the constituents.

Response: Appendix H presents a sensitivity evaluation for each of the subareas. Text summarizing the sensitivity analysis presented in Appendix H has been added to the end of each of the site-specific COPC selection sections to address the comment.

Section 4.5.1

"***Four chemicals (1,3-dinitrobenzene, 2,6-dinitrotoluene, nitroglycerin, and antimony) had quantitation limits that exceeded screening levels. 1,3-Dinitrobenzene and 2,6-dinitrotoluene were not detected in any of the five samples analyzed for explosives at this subarea and were not selected as COPCs, although it should be noted that the quantitation limits for all five samples exceed screening levels. Four of the samples collected for nitroglycerin analysis were non-detect and had quantitation limits greater than the screening level. However, nitroglycerin was detected in eight of the ten samples collected for nitroglycerin analysis at the firing line at concentrations that exceeded the screening levels and was, therefore, selected as a COPC. Antimony was not detected in two of nineteen samples; these two samples had quantitation limits greater than the screening level. However, antimony was detected 16 samples at concentrations greater than the screening levels and metals analysis were recommended for further investigation during the Full RFI.***"

Section 5.5.1

"***Four chemicals (1,3-dinitrobenzene, 2,6-dinitrotoluene, nitroglycerin, and antimony) had quantitation limits that exceeded screening levels. 1,3-Dinitrobenzene, 2,6-dinitrotoluene, and nitroglycerin were not detected in any of the samples and were not selected as COPCs, although it should be noted that the quantitation limits for all samples exceed screening levels. Antimony was not detected in any of the samples collected at this subarea and was not selected as a COPC for the Phase I RFI, although it should be noted that only five samples had quantitation limits greater than the screening level (65 percent). Regardless, antimony is a known munitions constituent and will be carried forward in the sampling program during the Full RFI.***"

Section 6.5

"***Three chemicals (1,3-dinitrobenzene, 2,6-dinitrotoluene, and nitroglycerin) had quantitation limits that exceeded screening levels. 1,3-Dinitrobenzene, 2,6-dinitrotoluene, and nitroglycerin were not detected in any of the samples and were not selected as COPCs, although it should be noted that the quantitation limits for all samples exceeded screening levels.***"

Section 7.5.1

"***Three chemicals (1,3-dinitrobenzene, 2,6-dinitrotoluene, and antimony) had quantitation limits that exceeded screening levels. 1,3-Dinitrobenzene and 2,6-dinitrotoluene were not detected in any of the samples and were not selected as COPCs, although it should be noted that the quantitation limits for all samples exceeded screening levels. Antimony was not detected in either of the two samples and was not selected as a COPC for the Phase I RFI, although it should be***

noted that only one sample had a quantitation limit that exceeded the PAL. Regardless, antimony is a known munitions constituent and will be carried forward in the sampling program during the Full RFI "

Section 8.5.1
"Antimony was not detected in four samples and three samples had quantitation limits that exceeded the screening level. However, antimony was detected in four samples at concentrations above the screening level and based on elevated metals concentrations metals have been recommended for further investigation during the Full RFI."

Section 9.5
"Three chemicals (nitroglycerin, antimony, and lead) had quantitation limits that exceeded screening levels. Nitroglycerin was not detected in any of the samples and was not selected as a COPC, although it should be noted that the quantitation limits for all samples exceed the screening level. Antimony was not detected in five samples and four of those samples had quantitation limits exceeding the screening level. However, antimony was detected in two samples at concentrations greater than the screening level and based on elevated metals concentrations metals have been recommended for further investigation during the Full RFI. Lead was not detected in one sample and that sample had a quantitation limit below the screening level. However, all of the detected lead samples exceeded the screening level and based on elevated metals concentrations metals have been recommended for further investigation during the Full RFI."

12. **Comment:** Section 2.0, Data Validation Outputs, of Appendix H.1, Data Quality Review, references a technical memorandum that presented the data qualification; however, this technical memorandum has not been included. Without this information, the data validation cannot be verified. Revise the RFI Report to include the referenced technical memorandum and/or data validation reports (DVRs). Ensure that the technical memorandum and/or DVRs specify the items evaluated during data validation, as well as the qualifiers assigned based on exceedances of acceptance criteria.

Response: As requested, the Data Validation Reports have been added to the Phase I RFI Report as Appendix L.

13. **Comment:** It is unclear why samples were qualified "NJ" in the data tables in Appendix G.1, Validated Analytical Results for Soil. For example, in Table G-3, Summary of Analytical Results for Surface Soil, the results for HMX and RDX for sample 77OB-SS005-G00.5 were qualified in this manner. The RFI Report does not discuss the reason for this qualification and the qualifier has not been defined. Revise the RFI Report to discuss this qualification and provide the definition for "NJ".

Response: Region II requires that an "NJ" qualifier be applied to compounds with a percent difference between 71% and 100%. "NJ" indicates that a compound is presumptively present. A footnote will be added to Table G-3 in Appendix G to define NJ:

"NJ = Presumptively present."

14. **Comment:** The data tables in Appendix G.1, Validated Analytical Results for Soil, provide the method detection limits (MDLs). However, the laboratory reporting limits (RLs) should be provided to demonstrate that the laboratory's RLs met the PALs. Revise the tables in Appendix G.1 to provide the corresponding laboratory RLs.

Response: The quantitation limits (QL), which are the same as the reporting limits (RL), are now presented in Appendix H (Munitions Constituents Data Usability Assessment) with a sensitivity evaluation and Table H.5, Soil Sensitivity Evaluations of the Quantitation Limit, has been added to Appendix H. The quantitation limits are also presented in the new Appendix L, Data Validation Reports.

SPECIFIC COMMENTS

1. **Comment: Section 3.6, Correlation Between X-Ray Fluorescence and Fixed-Base Laboratory, Page 3-24:** This section indicates that the Pearson Correlation and R-squared values were calculated for the x-ray fluorescence (XRF) and fixed base laboratory results. However, the Pearson Correlation calculations do not appear to have been provided. Revise the RFI Report to provide this information.

Response: The Pearson Correlation values are provided as the *r* values on the figures in Appendix I, X-Ray Fluorescence/Fixed-Base Laboratory Correlation Statistical Evaluation. The Appendix I text has been revised to clarify that the *r* values are also the Pearson Correlations.

Appendix I text, second paragraph, first and second sentences:
"For this project, if the ***Pearson*** correlation between the XRF and Fixed Based Laboratory concentrations is greater than or equal to 0.7, then the XRF concentrations can be used to predict the fixed based laboratory concentrations. The ***Pearson*** correlation, ***r***, always falls between -1 and 1."

2. **Comment: Section 4.5.3, Risk Characterization, Page 4-15:** It is unclear what value (soil concentration) was used in the calculations of hazard quotient and cancer risk after the maximum nitroglycerin concentration (a composite of 10 subsamples) from the 200-yard firing line was removed. Additionally, it is unclear why this data point was removed from the assessment. There is no discussion of outliers or options for the targeted removal action (both options for residual risk analysis more appropriately assessed within the context of an uncertainty analysis, than the Risk Characterization). Revise the RFI Report to clarify what values were used in these calculations, and to indicate why this calculation is necessary.

Response: The sample was not removed as an outlier but to roughly assess the effects of a targeted removal action. Two risk screening evaluations were provided in Section 4.5.3. The first evaluation presents the current risks at the site and the second evaluation presents the future residual risks that would remain at the site if contamination at the 200 yard firing line (sample 77RSS037-C00.05, the sample concentration driving the HQ

exceedance) was removed. 77RSS037-C00.05 was removed to show that if remediation occurred at this location then the remaining subarea risks would be acceptable. The following text has been added to Section 4.5.3;

"The following supplemental risk evaluation was conducted to determine the remaining risks from surface soil if remediation were to occur at the 200 yard firing line (location 77RSS037-C00.05, the sample concentration driving the HQ exceedance)."

3. **Comment: Section 5.6 Ecological Screening-Level Hazard/Risk Assessment, Page 5-13.** It is stated that the maximum arsenic level at the Potential OB/OD subarea exceeded a human health-based PAL and was not an ecological concern. The maximum arsenic level (3.41mg/kg) exceeded site background levels (2.65 mg/kg) and should be considered a potential ecological concern at the Potential OB/OD subarea. This correction should be made to Section 5.6 of the RFI Report.

   Response: See response to General Comment #4.

4. **Comment: Section 6.5, Human Health Screening-Level Hazard/Risk Assessment, Page 6-9:** This section indicates that no PALs were exceeded, so no COPCs were selected for the site; however, arsenic exceeds the RSL. It is unclear why this exceedance has not been evaluated. Revise the RFI Report to clarify why no constituents at the Potential Munitions Trench Subarea were screened for human health risk.

   Response: Arsenic concentrations in this subarea were not greater than the facility background concentration and, therefore, arsenic was not retained as a COPC for the purposes of the Phase I RFI, although it will be carried forth to the Full RFI sampling program and baseline risk assessment. Please see response to General Comment #1.

5. **Comment: Section 7.9 Recommendations for Detonation Area Near Concrete Pad, Page 7-10.** The recommendation of No Further Action (NFA) at the detonation subarea near the concrete pad is premature because it is based on only two soil samples. Even though the subarea is a small area and the samples were collected from targeted locations with anticipated high contaminant levels, a sample size of two is inadequate to evaluate the extent of contamination at a location. Also, the lead levels in both samples exceed the PAL. Further sampling is needed to verify that the lead contamination is confined to the two sampled areas. Amend this section to recommend further characterization and delineation of the lead exceedances.

   Response: Agree. The last paragraph of Section 7.9 and the first paragraph under the Detonation Area Near Concrete Pad Subarea heading on page ES-5 has been revised consistent with the response provided in General Comment 1.

6. **Comment: Section 8.5.3, Risk Characterization, Page 8-8:** This section indicates that cancer risk for nitroglycerin at the Pistol Range Subarea is within the target risk range of $1x10^{-4}$ to $1x10^{-6}$; however the calculated cancer risk is listed as $3 x10^{-7}$. Revise the RFI Report to correct this discrepancy.

Response: The text in Section 8.5.3, page 8-8, has been clarified to indicate that the cancer risks were less than EPA's risk range.

"Cancer risk for NG was ~~within the~~ ***less than*** USEPA's target risk range of $1x10^{-4}$ to $1x10^{-6}$."

7. **Comment: Appendix H.1, Section 3.1, Completeness, Page H-4:** This section describes the completeness deficiencies for sample collection for the Rifle Range Subarea and the Potential OB/OD Subarea, but does not discuss the completeness deficiencies for the Former Pistol Range Subarea. Table H.2, Sample Collection Completeness Evaluation, indicates that the completeness goal of 95 percent was not met for samples from the Eastern Berm Area for XRF (33 percent) and select metals (arsenic, copper, lead, antimony, and zinc) (25 percent). Revise this section to discuss the completeness deficiencies at the Eastern Berm Area of the Former Pistol Range Subarea.

Response: Per Section 9.3.2, Work Plan Deviation: "The UFP-SAP recognized that the orientation of the subarea was unknown. Based on the topography of the site as laid out by four corners as per the UFP-SAP, the UXO specialist along with the field crew observed that it was more likely that the firing direction and bullet stop would be to the north into the natural hillside, which was supported by the initial XRF results (see Section 9.3.3). Therefore, the originally proposed collection of 15 XRF soil samples from the eastern side of the site was reduced to 5 XRF soil samples. As a result, there were initially five XRF samples collected from each side (east, west, north, and south) for a total of twenty XRF samples. Contingent upon the XRF analysis of the initial samples, additional samples were collected in areas of elevated XRF lead concentrations and step-out samples as needed. The UFP-SAP allowed for FOL inspection of the study are to determine which areas are most likely to be contaminated based on visual observation and adjust the proposed sample locations accordingly; a total of ten confirmation samples were collected as originally planned, although weighted toward the areas of highest contamination. Step-out samples were collected primarily on the western and northern sides of the site with one step-out sample collected on the eastern side of the site."

The following text will be added to the end fourth paragraph of Appendix H, Section 3.1 (also see the response to PREQB Page-Specific Comment 22):

"***Sample collection completeness deficiencies (Table H.2) were also noted for XRF (33 percent) and select metals (25 percent) samples at the Eastern Berm Area of the Former Pistol Range Subarea. The originally proposed sample collection of 15 XRF soil samples was reduced to 5 XRF samples based on the firing direction as observed in the field, rather than that proposed in the UFP-SAP, this change was supported by the initial XRF results. However, in summary,overall completeness was achieved considering the revised orientation of the area.***"

8. **Comment: Appendix H.1, Section 3.2, Sensitivity, Page H-5:** This section does not discuss two explosives analytes that were not detected but have MDLs greater than the PALs. The analytes 1,3-dinitrobenzene and 2,6-dinitrotoluene have an MDL of 0.1 mg/kg and PALs of 0.079 mg/kg and 0.0328 mg/kg, respectively. Additionally, these analytes have not been included in the Sensitivity Table (Table H.4). Revise Appendix H.1 to discuss the sensitivity of 1,3-dinitrobenzene and 2,6-dinitrotoluene and update Table H.4 to include these two analytes.

Response: Table H.4 has been updated and a new table, Table H.5 Soil Sensitivity Evaluation of the Quantitation Limit, has been added to Appendix H. Sensitivity issues were identified when compared to laboratory quantitation limits for antimony, lead, nitroglycerin, 1,3-dinitrobenzene, and 2,6-dinitrotoluene; text has been added to Sections 3.2 and 4.4 of the text in Appendix H to discuss the results of this evaluation.

9. **Comment: Appendix H.1, Section 3.3, Laboratory Accuracy, Page H-6:** The text indicates that several Matrix Spike/Matrix Spike Duplicates (MS/MSDs) indicated on the chain of custody were not analyzed for metals by the lab, and as a result, only thirteen percent of the proposed MS/MSDs were analyzed. However, the first paragraph on this page indicates that MS analyses were performed at a frequency of one per 20 associated samples. The first paragraph should be updated to clarify this discrepancy. Further, Appendix H.1 should discuss why a lower number of MS/MSD analyses is sufficient to meet the project data quality objectives (DQOs). Revise Appendix H.1 to address these concerns.

Response: The fifth sentence of the first paragraph in Appendix H.1 Section 3.3 has been revised:

"LCS and MS analyses were ***to be*** performed at a frequency of one per 20 associated samples of like matrix."

The second paragraph of Appendix H.1 Section 3.3 has been revised as follows (note identical response to General Comment 1 on the SAP):

"All LCS/LCSD %Rs were compliant except for 18 nitroglycerin LCS %Rs for which the LCS %R ranged from 125 %R to 136 %R indicating nitroglycerin data qualified due to LCS noncompliance are biased high. Those qualified nitroglycerin results were not rejected and are therefore considered usable data. No data was qualified due to MS or surrogate %R noncompliance; therefore, data usability was not affected by those quality control parameters. Only 13 percent of metals MS measurements that were supposed to be produced according to the SAP (Tetra Tech, March 2010) were actually produced, because the laboratory failed to analyze several samples marked on chain-of-custody forms for MS/MSD analysis of metals. ~~Those MS/MSD measurements that were taken were for the analytes arsenic and zinc; therefore, laboratory accuracy based on MS data could not be evaluated for all of the other metal analytes the remaining metals.~~ ***The concentration of zinc in sample 77RR-SS055-G00.5 was 4 times greater than the amount of zinc added for the MS and MSD analyses of that sample; therefore, the MS and MSD %Rs were not evaluated. The concentration of arsenic in sample 77RR-SS055-G00.5 was 4 times greater than the amount of arsenic added to that sample for MS analysis; therefore, the MS %R was not evaluated. The MSD of***

arsenic evaluated for sample 77RR-SS055-G00.5 yielded a -214 %R indicating a suppression of the arsenic concentration result due to matrix effects. A post-digestion spike (PDS) of sample 77RR-SS055-G00.5 was analyzed for arsenic and zinc yielding %Rs of 123% and 96%, respectively. The PDS %Rs indicate that any matrix affects on analyte results occurred during the digestion procedures of the analytical process."

10. **Comment: Appendix H.1, Section 3.3, Laboratory Accuracy, Page H-6:** The text indicates that the MS/MSD samples were only spiked for arsenic and zinc. However, antimony, lead, and copper are also COPCs at SWMU 77 and it is unclear why the MS/MSD samples were not also spiked for these compounds. Revise Appendix H.1 to indicate why MS/MSD samples were not spiked for antimony, lead, and copper, and discuss any impact this may have on data usability.

    Response: Please see response to Specific Comment 9.

11. **Comment: Appendix H.1, Section 3.6, Representativeness, Page H-8:** This section indicates that data collected were representative of the actual site conditions; however, the precision of field duplicate samples at two subareas had large Relative Percent Difference (RPD) values. It is unclear why the difference in concentrations of copper and zinc in the duplicate samples was so large. Revise Appendix H.1 to discuss the representativeness of samples with respect to the field duplicate imprecision.

    Response: The precision estimates obtained from duplicate field samples encompass the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. It is uncertain exactly why the field duplicate pairs (77OB-SS001-G00.5 / 77OB-SS001-G00.5-D) and (77RR-SS054-G00.5 / 77RR-SS054-G00.5-D) yield RPDs greater than 120 RPD for copper and zinc, although heterogeneity is largely suspected. Regardless, those results were qualified as rejected in accordance with data validation procedures and are, therefore, not considered representative of site conditions.

    The last sentence of Appendix H, Section 3.6, has been revised as follows:

    "The DQR found the data collected ***that were not rejected during data validation were*** ~~to be~~ representative of targeted populations. ***Rejected data related to field duplicates is suspected to be a result of heterogeneity site conditions. As stated in the UFP-SAP, Worksheet #37 Usability Assessment, "Although rejected data will generally not be used, there may be reason to use them in a weight-of-evidence argument, especially when they supplement data that have not been rejected. If rejected data are used, their use will be supported by technically defensible rationales." Therefore, rejected data can be further discussed with the regulatory agencies during the Full RFI planning effort, and select rejected Phase I RFI data can be included in the data set, as appropriate, and as agreed upon.***"

MINOR COMMENTS

1. **Comment: Volume 1, Acronyms and Abbreviations, pages (unnumbered):** The acronyms "MPPEH" and "UXOSO" are incorrectly defined. MPPEH is correctly defined as "material potentially presenting an explosive hazard." UXOSO is correctly defined as "Unexploded Ordnance Safety Officer." Revise the RFI Report to make these changes in the cited section.

   Response: Typographical errors have been corrected to the acronym list per the comment.

2. **Comment: Volume 1, Table 4-1, Items Discovered During Detector-Aided Surface Surveys, page (unnumbered):** Items number 4 and 5 in the table are misidentified as "40 MM M871 Practice Grenades." The correct identification is "40MM M781 Practice grenades." Also, the footnotes define the acronym "MDAS" incorrectly. The correct definition is "material documented as safe." Revise the RFI Report to make this correction.

   Response: Typographical errors have been corrected to Table 4-1 per the comment.

3. **Comment: Volume 2, Appendix B-2, Former Pistol Range Subarea, Photograph #-2:** This photograph is labeled "Stray bullet." Revise the RFI Report to correct the label to read "Two cartridge cases."

   Response: Revisions have been made to Appendix B-2, Former Pistol Range Subarea, Photograph #2 caption per the comment.

RESPONSE TO USEPA PROVIDED COMMENTS DATED MARCH 24, 2011
ENCLOSURE 4 (PREQB Comments Dated December 14, 2010)
DRAFT PHASE I RCRA FACILITY INVESTIGATION REPORT DATED OCTOBER 2010
SWMU 77 – SMALL ARMS RANGE
NAVAL ACTIVITY PUERTO RICO (NAPR), CEIBA, PUERTO RICO

Note that where the comment response provides revised text, text additions are shown in bold italics and deleted text is shown as strikethrough.

GENERAL COMMENTS

1. **Comment:** Surface soil sample results for all sites need to be screened using EPA's migration to groundwater soil screening levels to evaluate the potential for contaminants to migrate to groundwater. This screening will aid in determining whether additional investigation is warranted for this potential exposure medium for all sites, including those recommended for no further action based on the screening against the higher of risk-based human health or ecological screening criteria or background concentrations.

   Response: Agree. The surface soil sample results have been compared against the most current version of USEPA's migration to ground water soil screening levels (SSLs) to evaluate the potential for contaminants to migrate to groundwater. (SSL will be added to the acronym list.)

   A sentence has been added to page ES-1, 4th paragraph, 4th sentence:

   "***For informational purposes, to aid in evaluation of the potential for contaminants to migrate to groundwater, United States Environmental Protection Agency (USEPA) migration to groundwater soil screening levels (SSLs) are included on the frequency of detection tables presented within each subsection.***"

   A column has been added to all of the frequency of detection tables (Tables 4-3, 4-5, 5-2, 6-2, 7-2, 8-2, and 9-2), and USEPA's migration to groundwater SSLs (USEPA, November 2010) will be presented on these tables, for informational purposes.

   Additionally, the following text has been added as the last sentence of Section 3.7: "***Additionally, for informational purposes, USEPA's migration to groundwater soil screening levels (SSLs) are presented on all soil frequency of detection tables alongside the PAL. In summary, for metals and the propellant nitroglycerin, migration to groundwater SSLs are less stringent than PALs, only for the explosive RDX is the migration to groundwater SSL more stringent than the PAL.***"

2. **Comment:** Please show human and ecological receptors on the graphical conceptual site models (CSMs) for all subareas. Currently, only sources and transport pathways are shown.

   Response: Example human and ecological receptors have been added to conceptual site model Figures 4-7, 5-8, 6-7, 7-4, 8-3, and 9-3 as requested.

3. **Comment:** Please clarify the following statement, " ... There are currently no specific plans to develop SWMU 77 pending outcome of the subject Phase I RFI and future Full RFI.. ." It appears from this statement that the results of the investigation, including risk assessments done as part of the Full RFI, will determine future land uses. However, undeveloped land is typically evaluated for all potential exposure scenarios in a baseline risk assessment, especially if a development plan is not available. Note that the potential exists for SWMU 77 to be developed as an ecotourism area with a hotel. Please discuss this as a potential future land use in Sections 2.2.4, 4.1.5, 5.1.5, 6.1.5, 7.1.5, and 8.1.5.

Response: A note has been added in each section that the potential exists for SWMU 77 to be developed as an ecotourism area with a hotel:

Section 2.2.4:
"The future use of the SWMU 77 site and the individual subareas is unknown ~~and pending completion of the RFI~~ ***at this time; however, the potential exists for SWMU 77 to be developed as an ecotourism area with a hotel.***"

Sections 4.1.5 and 5.1.5:
"There are currently no specific plans to develop SWMU 77 ~~pending completion of the RFI~~ ***at this time; however, the potential exists for SWMU 77 to be developed as an ecotourism area with a hotel.***"

Sections 6.1.5, 7.1.5, 8.1.5, and 9.1.5:
"There are currently no specific plans to develop SWMU 77 ~~pending outcome of the subject Phase I RFI and future Full RFI~~ ***at this time; however, the potential exists for SWMU 77 to be developed as an ecotourism area with a hotel.***"

4. **Comment:** Please provide a separate appendix that contains the Data Validation Reports.

Response: Appendix L has been added to the report and contains the Data Validation Reports.

PAGE-SPECIFIC COMMENTS

1. **Comment:** Page 2-4, Section 2.3.2: Please clarify what is meant by "no significant surface water features are present at SWMU 77 ... " Please clarify what surface water features are not considered significant and which types are considered significant.

Response: Section 2.3.2 provides a qualitative description of topography and hydrology at SWMU 77. Significant surface water features would include surface water bodies such as lakes, ponds, streams, and creeks and surface water features that are considered less significant would include drainage ditches and swales. Section 2.3.2, the 4th sentence, has been revised:

"No floodplains or significant surface water ~~features~~ ***bodies including lakes, ponds, streams, or creeks*** are present within SWMU 77."

2. **Comment:** Page 3-3, Section 3.2.6: This section states, "If non-site personnel or non-essential non-UXO personnel entered the exclusion zone at a site, all MEC operations ceased until the exclusion zone was re-established." EQB notes that we requested revision of this procedure to address EQB personnel entering the EZ in our December 2009 comments on the project QAPP (Comment 5):

"Section 17.1.2 requires operations to cease when non-site personnel or non-essential non-UXO personnel enter an exclusion zone. This is not in accordance with Navy policy (see NAVSEA OP 5, Section 14-7-5) which allows "authorized visitors" to enter the EZ when specific requirements are met. Please revise this section to describe the requirements for EQB personnel and EQB representatives to enter the EZ as authorized visitors while the MEC investigation is being performed." EQB notes again that OP 5 allows "authorized visitors" to enter the EZ if specific requirements are met. Please revise the statement to read: "No authorized visitors requested access to the EZ. Therefore, MEC operations ceased if non-essential personnel entered the EZ."

Response: No EQB personnel requested access to the EZ, the only visitor to the site during MEC operations was Commander Kalal. Section 3.2.6, Exclusion Zones, has been revised:

"Notification procedures were posted on barricades to ensure that non-essential personnel notified the team prior to entering the area during active operations. ***Access to an exclusion zone while munitions response operations were occurring was limited to essential personnel and authorized visitors. Commander CDR Kalal, the Navy Officer in Charge, visited the job site on May 11, 2010, there were no other visitors during UXO operations and no non-essential personnel entered an exclusion zone during UXO operations.*** ~~If non-site personnel or non-essential non-UXO personnel entered the exclusion zone at a site, all MEC operations ceased until the exclusion zone was re-established~~."

3. **Comment:** Page 3-19, Section 3.4.8, Paragraph 1: Please clarify the information in this section to include that the drum of IDW that is currently being stored at SWMU 77 will be properly disposed of during the full RFI per the UFP-SAP.

Response: Section 3.4.8, last sentence, has been revised:

"The drum is stored at SWMU 77 – Pistol Range Subarea***, and will be properly disposed of during the Full RFI.***"

4. **Comment:** Page 3-20, Section 3.5.2: The text states that the National Functional Guidelines were used to qualify data. However, according to the March 2010 SAP for this program as well as the Data Usability Assessment in Appendix H, Region 2 data validation SOPs were used. Please clarify and revise accordingly.

Response: USEPA Region 2 data validation SOPs were used. Section 3.5.2, 2nd paragraph, first sentence has been revised as follows:

"Assignment of data qualification flags conformed ***to rules established in the analytical method EPA Region II SOP #HW-16 Revision #2 (September 2006) - "Nitroaromatics and Nitroamines by HPLC SW-846 Method 8330A", EPA Region II "Validation of Metals for the Contract Laboratory Program (CLP) based on SOW ILMO5.3 (SOP Rev 12)" (September 2006), and the Department of Defense (DoD) document entitled Quality Systems Manual (QSM) for Environmental Laboratories (January 2006)*** ~~to USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (2008), and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Validation (2004) guidelines~~ to the greatest extent practicable for non-Contract Laboratory Program Data."

5. **Comment:** Page 4-2, Section 4.1.3: Please discuss Navy use prior to 2007. Although specific records do not exist for Navy use prior to 2007, please discuss what is known about Navy use of this range from the 1940s to 2007 and related MC training, storage and usage.

   Response: Appendix K-1 presents aerial photographs and an analysis of the aerial photography spanning 1936 – 1999. Text within this appendix provides a description of activity and features observed on each date of photography analyzed. During the analysis, small-arms ranges were observed on the northeast side of the base as early as 1958, and on all photographs through 1995. The following text has been added at the end of the first paragraph of Section 4.1.3:

   "***Appendix K also provides aerial photographs of the area and an analysis of the aerial photography which spans from 1936 to 1999. Text within this appendix provides a description of the activity and features observed on each date of photography analyzed. SWMU 77 was historically used for small arms operations; however, potential munitions disposal or detonation operations are suspected based on these historical aerial photographs.***"

6. **Comment:** Page 4-3, Section 4.1.4: Please revise the first sentence, as the sentence refers to areas where MC may be present, not sources of MC.

   Response: Section 4.1.4, the first paragraph, has been revised, and similarly Sections 5.1.4, 6.1.4, 7.1.4, 8.1.4, and 9.1.4:

   Section 4.1.4:
   "~~The sources of potential~~ MC contamination ***may be present*** at the Rifle Range Subarea ~~are~~***at*** the firing lines, target constructed earthen berm, and the steep wooded embankment beyond the earthen berm/concrete wall."

   Section 5.1.4
   "~~The sources of potential~~ MC contamination ***may be present*** at SWMU 77 – Potential OB/OD Subarea ~~are~~ from munitions suspected to be disposed/burned in the area."

   Section 6.1.4
   ~~The sources of potential~~ MC contamination ***may be present*** at SWMU 77 - Potential Munitions Trench Subarea ~~are~~ from munitions potentially disposed/buried in the area."

Section 7.1.4
"~~The sources of potential~~ MC contamination ***may be present*** at the Detonation Area Near Concrete Pad Subarea ~~are~~ from munitions suspected to be detonated in the area."

Section 8.1.4
"~~The sources of potential~~ MC contamination ***may be present*** at the Pistol Range Subarea ~~are~~***at*** the firing lines and target earthen berm."

Section 9.1.4
"~~The sources of potential~~ MC contamination ***may be present*** at the Former Pistol Range Subarea ~~are~~***at*** former firing lines and any berm that may have been present."

7. Page 4-9, Section 4.4.1:

a. **Comment:** Please provide a summary discussion of the correlation calculations that were done to estimate FBL data from XRF data. Appendix I present correlation graphs with equations but do not present a discussion of what was done to convert XRF data to estimated FBL data. For clarity, please present a discussion either in this section or in Appendix I, in which case a reference needs to be included wherever the report states that XRF data were used to predict FBL concentration. This comment also applies to Section 8.4.1.

Response: Text has been added to Appendix I for each correlation analysis stating that the FBL data were estimated using the regression equations and the equation has been added to the text.

The following text has been added to the correlation analysis for XRF concentrations less than 400 mg/kg: "Therefore, the XRF concentrations will be used to predict laboratory concentrations ***using the following equation: Laboratory Concentrations (mg/kg) = 36.1 + 1.59*XRF Concentration (mg/kg)."***

The following text has been added to the correlation analysis for XRF concentrations greater than 400 mg/kg: "Therefore the XRF concentrations will be used to predict laboratory concentrations ***using the following equation: Laboratory Concentration (mg/kg) = 529 + 3.65*XRF."***

b. **Comment:** Please clarify whether the maximum XRF sample concentration, 40,529 mg/kg, was only excluded from the dataset used for correlation analysis.

Response: The maximum XRF sample concentration of 40,529 mg/kg was only excluded from the dataset used for the correlation analysis. The text in Appendix I, end of 4th paragraph, has been changed to, "***Based on the graphical evaluation of the XRF concentrations and the Tukey outlier test it was concluded that the maximum XRF concentration appears to be an outlier and was removed from the correlation analysis.***"

8. Pages 4-10 to 4-11, Section 4.4.2:

a. **Comment:** The text states that six samples from the face of the wooded embankment exhibited zinc concentrations that exceeded the project action level (PAL) by several orders of magnitude. However, all zinc results with the exception of one (77RR-SS052) were within the same order of magnitude as the PAL. Please revise the text accordingly.

Response: The text, Section 4.4.2, 4th paragraph, 6th sentence, has been revised:

"Zinc was detected in eight samples with six samples having concentrations that exceeded the PAL; ***all results, with the exception of one (77RR-SS052), were within the same order of magnitude as the PAL*** ~~by several orders of magnitude~~."

b. **Comment:** The text states that all arsenic exceedances from the face of the wooden embankment were less than one order of magnitude above the PAL. However, three samples (77RR-SS052, 77RR-SS055, and 77RR-SS056) exhibited results for arsenic that were over one order of magnitude above the PAL. Please revise the text accordingly.

Response: The text, Section 4.4.2, 4th paragraph, last sentence, has been revised:

"Arsenic had eight samples exceeding the PAL, ***with four samples (77RR-SS052, 77RR-SS054, 77RR-SS055, and 77RR-SS056) exceeding the PAL by over one order of magnitude*** ~~although all exceedances were less than one order of magnitude above the PAL~~."

c. **Comment:** The text states that six samples from the constructed earthen berm exhibited zinc concentrations that exceeded the PAL by up to two orders of magnitude. However, only two samples (77RR-SS003 and 77RR-SS016) exhibited zinc concentrations that exceeded the PAL by one order of magnitude. The remaining zinc concentrations were within the same order of magnitude as the PAL. Please revise the text accordingly.

Response: The text, Section 4.4.2, 5th paragraph, 6th sentence, has been revised

"Zinc was detected in ten samples with six samples having concentrations that exceed***ed*** the PAL, ***two of which (77RR-SS03 and 77RR-SS16) exceeded the PAL*** by ~~up to two~~ ***an*** order~~s~~ of magnitude ***and the rest of the exceedances were within the same order of magnitude as the PAL***."

d. **Comment:** The text states that several of the copper exceedances from the constructed earthen berm were two orders of magnitude above the PAL. However only two samples (77RR-SS003 and 77RR-SS016) exhibited copper concentrations that were close to two orders of magnitude above the PAL. Please revise the text accordingly.

Response: The text, Section 4.4.2, 5th paragraph, 7th sentence, has been revised.

"Similarly, copper was detected in ten samples with eight samples having concentrations greater than the PAL, and ***two*** ~~several~~ of these exceedances ***(77RR-SS003 and 77RR-SS016)*** were approximately two orders of magnitude greater than the PAL."

9. **Comment:** Page 4-11, Section 4.4.3: Please include a discussion of the XRF data usability, since it is being included in the risk screening. This comment applies to Section 8.4.3 also.

Response: XRF screening results were not used in the human health risk screening calculations, human health risk ratios were only calculated for nitroglycerin and arsenic at certain subareas, on an as needed basis, as described in each individual section. The ecological screening-level hazard assessment consisted only of a comparison of positive detections to PALs, risk ratios were not calculated during the ecological risk screening. A qualitative evaluation of the XRF field screening data was conducted during the Field XRF/Laboratory Lead Data Correlation and is presented in each individual section and in Appendix I. Therefore, additional XRF data usability discussions were not added to text.

10. Page 4-12, Section 4.5:

a. **Comment:** Please revise the title of this section and the first sentence to indicate that a human health risk screening is being conducted only for organics detected at the Firing Line. Please also revise the titles of Tables 4-7 to 4-9 to reflect this information. This comment also applies to Section 8.5 and Tables 8-4 and 8-5.

Response: The title and first sentence of Section 4.5 and 8.5 have been revised to indicate that a human health risk screening is being conducted only for organics detected at the Firing Line. The title of the sections will be changed to "Human Health Screening-Level Hazard/Risk Assessment ***for Organic Compounds at the Firing Lines.***" The Table of Contents has also been revised accordingly.

The 3rd line of the titles of Tables 4-7, 4-8, 4-9, 8-4, and 8-5 will also be revised (as well as the Table of Contents): "SWMU 77 – (range subarea name) - ***ORGANIC COMPOUNDS AT*** FIRING LINES"

11. **Comment:** Page 4-12, Section 4.5.1: Please address Data Collection and Evaluation in this section in addition to selection of COPCs. Please discuss what data was used in the risk screening (discrete and/or composite, depth and whether data across all firing ranges was combined into one data set and why).

Response: A discussion of what data was used in the risk screening has been added to this section. The title of the section (and Table of Contents) has been updated to, "***Data Evaluation*** and Selection of Chemicals of Potential Concern." The following paragraph has been added to the beginning of the section, "***The samples from the Firing Points and Wooded Embankment area were used in the human health risk screening evaluation. Table 4-2 lists the sample locations for the 10 samples analyzed for nitroglycerin and the three samples analyzed for explosives. All of the samples were composite samples and collected from 0 to 6 inches.***"

12. Page 4-14, Section 4.5.3:

a. **Comment:** Please clarify "RSL or 10X RSL" in the equations presented on this page. It appears that the 10X should be applied to the adjusted RSL, in which case a different acronym should be defined and used for adjusted RSL. This comment applies to all 5 subarea sections.

Response: The adjusted RSLs were only used for COPC selection; the RSLs as presented in the EPA RSL Table were used for the risk ratios. The text for all sections has been changed to "***RSL***".

b. **Comment:** Please revise the following sentence, as the evaluation only includes one chemical: "...Total hazard indices (i.e., the sum of HQs for all COPCs) also exceeded one." This comment applies to Sections 5.5.3 and 8.5.3.

Response: Agree. The sentence about the total hazard indices has been removed from each section and the text has been limited to the discussion of the one hazard quotient for the one COPC.

13. **Comment:** Page 4-16, Section 4.5.3: Please clarify in the text why sample ID 77RSS037-C00.05 was removed from the risk evaluation.

Response: Two risk screening evaluations were provided in Section 4.5.3. The first evaluation presents the current risks at the site and the section evaluation also presents the risks that would remain at the site if sample 77RSS037-C00.05, driving the HQ exceedance, was removed. 77RSS037-C00.05 was removed to show that if remediation occurred at this location then risks would be acceptable. The following text has been added to Section 4.5.3, "***The following supplemental risk evaluation was conducted to determine the remaining risks from surface soil if remediation were to occur at the 200 yard firing line (location 77RSS037-C00.05, the sample concentration driving the HQ exceedance.)***"

14. **Comment:** Page 4-16, Section 4.6: Please add a discussion that describes Figure 4-8, including the rationale for selecting the exposure scenarios and receptors presented and the basis for the assumed complete and incomplete exposure pathways.

Response: A paragraph has been added to Section 4.6 discussing the current and future receptors and the basis for the complete and incomplete exposure pathways on the Conceptual Site Model Figures.

"***Figure 4-8 presents the updated CSM for the MC exposure pathways. From use of the Rifle Range there is potential contamination of the soil. The current or future receptors for the Rifle Range subarea are recreational users, commercial/industrial workers, outdoor workers, construction workers, trespassers, residents, and biota/critical ecological habitat. The human receptors at the rifle range may be exposed to potential contamination from surface soil, subsurface soil (from direct contamination or infiltration from surface soil) and***

groundwater (leaching of soil contamination). Stormwater is not present at the Rifle Range so the stormwater erosion runoff pathway is not complete. All of the human receptors would be exposed to surface soil and; therefore, complete exposure routes exist for exposure to surface soil from ingestion, direct contact, and inhalation of dust. For subsurface soil, outdoor workers, construction workers, and residents could potentially be exposed to subsurface soil while at the Rifle Range and; therefore, potentially complete pathways exist for exposure to subsurface soil from ingestion, direct contact, and inhalation of dust. Commercial/industrial workers, outdoor workers, construction workers, and residents could potentially be exposed to groundwater at the Rifle Range. Therefore, a potentially complete pathway exists for these receptors from exposure to groundwater through ingestion, dermal contact, and inhalation."

15. **Comment:** Page 4-17, Section 4.9: Please clarify the recommendations for MEC. The first sentence says that "A Full RFI is recommended for the Rifle Range Subarea." The next paragraph then says" ... information gathered during the Phase I RFI is adequate to recommend the path forward for the wooded embankment without the need for additional MEC/MPPEH investigation during a Full RFI." These two statements appear to conflict because the first says that full RFI is recommended and the second says that it is not needed.

Response: A Full RFI is recommended for the subsurface at the Rifle Range Subarea. although MEC/MPPEH is not expected in the subsurface at this subarea, there is the probability that the subsurface anomalies identified in the Rifle Range Subarea could be MEC/MPPEH. Therefore, a full RFI is recommended for the subsurface to include further characterization, delineation, and intrusive investigations.

No further investigation is recommended for surface MEC/MPPEH in the Full RFI, the Phase I RFI information is adequate to recommend a path forward for surface MEC/MPPEH at the wooded embankment without additional investigation during the Full RFI. Elsewhere at the Rifle Range Subarea, no MEC/MPPEH is present on the ground surface, hence no further investigation is necessary in these areas during the Full RFI.

Section 4.9 has been revised:

"A Full RFI is recommended for ***the subsurface at*** the Rifle Range Subarea. The scope of effort for the Full RFI, which will include further characterization, delineation, and intrusive investigations, will be determined during project planning.

For surface MEC, information gathered during the Phase I RFI is adequate to recommend the path forward for the wooded embankment without the need for additional MEC/MPPEH investigation ***of the surface*** during a Full RFI. It is now known that MEC/MPPEH is present and there is a high probability that items are still present in this area. Site conditions (i.e., thick vegetation) are also now known.

For subsurface, ***the Full RFI*** investigation should include intrusive investigation of subsurface anomalies.

For MC, the ***Full RFI*** investigation should determine lateral and vertical extent of MC, in particular metals (antimony, arsenic, copper, lead, and zinc), in and around the constructed earthen berm and wooded embankment and further investigate NG at the 200-yard Rifle Range firing line. A high density of bullets was observed on the constructed earthen berm; therefore, the wooded embankment should be investigated."

Additionally, page ES-1, the first sentence under the Rifle Range Subarea heading, will be revised:

"A Full RFI is recommended for ***MC and MEC/MPPEH in the subsurface at*** the Rifle Range Subarea***, no further investigation is recommended for surface MEC/MPPEH in the Full RFI.***"

16. Page 5-2, Section 5.1.2, Phase I RFI UFP-SAP:

    a. **Comment:** Please clarify the relationship between sites RR9, RR10 and RR11 and the OB/OD area.

       Response: These three locations at SWMU 77 had previously been identified as archeological sites and were under a previous archeological investigation by others. These locations are not shown on RFI figures to safeguard the locations from looters but were provided to the field team to ensure that the areas were not to be disturbed as part of the Phase I RFI work effort. A figure showing the locations of RR9, RR10, and RR11 will be sent, via e-mail, to the Commonwealth of Puerto Rico, Environmental Quality Board, if requested. No archeological artifacts were encountered during the Phase I RFI at any of the subareas.

    b. **Comment:** This section references "RR9". Please show this location on the figures in Section 5 .1.1.

       Response: See response to comment 16a.

    c. **Comment:** Paragraph 2: Please change the word "activate" in the second sentence to "activities".

       Response: The second sentence of paragraph 2, page 5-2, has been revised:

       "...during excavation activ***ities***~~ates~~ associated with shovel pit testing and unit excavations."

17. **Comment:** Page 5-9, Section 5.4.1: Please clarify the following statement as it appears text is missing: " ... Lead was detected in all six samples; however, only two samples had concentrations that exceeded the PAL and of the same magnitude ... " Note that Table 5-3 shows that lead exceeded the PAL in samples SS-01, SS-04 and SS-05 (three samples).

    Response: The 6th sentence of the second paragraph in Section 5.4.1 has been revised:

"Lead was detected in all six samples; ~~however only two~~ ***three of the*** samples had concentrations that exceeded the PAL and ***were detected at concentrations*** of the same ***order of*** magnitude ***as the PAL***."

18. **Comment:** Page 5-14, Section 5.8: Please add a discussion that describes Figure 5-9, including the rationale for selecting the exposure scenarios and receptors presented and the basis for the assumed complete, potentially complete and incomplete exposure pathways.

Response: A paragraph has been added to Section 5.8 discussing the current and future receptors and the basis for the complete and incomplete exposure pathways has been explained.

"***Figure 5-8 presents the updated CSM for the MC exposure pathways. From use of the OB/OD subarea there is potential contamination of the soil. The current or future receptors for the OB/OD subarea are recreational users, commercial/industrial workers, outdoor workers, construction workers, trespassers, residents, and biota/critical ecological habitat. The human receptors at the OB/OD subarea may be exposed to potential contamination from surface soil, subsurface soil (from direct contamination or infiltration from surface soil), and groundwater (leaching of soil contamination). Stormwater is not present so the stormwater erosion runoff pathway is not complete. All the human receptors would be exposed to surface soil and; therefore, complete exposure routes exist for exposure to surface soil from ingestion, direct contact, and inhalation of dust. However, based on the Human Health Risks screening risks contamination is at an acceptable level. For subsurface soil, outdoor workers, construction workers, and residents could potentially be exposed to subsurface soil and; therefore, potentially complete pathways exist for exposure to subsurface soil from ingestion, direct contact, and inhalation of dust. Commercial/industrial workers, outdoor workers, construction workers, and residents could potentially be exposed to groundwater. Therefore, a potentially complete pathway exists for these receptors from exposure to groundwater through ingestion, dermal contact, and inhalation.***"

19. **Comment:** Page 6-7, Section 6.3.3, Soil Sample Results and Table 1-1: Please clarify that, as presented in the UFP-SAP, the additional non-MC analyses would be conducted only if there were no surface MEC or subsurface anomalies detected in the Potential Munitions Trench Subarea. As there were anomalies detected, the analyses focused on select metals, propellants and explosives.

Response: Agree. Text has been clarified:

Footnote 3 has been added to Table 1-1 for the ✓ under the non-MC analyte column for the Potential Munitions Trench Subarea: "***3. Potentially planned if no anomalies are identified during the MEC investigation.***"

Further, a sentence has been inserted between the 4th and 5th sentence of 4th paragraph of Section 6.3.3: "***As stated in the UFP-SAP, samples were also to be collected for non-MC analysis (TCL VOCs, SVOCs, pesticides, PCBs, and cyanide) if anomalies***

were not identified during the MEC investigation; however, because anomalies were detected in this subarea, samples were not collected for non-MC analysis and will instead be addressed during the Full RFI."

20. **Comment:** Page 7-10, Section 7.9: Please discuss the potential for migration of nitroglycerin and other COPCs to subsurface soil and groundwater.

Response: The following text has been added discussing the potential migration of nitroglycerin and arsenic the COPCs for the Detonation subarea.

"***Arsenic and NG were the COPCs for the Detonation Subarea. Arsenic found in soil is either naturally occurring or from anthropogenic releases in the form of insoluble complexes with iron, aluminum, and magnesium oxides found in surface soil, and in these forms, arsenic is relatively immobile. However, under reducing conditions, arsenic can be released from the solid phase, resulting in soluble mobile forms of arsenic, which may potentially leach into groundwater (ATSDR, August 2007). NG contains a hydrocarbon chain, which renders it susceptible to aerobic biodegradation; it is sufficiently biodegradable that mobility is seldom an issue and so usually will be attenuated before reaching groundwater. When NG is bound with nitrocellulose it is not susceptible to degradation in soil until the nitrocellulose is weathered away. In such circumstances, a low-level of NG will remain in the soil but will have no impact on groundwater (US Army Corps, 2006).***" (Also, the references were added to the reference list.)

21. **Comment:** Page 8-2, Section 8.1.4: A subsurface investigation is recommended for this subarea to evaluate the potential for MC to have impacted subsurface soil. Therefore, please revise this section to indicate that contaminants may have impacted subsurface soil and groundwater (as shown in the CSM for this site).

Response: The last sentence of Section 8.1.4 has been revised to include the potential for impacts to subsurface soil.

"As a result, MC in the form of propellant residue (NG) and metals could have contaminated surface soils ***and potentially subsurface soil and groundwater. However, nitroglycerin contains a hydrocarbon chain, which renders it susceptible to aerobic biodegradation; it is sufficiently biodegradable that mobility is seldom an issue and so usually will be attenuated before reaching groundwater. When NG is bound with nitrocellulose it is not susceptible to degradation in soil until the nitrocellulose is weathered away. In such circumstances, a low-level of NG will remain in the soil but will have no impact on groundwater (US Army Corps, 2006).***"

22. Page 9-3, Section 9.3.3.1:

a. **Comment:** Per Section 17.3.3 of the March 2010 SAP, ten confirmation samples will be spatially distributed similar to the collection of the XRF screening samples (4 from the Eastern berm, 2 from the Southern berm, 2 from the Western berm, and 2 from the Northern berm) and submitted to the fixed-base laboratory and analyzed for lead and the other select metals. Per the text and Table 9-1, only one sample was submitted to the fixed base laboratory from the Eastern earthen berm. Please explain why this occurred under Section 9.3.2 (Work Plan Deviations).

Response: Per Section 17.2.1 of the SAP, "The FOL will inspect the study area to determine which areas are most likely to be contaminated based on visual observation and adjust the proposed sample locations accordingly.....In the absence of field conditions indicating otherwise, the FOL will attempt to collect samples at or near the locations identified on Figures 17-1 through 17-6." Per Section 9.3.2 of the report: "Based on the topography of the site as laid out by four corners as per the UFP-SAP, the UXO specialist along with the field crew observed that it was more likely that the firing direction and bullet stop would be to the north into the natural hillside, which was supported by the initial XRF results (see Section 9.3.3). Note that a total of ten confirmation samples were collected as originally planned, although weighted toward the areas of highest contamination.

Text has been added to the last sentence of Section 9.3.2: "...additional samples were collected in areas of elevated XRF lead concentrations and step-out samples as needed. ***The UFP-SAP allowed for FOL inspection of the study area to determine which areas are most likely to be contaminated based on visual observation and adjust the proposed sample locations accordingly; a total of ten confirmation samples were collected as originally planned, although weighted toward the areas of highest contamination. Step-out samples were collected primarily on the western and northern sides of the site with one step-out sample collected on the eastern side of the site.***"

b. **Comment:** Paragraph 2 states that one of the initial XRF samples with a concentration greater than 200 ppm was located in the southern portion of the study area. However, as per Table 9-1, this should be revised to the eastern portion of the study area.

Response: Section 9.3.3.1, paragraph 2, 2nd sentence has been revised: "...and one was located in the ~~southern~~***eastern*** portion of the study area."

23. **Comment:** Page 9-5, Section 9.4.2, Paragraph 3: The text states that copper exceeded the PAL at three locations at up to approximately two orders of magnitude. However, based on results provided in Table 9-3, copper exceeded the PAL by one order of magnitude.

Response: Section 9.4.2, paragraph 3, 6th sentence has been revised: "Copper (maximum concentration of 4,400 mg/kg) exceeded the PAL (168 mg/kg) at three locations at ***concentrations*** up to ~~approximately two~~***one*** order~~s~~ of magnitude greater than the PAL."

24. Table 4-2:

a. **Comment:** Please add a column for lead under Fixed Base Lab Analysis and include the FBL lead result consistent with the presentation of the lead concentration for each XRF sample.

Response: Fixed-base laboratory results are presented on the Summary of Detected Concentrations table, Table 4-4. A footnote has been added to Table 4-2, "***3. XRF results for lead represent raw, uncorrelated data; refer to Appendix I for the statistical correlation and refer to Table 4-4 for fixed-base laboratory sample results for lead (LEAD), as well as raw XRF results (LEAD-XRF) and calculated lead results (LEAD-CALC) following the correlation effort.***" Similar footnotes were added to Tables 8-1 and 9-1 to direct the reader to the Summary of Detected Concentrations tables for fixed-base laboratory sample results.

b. **Comment:** Please complete Note 2.

Response: For better clarification, the footnote has been removed and replaced with the following: "***The SAP did not include nitroglycerine (NG), a propellant, with the analytical suite for the constructed earthen berm or the wooded embankment; however, because explosives analyses were specified and NG and explosives were analyzed by the same analytical method (SW-846 Method 8330A), NG was inadvertently reported by the analytical laboratory.***"

25. **Comment:** Tables 4-3 to 4-6: Please clarify what type of information is being presented in the rows for analytes "LEAD", "LEAD-CALC" and "LEAD." Note that two rows show data for lead, but each row presents different data. In addition, clarify what type of data is being presented for "Lead-CALC."

Response: The 4th row of Table 4-3, entitled LEAD, with a frequency of detection of 10/10 presents the fixed base laboratory results for confirmatory soil samples. The 5th row, with a frequency of 30/30, entitled LEAD-CALC, presents the predicted fixed base laboratory concentrations. Because the correlation analysis determined that there was an acceptable linear relationship between the XRF and fixed base laboratory concentrations, XRF concentrations were used to predict laboratory concentrations at all sample locations (for a given sample location where both fixed-based data and XRF data is available, the fixed based data supersedes the predicted value). The 6th row, entitled LEAD, has been revised to LEAD-XRF, this row presents the raw XRF screening concentrations. Table 4-5 has been revised similar to Table 4-3. Tables 4-4 and 4-6 are correctly labeled. Similarly, Tables 8-2 and 9-2 have been revised to differentiate the XRF lead result.

26. **Comment:** Table 4-7: Minor typographical error - please correct spelling of "determining" in Footnote 1.

Response: The spelling of "determining" has been corrected in Footnote 1 of Table 4-7.

27. **Comment:** Table 4-9: The total HI is shown as 1; however, the total cardiovascular HI is shown as 2. Since only one COPC was identified, the total HI and target organ or system HI should be the same. Please clarify.

Response: Agree. The HI for nitroglycerin is 1.2, the total HI and the total organ HI should both be 1 and the table has been corrected.

28. **Comment:** Table 5-1: The table shows a sample depth of 1-1.5 feet for the subsurface soil sample, 77OB-SB001. However, as per the sample log sheet in Appendix F and the chain-of-custody in Appendix G, this should be 1-2 feet. Please clarify and revise accordingly.

Response: The correct sample depth is 1-1.5 feet for subsurface soil sample 77OB-SB001. Per Section 5.3.2, refusal was encountered at this soil boring at 1.5 feet below ground surface (bgs); the subsurface soil sample was collected from the 1-1.5 foot bgs depth interval. The sample log sheet in Appendix F and chain-of-custody form in Appendix G has been revised and initialed/dated by the FOL to indicate a sample depth of 1-1.5 feet.

29. Table 10-1:

a. **Comment:** Please consider describing the CSM for each subarea rather than presenting all subareas in one CSM for clarity.

Response: Subareas will remain grouped together in the CSM during this phase of investigation considering all subareas are encompassed as one site, SWMU 77. The Navy will consider separating subareas after the next phase of investigation once more site-specific information is known for each subarea.

b. Information Needs, Maximum Probability Penetration Depth:

i. **Comment:** This section says MEC is suspected only at the surface at the Rifle Range Subarea. However, MEC is expected to be located in the subsurface in the berm because surface MEC and subsurface anomalies were located there. Please clarify.

Response: "~~Only~~" has been deleted from the first line of the Maximum Probability Penetration Depth section of Table 10-1 and a sentence has been added following the second line:

"***Intrusive investigations need to be conducted at the Rifle Range Subarea to determine the source of the anomalies.***"

ii. **Comment:** This section says that MEC is expected in the surface at the Concrete Pad when this site has been recommended for no further action indicating that MEC is not expected at the site. Please clarify.

Response: A sentence has been added: ***"MEC/MPPEH was not found on the surface nor were subsurface anomalies present within the depression area at the Detonation Area Near Concrete Pad Subarea."*** Also, note that the recommendation for this Subarea has been changed from NFA to proceed to Full RFI, as per the response to EPA (TechLaw) Specific Comment 5.

iii. **Comment:** This section says that geophysical results confirmed subsurface anomalies only at the OB/OD Subarea and Potential Munitions Trench Subarea when more than fifty subsurface anomalies were also confirmed at the Rifle Range Subarea (an analog detector-aided survey was conducted over 100% of the berm). Please clarify.

Response: The 5th sentence of the Maximum Probability Penetration Depth section has been revised:

"***Digital*** ~~G~~geophysical survey results during the Phase I RFI confirmed subsurface anomalies at the Potential OB/OD Subarea, and Potential Munitions Trench Subarea***; additionally, analog survey results during the Phase I RFI indicated suspect subsurface anomalies at the Rifle Range Subarea***"

30. Exposure Pathway Analysis Figures 4-8, 5-9, 6-9, 7-9, 8-4 and 9-4:

a. **Comment:** Please clarify why there are current receptors (other than trespassers) if the site is not being used. It appears that all receptors are potential future receptors. Please clarify.

Response: The header has been changed to apply for all the receptors on each Exposure Pathway Analysis figure to "***Current or Future***."

b. **Comment:** Please add commercial/industrial and outdoor workers and recreational receptors as future receptors for all subarea Exposure Pathway Analysis figures unless it can be shown that a particular receptor group is not likely for a particular site.

Response: The "Contractor/Visitor" header has been changed to "Commercial/Industrial Workers" and a column for "Outdoor Workers" has been added, while the "Military/Civilian" header has been changed to "Recreational Receptors" on all Exposure Pathway Analysis figures.

c. **Comment:** Please revise future residential (and commercial/industrial worker) exposure to groundwater to "potentially complete," as groundwater is classified as potable per Puerto Rico's Water Quality Standards pending additional information on the hydrogeology of the area, including an assessment of the potential for leaching of contaminants to groundwater, to determine the potential for groundwater impacts and to determine if groundwater is saline due to saltwater intrusion.

Response: The MC Exposure Pathway Analysis figures have been revised to show that exposure to groundwater is a "potentially complete pathway" for the Resident and Commercial/Industrial Workers, with the exception of Figure 7-5, associated with the Detonation Area Near Concrete Pad Subarea, where the groundwater exposure pathway is a "potentially complete pathway but contamination at acceptable risk level".

d. **Comment:** Future commercial/industrial workers and outdoor workers may be potentially exposed to groundwater.

Response: See response to comment 30c; the same revisions have been made for the Outdoor Worker.

e. **Comment:** Outdoor workers may be exposed to soil to 2 feet below grade during landscaping activities; recreational receptors may be exposed to surface soil; and commercial/industrial workers may be exposed to surface soil and associated indoor dust.

Response: As applicable, based on contamination found or not found at a given subarea, the MC Exposure Pathway Analysis figures have been revised to show "complete", "incomplete", "potentially complete" or "potentially complete but contamination at acceptable risk level" pathways for Outdoor Workers exposure to soil to 2 feet below grade, Recreational Receptors exposure to surface soil, and Commercial/Industrial workers exposure to surface soil and associated indoor dust.

f. **Comment:** Runoff and erosion are identified as transport mechanisms. Please clarify why there are no complete or potentially complete exposure pathways to soil impacted by runoff-erosion, whether there are any insignificant surface water features or depositional or drainage areas present within each subarea.

Response: There are no ditches or streams present and the subareas are heavily vegetated. Therefore, erosion is not a concern at any of the subareas.

31. **Comment:** Figures 5-10 and 6-9: Since it is possible that there is MEC in the surface it is possible that there will be exposure of receptors to MEC on the surface through transportation of MEC by erosion. The surface receptors (handle/tread underfoot) should show potentially complete pathways. Also, why is there an "intrusive" activity for surface MEC? Intrusion implies exposure to subsurface MEC through intrusive activities. Deleting the surface intrusive activity and showing potential exposure for "handle/tread underfoot" for surface MEC is recommended.

Response: MEC/MPPEH was not found on the ground surface at either the Potential OB/OD Subarea or the Potential Munitions Trench Subarea; therefore, surface soil, handle/tread underfoot exposure pathways are incomplete at both subareas. Surface soil is defined as 0-6 inches at these sites, and it is possible that MEC/MPPEH may be "in" the surface soil while not located on the ground surface at these sites; therefore, receptors may contact MEC/MPPEH in the surface soil (ground surface to 6 inches below the ground surface) through intrusive activities and this pathway will be shown as potentially complete on Figure 6-9 (already shown in this manner on Figure 5-10) for receptors that may be exposed to this depth interval. Additionally, footnotes have been added to these

figures (and Figures 4-9 and 7-6) indicating that handle/tread underfoot is for the ground surface and intrusive activities in the surface are for below the ground surface to a depth of 6 inches:

"1. Handle/tread underfoot occurs at the ground surface.
2. Intrusive surface activities occur from the ground surface to a depth of 6-inches below the ground surface."

32. **Comment:** Figure 7-2: - Please identify the locations of where assumed kick-out debris was observed, as this will aid in determining the extent of potential impacts from the past detonation.

Response: Kick-out metal fragments were not observed at the Detonation Area Near Concrete Pad Subarea. Small metal pieces of unknown origin were observed on the ground surface throughout the site.

33. **Comment:** Figure 9-1: 77FPSB028 is located in the western berm area on the figure. However, the sample log provided in Appendix F states that this is in the northern berm area. Please clarify and revise accordingly.

Response: Figure 9-1 is correct, sample 77FPSB028 was located in the western berm area, the sample log provided in Appendix F has been revised and initialed/signed by the FOL.

Appendix F, MC Field Documentation

1. **Comment:** Please include the XRF log sheets (an example of which is provided in the SOP section of the UFP-SAP) as additional documentation in this Appendix.

Response: Field XRF spreadsheets have been added to Appendix F, as Appendix F-5, as requested. Field XRF data was entered onto Excel spreadsheets in the field rather than the example XRF log sheets presented in the UFP-SAP SOP.

Appendix G, Validated Analytical Results

1. **Comment:** Nondetect results for antimony, arsenic, explosives, and nitroglycerine were reported down to the method detection limit (MDL) instead of the quantitation limit. Typically, the MDL is a statistically derived value that is not accurately verified by the laboratory analysis. The quantitation limits are accurately verified by laboratory analyses of standards at the unadjusted quantitation limit. The quantitation limits (not MDLs) should be used for the evaluation of the data when comparing results to the PALs due to the higher accuracy of these numbers. Revise the listed tables to reflect the reporting of nondetect results down to the quantitation limit instead of the MDL.

Response: Quantitation limits are now presented in Appendix H with a sensitivity evaluation; quantitation limits are also presented in Appendix L, Data Validation Reports.

Appendix H, Munitions Constituents Data Usability Assessment

1. **Comment:** Page H-5, Section 3.2: Sensitivity was evaluated by comparing the MDLs to the PALs. However, as per Worksheet #15 (page 68) of the March 2010 SAP, a comparison of the laboratory's quantitation limits to the PALs needs to be performed in order to determine potential limitations on the data. Please revise the text and the associated Table H.4 to address this.

   Response: A new table, Table H.5 Soil Sensitivity Evaluation of the Quantitation Limit, has been added to Appendix H. Sensitivity issues were identified when compared to laboratory quantitation limits for antimony, lead, nitroglycerin, 1,3-dinitrobenzene, and 2,6-dinitrotoluene; text has been added to Sections 3.2 and 4.4 of the text in Appendix H to discuss the results of this evaluation.

2. **Comment:** Page H-6, Section 3.3: The text states that the laboratory failed to analyze samples marked on the chain-of-custody forms for MSIMSD analyses of metals. This is a significant deficiency in the QA program and also strongly impairs the ability of performing a proper data usability assessment. Unlike organic analyses which use surrogate spikes in each sample, metals analyses have no means of monitoring matrix effects in the samples. Without this information, there is no way to assess the potential matrix effects and biases on the final results. As most of the sites are being recommended for full RFIs, this issue can be addressed during the next rounds of sampling. However, please provide a more detailed discussion on the lack of this information during these investigations in this usability assessment.

   Response: Additional text has been added to Sections 3.3 and 4.4 of the text in Appendix H that further discusses the effect of not having MS/MSD samples has on evaluating matrix effects for metals.

   Appendix H text, Section 3.3, end of 3rd paragraph:
   "....Those MS/MSD measurements that were taken were for the analytes arsenic and zinc~~; therefore~~, laboratory accuracy based on MS data could not be evaluated for ~~all of the other analytes~~ ***the remaining metals. Soil matrix bias cannot be fully evaluated in the absence of MS/MSD data for metals. Other accuracy data quality indicators such as LCS and calibration recoveries indicated that the laboratory analyses of metals were sufficiently accurate for project data use; however, it cannot be absolutely determined whether soil matrix effects biased results for those metals that do not have corresponding MS/MSD data.*** ~~Other accuracy data quality indicators such as LCS and calibration recoveries indicated that the laboratory analyses of metals were sufficiently accurate for project data use~~."

   Appendix H text, Section 4.4, 2nd paragraph:
   "....Those MS/MSD measurements that were taken were for the analytes arsenic and zinc.~~; therefore, laboratory accuracy based on MS data could not be evaluated for all of the other metal analytes~~. ***Potential soil matrix effects could not be evaluated for other metals with no corresponding MS/MSD data. Soil matrix effects can significantly bias results and should always be considered when attempting to***

determine data usability. Soil matrix bias cannot be fully evaluated in the absence of MS/MSD data for metals. Other accuracy data quality indicators such as LCS and calibration recoveries indicated that the laboratory analyses of metals were sufficiently accurate for project data use***; however, it cannot be determined whether soil matrix effects biased results for those metals that do not have corresponding MS/MSD data.***

Appendix I, XRF/FBL Correlation Statistical Analysis

1. **Comment:** Please present the statistical analysis that was conducted that shows the highest XRF sample concentration was an outlier.

   Response: The supporting graphical evaluations (boxplot and a histogram) along with Tukey's Outlier Test that were used to determine that the highest XRF sample concentration was an outlier were added to Appendix I, including supplementary text and a figure. The graphical evaluation of the XRF concentrations and the Tukey outlier test, was the basis for concluding that the maximum XRF concentration was an outlier and should be removed from the correlation analysis.

2. **Comment:** Please present the XRF/Lab data pairs used to determine correlation coefficients.

   Response: A new table has been added to Appendix I showing the XRF/Lab data pairs. Also, a sentence has been added to the text to reference the new table. Note existing Appendix I tables and figures from the draft version of the report have been renumbered as necessary to incorporate new figures and tables.

3. **Comment:** Please present the correlation analysis for the dataset representing all data with the exception of the outlying point, including the presentation of a figure similar to Figure 1.

   Response: Text detailing the correlation analysis for the dataset representing all the data, without the outlying point, has been added to the text of Appendix I. A new figure, which includes the scatter plot of the data, has also been added.

4. **Comment:** Please provide the justification for selecting 400 mg/kg as the concentration at which the dataset is split into two groups - one representing data below 400 mg/kg and one representing data above 400 mg/kg. Note that the equations used to predict laboratory concentrations from XRF data do not converge at 400 mg/kg, resulting in vastly different predicted lab concentrations for XRF near 400 mg/kg. The equations from Figures 2 and 3 in Appendix I would predict lab concentrations of 672 mg/kg and 1988 mg/kg for XRF concentrations of 399.9 mg/kg and 400.1 mg/kg respectively. Please address this issue as part of the justification and discuss the predicted laboratory results for XRF data immediately below and above 400 mg/kg.

Response: Based on the scatterplot of the data it appears that the lower concentrations follow a different slope than the higher concentrations. This indicates that the two subgroups may come from different populations and; therefore, different regression models would be required to estimate the fixed base lab concentrations. 400 mg/kg was chosen as the concentration at which the dataset is split into two groups based on the visual examination of the data. Concentrations should only be predicted for the observed concentration range. Based on the way the data was split, there is no overlap of observed concentrations. The utility of using XRF screening for delineation and characterization of lead contamination vs. fixed-based laboratory analysis will be discussed further during the Full RFI project planning.