



responses to comments on former skeet range riwp (UNCLASSIFIED)

Thursday, January 6, 2011 10:55 AM

From: "Gabel, Ted Mr CIV USA IMCOM" <ted.gabel@us.army.mil>

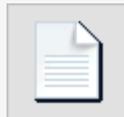
To: Roach.Bill@epamail.epa.gov, "Greg Zalaskus" <Greg.Zalaskus@dep.state.nj.us>, "Jim Kealy" <Jim.Kealy@dep.state.nj.us>

Cc: "Joe Marchesani" <Joe.Marchesani@dep.state.nj.us>, subsurfacesolns@earthlink.net, michaelglaab@worldnet.att.net

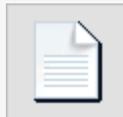
 4 Files (633KB)



Fig5_Propos



RTC-SkeetR



Army-appro



submtrtcons

Classification: UNCLASSIFIED

Caveats: NONE

Bill/Greg and Joe:

Attached are responses to your comments on the Skeet Range. The submittal also includes Figure 5 with the additional sample locations based on the comments.

Let me know. Only Bill gets hard copy.

Thanks.

Ted Gabel
Project Manager
for Environmental Restoration
US Army Garrison, Picatinny Arsenal
INCOM-NERO-PIC-PWE
B319
Picatinny Arsenal, NJ 07806-5000
Commercial: (973) 724-6748
Fax: (973)-724-5398
DSN: (312) 880-6748

"We are the Army's Home in Northern New Jersey"

Classification: UNCLASSIFIED

Caveats: NONE



DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, PICATINNY
PICATINNY ARSENAL, NEW JERSEY 07806-5000
January 6, 2011



REPLY TO
ATTENTION OF

Environmental Affairs Division

SUBJECT: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/Interagency Agreement (IAG) Administrative Docket No. II-CERCLA-FFA-001-04: **Response to Comments on Former Skeet Range Remedial Investigation Work Plan, October 2010:** Review is ER-A eligible

Mr. William Roach
U.S. Environmental Protection Agency
Region 2
290 Broadway, 18th Floor
New York, NY 10007-1866

Mr. Gregory Zalaskus
New Jersey Department of Environmental Protection
Emergency Management Program
East State Street, Floor 5, P.O. Box 028
Trenton, New Jersey 08625-0028
Dear Sirs:

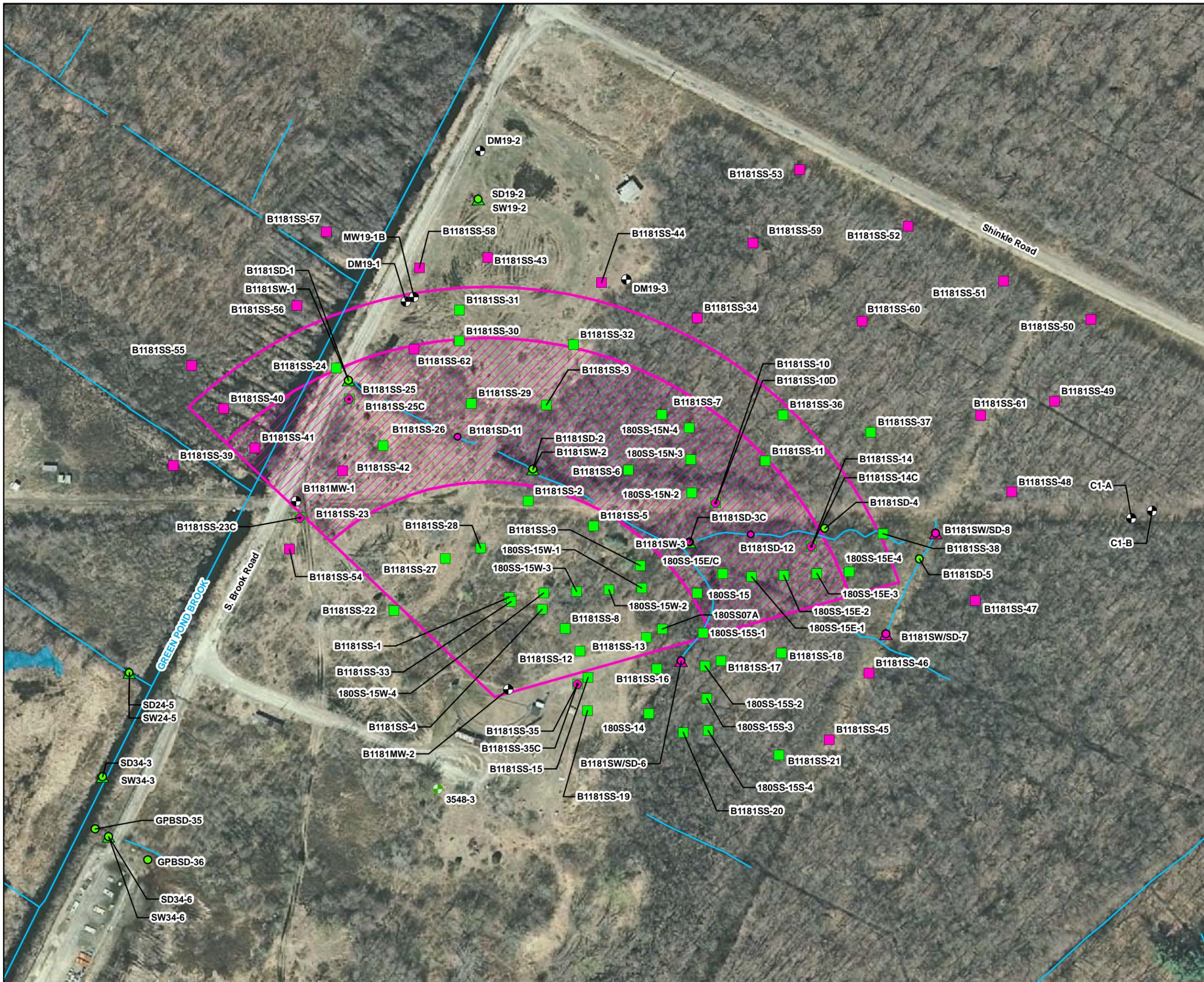
Enclosed for your review are the responses to your comments of the **on Former Skeet Range Remedial Investigation Work Plan**. This response also includes a map with the new sampling location based on your comments.

Please get back to me by email or otherwise if these comments satisfy your concerns.

Sincerely,

Project Manager for
Environmental Restoration

Enclosures
CC (emailed only):
Mr. Jim Kealy, NJDEP
Mr. Joe Marchesani, NJDEP (hardcopy)
Ms. Barbara Dolce, TAPP Contractor
Mike Glabb, RAB-Co-Chair



LEGEND

- Monitoring Well Location
- Abandoned Monitoring Well Location
- Previous Sediment Sample Location
- Previous Surface Soil Sample Location
- Previous Surface Water Sample Location
- Proposed Subsurface Soil Sample Location
- Proposed Sediment Sample Location
- Proposed Surface Soil Sample Location
- Proposed Surface Water/Sediment Sample Location
- Water Feature
- Water Body
- Maximum Shot Fall Zone
- Former Skeet Range Impact Fan

Notes:
 1) Aerial photography (1-foot resolution), dated 2007-2008, was obtained from New Jersey Office of Information Technology (NJGIT), Office of Geographic Information Systems (OGIS).



FIGURE 5
PROPOSED SAMPLE LOCATIONS

FORMER SKEET RANGE REMEDIAL
 INVESTIGATION WORKPLAN

PICATINNY ARSENAL, DOVER, NEW JERSEY

**Response to NJDEP Comments from
Jim Kealy
Picatinny Former Skeet Range
Remedial Investigation, Draft Work Plan
Picatinny Arsenal, New Jersey**

Comments dated: 9 November 2010

Comment: Based on my review, I have the following recommendations for additional surface soil sample locations and sediment for lead analyses to fill potential data gaps:

1. Surface soil (SS) midway between B1181SS-7 and proposed sample B118SS-51.
2. SS midway between B1181SS-34 and proposed sample B1181SS-53.
3. SS midway between B1181SS-37 and proposed sample B1181SS 49.
4. SS midway between B1181SS-31 and B1181SS-25.
5. Collect an additional sediment sample from the ditch midway between historic sample locations B118SD-1 and 1181SD-2.
6. Collect an additional sediment sample from the ditch midway between historic sample locations B118SD-3 and 1181SD-4.

Response: The recommended samples in the northeastern operation of the site may be difficult to access, because the area is a marsh with pools of standing water and a high water table. Most of the samples in this area were purposely located near roads and fire breaks for safer access. Shaw personnel will attempt to collect the requested samples; however, if the locations cannot be safely accessed and sampled, the sample will have to be eliminated. It should be noted that for all these recommended samples, downgradient samples have been or will be collected, so horizontal delineation will be characterized. These additional samples will be analyzed for lead only.

**Response to EPA Comments on the
Former Skeet Range
Remedial Investigation Work Plan, October 2010
Picatinny Arsenal, New Jersey**

Comments dated: 20 December 2010

GENERAL COMMENTS

Comment 1: It is unclear whether the number of soil samples proposed in the RI Work Plan is adequate to delineate the extent of contamination. Polynuclear aromatic hydrocarbons (PAHs) were detected in surface soil samples B1181SS-22, B1181SS-23, and B1181SS-27, located on the western edge of the impact fan at concentrations exceeding the applicable levels of concern. However, no additional samples are proposed for collection further west of these locations to delineate the extent of observed PAH contamination. In addition, PAHs were detected in surface soil samples B1181SS-24, B1181SS-30, and B1181SS-31, located on the northwestern edge of the impact fan at concentrations exceeding applicable levels of concern. However, no additional samples are proposed for collection further northwest of these locations. The beginning of Section 3.0, Remedial Investigation Sampling Procedures, indicates that the objectives of the proposed sampling is the delineation of observed lead and PAH contamination. Revise the RI Work Plan to explain how the extent of contamination has been delineated in these areas or propose the collection of additional samples at these locations.

Response 1: One objective of the Remedial Investigation (RI) is to quantify risk at the site. Following the RI, a feasibility study (FS) will be performed to evaluate remedial alternatives to address unacceptable risks at the site. As part of the FS or subsequent remedial action, the extent of contamination will be delineated, if necessary. In regard to additional delineation samples to the north and west of the impact fan, five additional surface soil samples (B1181SS-54 through B1181SS-58) will be proposed to the north and west of the aforementioned samples for purposes of delineation of PAH impacts (see attached Figure 5). Text will be added to the RI workplan that the proposed sampling is expected to characterize the nature of contamination at the site. If additional delineation sampling is necessary in order to develop alternatives for the FS, it will be conducted as part of the FS.

Comment 2: Figures 2 and 6 use aerial photography as background for historical lead concentrations and proposed sample locations respectively. However, use of aerial photography for this purpose makes the figures difficult to read (green background and red sample symbols). Aerial photograph should be limited to a figure that shows site conditions and not sample locations, etc. In addition the purpose of Figure 4, 2010 Lead Sampling and Analysis Area, is questionable as it does not include previous sampling results. In determining the need for additional sampling, it would be helpful to place all sample results on one figure with contaminant iso-contours on a scale similar to Figure 3 from August 2010 Data Report.

Response 2: It is assumed that the comment is referring to Figures 2 and “5”, instead of Figures 2 and “6”. The sample locations in Figures 2 and 5 are clearly distinguished. The modern practice in consulting is to use Geographic Information Systems (GIS) with aerial photograph

layers to facilitate the data presentation. In regard to figures showing historical lead concentrations, this is clearly outlined within Figure 2. The purpose of Figure 4 is to show only the proposed sampling locations. No changes will be made to the RI Work Plan (RIWP).

Comment 3: The RI Work Plan uses the term Level of Concern (LOC), but does not include a table or text that defines the source of the identified LOC. Revise the RI Work Plan to reference the source of the LOC values.

Response 3: An explanation of the source of the LOCs will be added to the text and also referenced within the revised RIWP.

Comment 4: The RI Work Plan references a Picatinny Arsenal Facility-Wide Field Sampling Plan, dated September 1998. Given the age of the referenced document, revise the RI Work Plan to provide a summary of updated elements including:

- Current, updated laboratory analytical methods;
- Associated current sample preservation requirements;
- Appropriate sample holding times; and,
- Appropriate quality control acceptance criteria for this investigation.

Also, ensure that the Data Quality Objectives (DQOs) are provided in the RI Work Plan. The DQO section should clearly define the problem and the environmental questions that will be addressed by the proposed investigation. Project decision “If..., then...” statements should be developed, linking data results with possible actions. The DQOs should also identify the type, quantity, and quality of data needed to answer the study questions. The following are general guidelines provided to help clarify the types of information that should be included as part of the DQOs:

- State the problem to be addressed by the project.
- Provide the environmental questions to be addressed. For example, what is the nature and extent of metals contamination in the soil?
- If previous site reconnaissance or sampling was performed, provide any observations from the site reconnaissance and/or provide a synopsis of secondary data or information from site reports. Also, indicate if there are any limitations with the use of secondary data. Additionally, indicate if past investigations have eliminated previously analyzed compounds (e.g., lead was below relevant criteria in groundwater and is no longer a concern).
- Provide project decision conditions (“If..., then...” statements).
- Indicate who will use the data.
- Indicate the intended use of the data.
- Specify what types of data are needed (e.g., target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques).
- Specify how “good” the data must be in order to support the environmental decision (e.g., definitive-data with 100% validation).
- Specify how much data is needed (number of samples for each analytical group, matrix, and concentration).

- Provide the rationale for inclusion of chemical and nonchemical analyses, the proposed number of samples, the proposed type of sample (e.g., grab samples vs. composite samples, random samples vs. judgmental), and the proposed locations/depths of samples. The rationale should include justification for the selection of each criteria with respect to the environmental questions posed.

Response 4: The first paragraph in this comment requests information which is already included within Tables 1 and 2 of the RIWP.

In the 1990s, ICF Kaiser, a legacy company of Shaw, developed a Picatinny Arsenal facility-wide Work Plan (WP), Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP) to support our field operations at the base. The facility-wide plans were created to reduce the costs of having to develop and reproduce the documents for each field assignment. The plans were developed based on existing guidance at that time.

Since that time, the plans have been revised/updated to meet project-specific requirements and match current regulatory guidance [e.g., New Jersey Department of Environmental Protection (NJDEP) Field Sampling Procedures Manual and the New Jersey Technical Requirements for Site Remediation]. The majority of the information requested such as documentation, decontamination, sample shipping, and packaging are included in the facility-wide FSP which is referenced in the skeet range RIWP. Project organization is discussed in the facility-wide WP.

Shaw will add a section with the problem statement and the DQOs in accordance with USEPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA, 1988). For the remaining information requested, this information can be found in the aforementioned documentation.

Comment 5: Lead is a key compound of interest at the former skeet range based on site use. According to the *Former Skeet Range Investigation Data Report*, dated August 2010, this compound was detected in surface soil above 800 mg/kg in various samples collected from the site. Therefore, Section 4.1, Human Health Risk Assessment (HHRA), should outline the protocol to be used to evaluate lead exposures for the current commercial/industrial land use and the future potential residential land use scenarios. Specifically, if lead in soil exceeds 400 mg/kg under the residential scenario or 800 mg/kg under the industrial scenario, lead soil exposures to these receptors should be more closely evaluated using the Integrated Exposure Uptake Biokinetic (IEUBK) model and the Adult Lead Model (ALM), respectively. The IEUBK models blood lead levels of child residents, while the ALM models fetal blood lead levels of pregnant industrial workers. Revise Section 4.1 to include further detail about how lead will be evaluated in the HHRA. Alternatively, if further blood lead modeling is not conducted to gain a better understanding of soil exposures to lead, the level of concern (i.e., the Regional Screening Level [RSL]) will serve as the trigger for remedial action.

Response 5: The RIWP will be revised to state that the HHRA will evaluate lead using the Integrated Exposure Uptake Biokinetic (IEUBK) model and the Adult Lead Model (ALM), respectively, for children and pregnant industrial workers, assuming lead is selected as a contaminant of potential concern (COPC) in soil.

Comment 6: The HHRA protocol does not define exposure assumptions (i.e., propose specific exposure factors) to be used in the quantitative HHRA. The Army may wish to reach agreement on the specific exposure factors in advance of completing the draft HHRA. If so, revise the HHRA protocol to propose specific exposure factors for the exposure scenarios. Otherwise, comments on the specific exposure assumptions will be reserved for the draft HHRA.

Response 6: Readily-available USEPA default exposure assumptions will be used in the HHRA for the routine worker, construction worker, and future adult and child resident. For those exposure pathways that do not have recommended defaults, best professional judgment will be used. For example, the construction worker exposure duration will be conservatively assumed to be 1 year, while the exposure frequency will be assumed to be 30 days per year (a one month construction period). For the exposure frequency for contact with surface water and sediment, a value of 39 days per year will be used for routine workers and future residents. This assumes these receptors visit the surface water/sediment area onsite once a week during the spring, summer and fall. No changes will be made to the RIWP.

Comment 7: The HHRA protocol does not provide the hierarchy of toxicological criteria that will be used in the HHRA. Ensure that the subsequent draft HHRA details the selection of preferential toxicological criteria used in the HHRA.

Response 7: The RIWP will be revised to state that HHRA toxicity values will be those recommended in the current version of USEPA's RSL Table, which follows the recommended hierarchy of human health toxicity values (OSWER Directive 9285.7-53 (USEPA, 2003).

Comment 8: While this investigation is associated with the former skeet range, a former burning ground is located approximately 500 feet southwest of the site. Depending on wind patterns, the former skeet range may be impacted by burn activities that were conducted at the burning ground. Revise the HHRA protocol to justify the lack of dioxin assessment at the former skeet range given the close proximity to the former burning grounds.

Response 8: The Burning Ground area has already had a Record of Decision based on an approved RI and approved HHRA. Although dioxin was identified as a COC at the Burning Ground, the total carcinogenic risk from soil exposure for current site workers falls within the NCP target risk range (Shaw, 2005). In addition, the USEPA-approved RA for the Burning Ground includes an asphalt cap, which will eliminate future exposures to dioxin. Therefore, a dioxin assessment is not necessary in association with the former skeet range. No changes will be made to the RIWP.

Comment 9: The figures provided in the work plan make it unnecessarily difficult to determine the nature and extent of lead and PAH contamination that has been found at the former Skeet Range to date vis-à-vis the need for further investigation of these contaminants. Regarding lead, for example, Figure 2 provides "historical lead concentrations", Figure 4 provides "2010 lead sampling and analysis", and Figure 5 shows "proposed sampling locations". If at all possible, all historical lead contamination should be shown on one figure with the proposed sampling locations in order to facilitate review of whether the proposed sampling regime will adequately

determine the nature and extent of the contamination. A larger format figure may be suitable for this purpose (similar to Figure 3 from the Former Skeet Range Data Report). In addition, Figure 2 and Figure 5 use aerial photography as background which makes it difficult to see the skeet range layout and sample locations. Aerial photographs should only be used to show existing site conditions, not as background for sample locations, etc.

Response 9: As addressed in **Response 2** above, historical lead concentrations are already clearly outlined within Figure 2 and the purpose of Figure 4 is to show only the proposed sampling locations. In addition, GIS using aerial photography is a common practice for data presentation. No changes will be made to the RIWP.

SPECIFIC COMMENTS

Comment 1: Section 2.0, Former Skeet Range and Site 180 Background, Page 2: This section refers to the Green Pond Brook located to the west in Figure 1. However, the Green Pond Brook could not be located on Figure 1. Revise Figure 1 to indicate where the Green Pond Brook is located.

Response 1: Green Pond Brook is already cleared noted in the upper left hand corner of Figure 1. No changes will be made to the RIWP.

Comment 2: Section 2.1.3.3, June 2010 Investigation, Groundwater Sampling Results, Page 5: The text states that “Arsenic is a known groundwater contaminant in the area and is likely from historic landfilling operations or contamination from other sites. Vanadium may also be related to historic landfilling operations in the area. It is unlikely the arsenic and vanadium detections in groundwater are related to the historic operation of the former Skeet Range,” but does not reference or provide data to substantiate these statements. Ensure that the proposed sampling will result in the collection of data sufficient to substantiate the statements made regarding arsenic and vanadium.

Response 2: The proposed sampling will result in data sufficient to characterize the nature and extent of contamination resulting from former operations at the skeet range. COCs resulting from historical operation of small arms ranges have been well characterized (AFCEE, 2000; NSSF, 1997; ITRC, 2003; ITRC, 2005; FDEP, 2003; USAEC, 1997; USEPA, 2000; USEPA 2003). Vanadium is not a COC at the former skeet range. There is no New Jersey Groundwater Quality Standard or maximum contaminant level (MCL) for vanadium. Furthermore, the LOC for vanadium is a Tapwater risk-based concentration (RBC) which is inappropriate for the turbid groundwater from a swampy area such as the skeet range. In addition, Shaw has performed long-term monitoring of Picatinny Arsenal’s Area C groundwater operable unit since 2001 which includes the area surrounding the skeet range. Arsenic is prevalent in the groundwater throughout Area C. References to the relevant Area C groundwater reports will be added to the references section of the RIWP.

Comment 3: Section 3.1, Groundwater Sampling, Page 7: According to Section 3.1, groundwater samples will be collected from five monitoring wells. It is unclear whether these locations are adequate to delineate the full extent of potential groundwater contamination at the

site. In addition, it is unclear why monitoring wells MW19-B, DM19-1 and DM19-2 are not proposed for sampling, as they appear to be downgradient of the site (based on June 17, 2010 groundwater elevation data provided *Former Skeet Range Investigation Data Report*, dated August 2010). Revise the RI Work Plan to clarify how the collection of groundwater samples from the proposed monitoring well locations is sufficient to determine the extent of potential contamination.

Response 3: The proposed monitoring wells are adequate to delineate the full extent of groundwater contamination from the former operation of the skeet range. The groundwater elevation data presented in the *Draft Former Skeet Range Investigation Data Report* (Figure 4) was incorrect. The groundwater contour map was subsequently revised and distributed to USEPA and NJDEP. The revised groundwater contour map will be added to the Draft Final RIWP. As indicated in the previous response, the Army has performed extensive groundwater investigations for the Area C groundwater operable unit at Picatinny Arsenal for the past 10 years. Numerous data already exist regarding groundwater in this area including the Area C Groundwater ROD and the results from the approved Area C Groundwater Long Term Monitoring Plan.

Comment 4: Section 3.2, Soil Sampling, Page 8: According to this section, subsurface soil samples will be collected at four locations (B1181SS-10, B1181SS-14, B1181SS-25, and B1181SS-35). However, it is unclear why these locations are proposed selected for subsurface sampling. For example, according to Figure 4, 2010 Lead Sampling and Analysis Area, lead was not detected in surface soil samples collected at locations B1181SS-10 and B1181SS-14 during the June 2010 investigation. In addition, higher concentrations of PAHs were detected in surface soil sample B1181SS-23 than B1181SS-35. Revise the RI Work Plan to provide a rationale for the collection of subsurface samples from the locations specified and for the sample collection depth selected at location B1181SS-10D (4.0-4.5 feet below ground surface [bgs]). In addition, discuss whether the collection of subsurface soil samples from four locations is adequate to delineate the vertical extent of contamination at the site, and clarify what steps will be taken to ensure that the full lateral and vertical extend of soil contamination will be delineated.

Response 4: Subsurface soil samples are proposed to be collected at sample locations B1181SS-10 and B1181SS-14 because concentrations of lead were found in excess of LOCs at the surface during the 2007/2008 investigation. Subsurface soil samples are proposed to be collected at sample locations B1181SS-25 and B1181SS-35 because concentrations of lead and/or PAHs were found in excess of LOCs at the surface during the 2010 investigation. Figure 4 did not show the lead concentrations at proposed subsurface sample locations B1181SS-10 and B1181SS-14 because samples were unable to be collected at these locations during the 2010 investigations. During the sampling event, these locations were submerged beneath a large ponded surface water body. Shaw's sampling personnel could not safely access these submerged locations.

In addition to the subsurface soil sample already proposed to be collected at location B1181SS-35, an additional subsurface soil sample will be collected at sample location B1181SS-23. Both of these subsurface soil samples will be collected from a depth of 2.0-2.5 feet bgs and analyzed for PAHs only. Sample B1181SS-10D is proposed to be collected from the 4.0 to 4.5 foot depth

because this is the maximum depth that can be collected manually without the use of a Geoprobe or drill rig; it is also well below the water table. In addition, PAHs and metals generally do not migrate in soil vertically; they tend to adhere to soil particles. Please refer to the **Response to General Comment 1** for additional clarification of the delineation approach in the RIWP. Additional text will be added to the RIWP reiterating the above response.

Comment 5: Section 3.2, Soil Sampling, Page 8: This section indicates that 7 soil samples will be analyzed for “munitions metals” and that the remaining 12 will be analyzed for lead only. It is unclear why certain samples are proposed for munitions metals analyses versus lead only. Revise the RI Work Plan to provide a rationale for the analyses selected at each sample location and clarify what steps will be taken to ensure that the full lateral and vertical extent of soil contamination will be delineated.

Response 5: A table will be added to the RIWP listing each sample, the sample medium, the proposed analytes and a rationale for the analyses. See the **Response to General Comment 1** for additional clarification of the delineation approach in the RIWP.

Comment 6: Section 3.3, Surface Water and Sediment Sampling, Page 8: This section states that two surface water and sediment samples will be collected at random locations either within or adjacent to the former skeet range impact fan, depending on field conditions encountered and site observations during sampling. However, criteria for sample location selection have not been provided (e.g., should all conditions encountered be the same, how will the locations be selected). Revise the RI Work Plan to include the criteria that will be used to select the random sample locations.

Response 6: As stated in the 2010 data report and RIWP, field conditions within and around the former skeet range can vary and present safety concerns. These concerns include standing water, iced over ponded water, phragmites, etc. These items were the basis of choosing the additional surface water and sediment samples at random locations. In addition, two additional sediment samples (B1181SD-11 and B1181SD-12) will be added within the skeet range impact fan based on comments from the NJDEP. Figure 5 will be revised in the RIWP with these new locations.

Comment 7: Section 4.1.1, Screening Level HHRA, Page 10: *Minor comment:* The last sentence of the first paragraph states, “The second step involves the development of a baseline RA (Section 3.4.1.2).” This sentence incorrectly references Section 4.4.1.2, Baseline HHRA, and should be revised.

Response 7: The sentence will be revised to reference the correct section.

Comment 8: Section 4.1.2, Baseline HHRA, Page 12: The HHRA protocol does not clarify why incidental ingestion of groundwater and dermal contact with groundwater are not evaluated for on-site current and future construction workers. Clarify in Section 4.1.2 if the depth to groundwater is greater than 10 feet bgs or the maximum depth that construction workers are anticipated to encounter. If groundwater occurs at depths less than 10 feet bgs at the former skeet range, incidental ingestion of groundwater and dermal contact with groundwater should be evaluated for construction workers conducting intrusive activities (e.g., excavation).

Response 8: The depth to groundwater is not greater than 10 feet bgs, as it is typically found from approximately 0 to 2 feet bgs (much of the Site is in a wetland). Incidental ingestion and dermal contact with groundwater is shown as “insignificant” on the conceptual site model (CSM) because construction workers are not expected to incidentally ingest groundwater that would pool at their feet in an excavation trench, and as they are assumed to be wearing heavy work boots, the dermal contact pathway is also expected to be insignificant. Therefore, these pathways were evaluated for the construction worker, and deemed to be toxicologically insignificant. This information will be added to the RIWP.

Comment 9: Section 4.1.2, Baseline HHRA, Page 12: The HHRA protocol indicates that soil exposures for future hypothetical residents will be evaluated using “total” soil from 0 to 10 feet bgs. Generally, this approach is only acceptable for residential receptors if the maximum detected concentrations (MDCs) from 0 to 10 feet bgs are used as the exposure point concentrations (EPCs) to estimate risk and hazard. Otherwise, for example, an EPC predicated on the 95% upper confidence level (UCL) could be biased low if most of the soil contamination is limited to surface soil. Revise the HHRA protocol to either evaluate soil exposure to future hypothetical residents on the basis of two discrete EPCs (i.e., surface soil only either from 0 to 6 inches bgs *or* up to 0 to 2 feet bgs; *and* total soil [0-10 feet bgs]) or specify that EPCs will be equivalent to MDCs in “total” soil 0 to 10 feet. If two discrete soil EPCs (i.e., surface soil and total soil) will be used to evaluate soil exposures, ensure that adequate justification is provided for the soil horizon selected to evaluate surface soil exposures (e.g., either 0 to 6 inches bgs or up to 2 feet bgs, depending on the distribution of contamination in surface soil and future hypothetical residential exposure).

Response 9: The HHRA protocol will be revised to state that risks and hazards for future hypothetical residents (and routine workers) will be quantified using surface soil EPCs, defined as 0 – 0.5 feet bgs, as well as a semi-quantitative evaluation in the Uncertainty Section for 0 – 10 feet bgs soil EPC exposure. This approach is recommended because the COPCs at the skeet range are expected to have higher concentration in surface soil, not subsurface soil, due to the source characteristics (skeet shooting, and the expected low mobility of these COPCs to migrate to deeper soil horizons). However, as recommended in the Comment, an additional evaluation will be performed to assess EPCs in total soil (0-10 feet bgs), in case some COPCs do have higher concentrations in subsoil. Therefore, in the Uncertainty Section of the HHRA, COPC EPCs in 0-0.5 feet bgs soil and in 0-10 feet bgs soil will be compared, and for those (if any) that have higher EPCs in total soil than in surface soil, cancer risks and non-cancer hazards will be estimated by scaling the surface soil HHRA results. For example, if the surface soil benzo(a)pyrene EPC and cancer risk for the future adult resident are 1.0 mg/kg and 3E-7, respectively, and the total soil EPC is 3 mg/kg, then the estimated future adult resident cancer risk for exposure to benzo(a)pyrene in total soil would be estimated to be 9E-7 (3 mg/kg/1 mg/kg x 3E-7).

The 0-0.5 feet bgs horizon is recommended for surface soil (and not 0-2 feet bgs) due to the fact that the surface soil sample collection interval is proposed to be 0-0.5 feet and as no VOCs are being analyzed, concentration bias on the low end due to decreases in concentration over time in the 0-0.5 feet horizon, compared with concentrations in 0.5 to 2.0 feet bgs, is not expected.

It should also be noted that if some historical soil samples were collected from a depth of 0 to 2.0 feet bgs, these will be treated as surface soil, for purposes of EPC calculations.

Comment 10: Section 4.1.2, Baseline HHRA, Page 12: This section discusses the evaluation of offgassing of volatile organic compounds (VOCs) from groundwater into a trench. On page 13, the text states, “Complete pathways involving intermedia transfers between soil or groundwater and air will be quantified for the baseline HHRA, as volatile groundwater COPCs [chemicals of potential concern] are expected to be identified during the screening process.” However, according to Section 3.0, Remedial Investigation Sampling Procedures, soil and groundwater samples collected at the site will not be analyzed for VOCs, but rather, samples will be analyzed for munitions metals (including lead) and PAHs. Also, based on a review of the *Former Skeet Range Investigation Data Report*, dated August 2010, historical samples collected from the site do not appear to have undergone VOC analysis. Therefore, it appears that portions of Section 4.1.2 may not be pertinent to the former skeet range. Revise Section 4.1.2 to resolve any discrepancies and clarify in the HHRA protocol if VOCs are anticipated COPCs at the site. If so, soil and/or groundwater samples should be analyzed for VOCs.

Further, page 13 and the conceptual site model suggest that vapor intrusion (VI) may be an applicable exposure pathway. If VI is an applicable exposure pathway, revise Section 4.1.2 to clarify how this exposure pathway will be evaluated. Revise the HHRA protocol to clarify the approach, given that VOCs are not included in the target analyte list (though it is acknowledged that a few semi-volatile organic compounds [SVOCs] are sufficiently volatile to contribute to VI) and no buildings are located on-site. Also, note that EPA’s preferred approach involves screening groundwater detections against criteria established in Table 2c of EPA’s *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathways from Groundwater and Soils* (November 2002). Occupied buildings located within 100 feet vertically or laterally of groundwater exhibiting contaminant detections above VI screening criteria should then be closely evaluated, ideally with the collection of co-located sub-slab soil gas and indoor air sampling to determine building-specific constituent-specific VI potential. Revise the HHRA protocol to describe how VI will be evaluated in the HHRA.

Response 10: As no VOCs are being analyzed in the collected samples, discussions related to offgassing of VOCs from groundwater into a trench, and vapor intrusion into indoor air, will be deleted from the RIWP.

Although it is acknowledged that a few SVOCs are sufficiently volatile to potentially contribute to VI and offgassing (i.e., naphthalene), as no buildings are located on Site and none are expected in the future (as the Site is located within a wetland), quantification of these exposure pathways are not expected to be toxicologically significant, especially compared with other pathways that will be quantified.

**Response to EPA- Biological Technical Assessment Group Comments
on the
Former Skeet Range
Remedial Investigation Work Plan, October 2010
Picatinny Arsenal, New Jersey**

Comments dated: 20 December 2010

Comment 1a: Further information is needed to evaluate whether the proposed sample numbers and locations are adequate to address the nature and extent of contamination. The justification for the proposed work plan should be discussed in the text. The rationales for selecting sampling locations, sample depths (for subsurface soil samples), analyses being performed at each location, and the total number of samples being proposed should be presented. It is difficult to evaluate the proposed sampling locations in the context of previous data, because the relevant information is not clearly presented in the figures. For example, the proposed sampling locations presented in Figure 5 do not indicate which samples will be analyzed for lead, PAHs, and munitions metals. Figure 5 should include the locations of previous subsurface soil samples along with previous or proposed subsurface sediment sampling locations. It may be useful to include three figures which illustrate previous and proposed sampling locations for lead in surface soil, previous and proposed sampling locations for PAHs and munitions metals in surface soil, and previous and proposed sampling locations for subsurface soils indicating the analyses being performed for each sample. Previous and proposed sampling locations for surface water, surface sediment, and subsurface sediment, coded to depict sample medium and depth, could be combined in one figure. Of primary importance is clearly depicting the locations of all samples intended to delineate a specific parameter (for example, lead contamination in the horizontal landscape).

Response 1a: An additional table will be created which will list the sample number, the sample depth, the analytes, and the rationale for each sample location. Figure 5 already includes the locations of previous subsurface soil samples along with previous or proposed subsurface sediment sampling locations.

Comment 1b: Although it is difficult to make an accurate assessment of whether the number and location of proposed samples will adequately delineate the nature and extent of contamination, it appears that there may be insufficient numbers of samples being proposed for at least some contaminants and media. Potential issues include:

There are fairly large areas within and around the Range that have not been sampled, and which will not be sampled for the RI (previous and proposed sampling locations for PAHs are more infrequent). Only three additional surface soil samples will be taken near the western edge of the maximum shot fall zone, and none will be taken northwest of the impact fan. In addition, there is considerable distance (300 feet or more) between previous and proposed sampling locations to the northeast of the impact fan.

Response 1b: One objective of the RI is to characterize the nature of contamination at the former skeet range in order to quantify the risks and hazards at the site. Based on these risks and hazards, a RA (e.g., removal action) will be planned. In regard to additional delineation samples to the north and west of the impact fan, five additional surface soil samples (B1181SS-54 through B1181SS-58) will be added to the north and west of the aforementioned samples for purposes of delineation of PAH impacts (see attached Figure 5). In regard to additional sampling locations to the northeast of the impact fan, additional sampling locations (B1181SS-59 through B1181SS-61) will be added between some of the locations already proposed, based on comments received from the NJDEP. Additional delineation sampling, if necessary, will be conducted as part of the RA.

Comment 1c: The proposed sampling locations for delineating PAHs in surface soils are grouped primarily along the northern and western portions of the impact fan. Therefore, data gaps may remain regarding the concentrations of PAHs to the northeast and east of the impact fan.

Response 1c: The number of samples to the northeast and east of the skeet range impact fan was limited due to safety concerns (ponded water, iced over water, phragmites) and current land use. If land use changes in the future (e.g., if condominiums are built within the swamp), additional sampling will be required as a condition of the existing land use controls (LUCs). No changes will be made to the RIWP.

Comment 1d: Proposed sampling locations for delineating lead in surface soils are primarily located to the north and east of the impact fan. Thus, data gaps may remain regarding the concentrations of lead to the northwest and west of the impact fan.

Response 1d: Additional delineation surface soil samples (B1181SS-54 through B1181SS-58) will be added to the west and northwest of the impact fan and analyzed for PAHs and Munitions Metals (including lead).

Comment 1e: The habitat within the Range has not been described in sufficient detail to determine whether there will be enough sediment and surface water samples to adequately evaluate the nature and extent of contamination in these media. In addition, no surface water or sediment samples are proposed to be taken from Green Pond Brook, which runs through the western portion of the maximum shot fall zone. Based on the information provided, only four sediment and surface water samples are proposed. Therefore, additional information regarding the extent of these habitats at the Range may assist in the determination of whether the number and placement of proposed samples is satisfactory.

Response 1e: Shaw performed a site visit with the NJDEP, USEPA and United States Fish and Wildlife Service (USFWS) representatives in November 2005 to observe the areas within and around the former skeet range, including potential habitats. The Army is willing to conduct another site visit with USEPA personnel in order to better understand the existing habitats, potential ecological receptors and proposed sample locations to determine if additional samples are necessary. Photographs of the site will be provided in the Draft Final RIWP to show the different habitats at the site. Potential impacts to Green Pond Brook (GPB)

were evaluated in an RI (Dames and Moore, 1998), FS (IT, 2001), and ROD (Shaw, 2004). No additional characterization of GPB will be performed.

Comment 1f: The RIWP indicates that only one subsurface sediment sample will be collected. There do not appear to be any existing data regarding contaminant concentrations in subsurface sediment. Thus, the single proposed subsurface sediment sample seems insufficient for determining the nature and extent of vertical contamination in sediments.

Response 1f: The subsurface sediment sample will be changed to sample location B1181SD-3 where the highest concentration of lead was detected in sediment. The sediment sample originally proposed at B1181SD-7 will remain for additional delineation in surface sediment only. Potential biological impacts are typically limited to 2.0 feet bgs in sediment; therefore additional delineation is not needed.

Comment 2: It may be useful to include a summary table of data sampling events, the number and types of samples from each medium, and the parameters analyzed. Analytical results from previous investigations presented in a summary table or appendix may also be helpful.

Response 2: A summary table will be added which lists each sampling event, the number and type of samples from each media and the parameters analyzed historically. However, full analytical results from previous investigations have been presented in the referenced reports and will not be reproduced for the RIWP.

Comment 3: The levels of concern (LOCs) form the basis of discussions regarding the significance of various levels of contamination measured at the Range. However, the method of derivation or source(s) of the LOCs is not provided. Justification for the selection or use of LOCs should be discussed. In addition, the RIWP should include a table that presents the contaminants of potential concern at the Range and their respective LOCs for each medium.

Response 3: An explanation of the source of the LOCs will be added to the text and also referenced within the revised RIWP. The 2010 Skeet Range Data Report already provides a table which presents the COCs and their respective LOCs for each medium.

Comment 4: It is not clear that the proposed analytical regime is appropriate to evaluate ecological risks from contaminants at the Range. A limited subset of contaminants (lead, PAHs, and “munitions metals” including arsenic, antimony, copper, zinc, and iron) is being analyzed, and not all contaminants are being analyzed in all samples. There may be risk from other contaminants at the Range. For example, Sample 180SS-15A exceeded LOCs for cadmium, mercury, and nickel, which are not considered “munitions metals.” Given that the Range includes marshy and wetland habitats, the potential for mercury to become methylated and present risk to the aquatic food chain is of particular concern. In addition, according to the discussion of historical investigations of Site 180 (Section 2.2.1), rusted drums and other debris were found in the vicinity of the Range; migration of contaminants from those drums may not be revealed since analyses are only being performed for munitions metals and PAHs. Therefore, further justification for the proposed analytical regime should be provided.

Response 4: The purpose of this investigation is to characterize impacts from the operation of **the former skeet range**. COCs associated with small arms ranges have been well documented (see **Response to EPA Specific Comment 2**). Other areas of concern identified above by the commenter are associated with other CERCLA sites at Picatinny (i.e., Site 180) which have been addressed under other investigations. No changes will be made to the RIWP.

Comment 5: While a conceptual site model (CSM) for ecological risk is presented in the document, the discussion of the proposed screening level ecological risk assessment (SLERA) does not address potential ecological receptors, exposure pathways, or transport mechanisms. Because the data being collected as part of the RI Work Plan will be used to develop the SLERA, it is essential that it will be appropriate to assess the proposed ecological receptors and exposure pathways. The potential receptors and exposure media should be discussed in the document so that a proper evaluation of the adequacy of the proposed data collection activities can be performed.

Response 5: The RIWP will be revised to state that the SLERA will quantitatively evaluate the following ecological receptors: plants, terrestrial and aquatic invertebrates, American woodcock, Bobwhite quail, short-tailed shrew, vole, marsh wren, and raccoon. These six wildlife receptors include three mammals and three birds, have relatively small home ranges so are expected to have a greater potential for impact than wildlife with much larger home ranges, include carnivores, omnivores, and herbivores, and three of the six wildlife species are included as assessment receptors in USEPA's Soil Screening Level (SSL) Guidance, such as the Eco SSL for Lead (USEPA, 2005). The exposure pathways to be quantified will be incidental ingestion of soil and/or sediment, and ingestion of surface water and food items that are modeled to bioaccumulate COPECs in food, such as plants, terrestrial invertebrates, small mammals or birds, and/or benthic invertebrates. As the surface water at the Site consists of small drainage ditches that are stagnant and highly turbid, fish are not expected and therefore no piscivores are included as wildlife receptors. The raccoon and marsh wren are specifically included to serve as aquatic receptors potentially exposed to COPECs in sediment and sediment-related food items. The other four wildlife receptors (woodcock, quail, shrew, and vole) will be considered primarily as terrestrial species potentially exposed to soil. Hazard quotients estimated for the six wildlife receptors, if found to be elevated above 1, will be evaluated in more detail, examining such factors as hazard drivers and pathways of most concern, toxicity reference values, and the potential density of wildlife receptors expected at the site and whether or not viable breeding populations are likely to be present.

For surface water, sediment, and soil direct contact toxicity exposure, measured COPEC concentrations will be compared with readily-available plant, soil invertebrate, benthic invertebrate and aquatic biota toxicity benchmarks, such as water quality criteria for the protection of aquatic life, sediment screening benchmarks, and plant and terrestrial invertebrate toxicity benchmarks. Additional lines of evidence, such as visual signs of vegetative stress and other site-specific information, will also be used in the direct contact assessment. If any benchmark exceedances are noted, the technical basis of the benchmarks will be investigated to determine whether or not they are appropriate for Picatinny.

Comment 6: There is very little discussion of data quality objectives (DQOs) and quality assurance/quality control (QA/QC) measures for the proposed sampling, beyond listing the analytical methods and the number of duplicate and blank samples. A thorough presentation of the sampling and analytical requirements and quality control measures must be developed prior to sampling, via a field sampling plan (FSP) and quality assurance project plan (QAPP).

Response 6: In the 1990s, ICF Kaiser, a legacy company of Shaw, developed a Picatinny Arsenal facility-wide WP, FSP, QAPP, and HASP to support our field operations at the base. The facility-wide plans were created to reduce the costs of having to develop and reproduce the documents for each field assignment. The plans were developed based on existing guidance at that time. Since that time, the plans have been revised/updated to meet project-specific requirements and match current regulatory guidance (e.g., NJDEP Field Sampling Procedures Manual and the New Jersey Technical Requirements for Site Remediation). The majority of the information requested such as documentation, decontamination, sample shipping, and packaging are included in the facility-wide FSP which is referenced in the skeet range RIWP. Project organization is discussed in the facility-wide WP.

Shaw will add a section with the problem statement and the DQOs to satisfy RI/FS requirements. For the remaining information requested, this information can be found in the aforementioned documentation.

SPECIFIC COMMENTS

Comment 1: Section 1.0, *Introduction*: One of the stated objectives of the Work Plan is to perform groundwater monitoring to ensure that elevated concentrations of lead and/or PAHs do not leach into surrounding water bodies or the underlying aquifer. Additional information should be included in the document regarding groundwater flow patterns and groundwater/surface water connectivity, including the presence of seeps or the degree of infiltration into wetlands, to better assess the likelihood that contaminants in groundwater will impact other media.

Response 1: A groundwater contour map will be added to the revised RIWP to indicate groundwater flow direction. The former skeet range is located within a wetland/marshy area and the groundwater and surface water are interconnected.

Comment 2: Section 2.1.1, *Historical Site 180 Investigation Results*: Section 2.1.3, *Historical Skeet Range Investigation Results*, states that sampling was performed within the Range during Site 180 investigations in 2002. However, Section 2.1.1 does not mention 2002 sampling efforts at Site 180. This discrepancy should be corrected.

Response 2: A brief description of the 2002 Site 180 investigation will be added to Section 2.1.1. However, since this RIWP is for characterization of contamination at the former skeet range, evaluation of the results will be focused on the two samples collected at the range, as presented in Section 2.1.3.1.

Comment 3: 7th paragraph: This paragraph states that samples taken in 2005 and 2006 were compared to sediment LOCs. However, the summary of sampling performed at the Site does not present any information regarding sampling during this time frame. If these were taken as part of the 2007 and 2008 investigation, it should be made clear that this investigation includes sampling events from 2005 and 2006. If these samples were taken as part of a different investigation, this information should not be presented in the discussion of the 2007 and 2008 investigation.

Response 3: This paragraph discusses lead and percent solids results from the 2007 and 2008 investigation. The text uses a comparison of skeet range sample results from 2005 and 2006 regarding percent solids and what this means regarding the 2007 and 2008 results in order to determine the most appropriate lead standard (i.e., soil or sediment). No changes will be made to the RIWP.

Comment 4: Section 2.1.3.3 - *June 2010 Investigation, Groundwater Sampling Results* – 1st paragraph: The text states that six groundwater samples were taken for this investigation, but only five locations are listed (B1181MW-1, B1181MW-2, C-1A, C-1B, and DM19-3). This discrepancy should be clarified.

Response 4: There was a duplicate sample collected; therefore, six samples were collected from five locations during the 2010 investigation. The text of the RIWP will be changed to state that the six samples collected included a duplicate sample.

Comment 5: 2nd paragraph: The text states that arsenic is a known groundwater contaminant in the area and is likely present as a result of historic landfilling operations or contamination from other sites, rather than as a result of the operation of the former Skeet Range. However, according to Section 3.0, arsenic is used in the production and manufacturing of small arms range ammunition, and is considered a “munitions metal.” Therefore, it may be possible that elevated arsenic concentrations are the result Site-related activities.

Response 5: Extensive groundwater investigations have been performed within the Area C Groundwater operable unit (PICA Site 206) over the past 10 years (Shaw, 2009). While it will be acknowledged in the RIWP that arsenic contamination could be related to skeet range ammunition, groundwater results collected area-wide suggest the source is historic landfilling operations. It should be noted that USEPA approved the RA work plan for PICA 206, which is long-term groundwater monitoring including one well within the skeet range impact fan.

Comment 6: Section 2.1.3.3 - *June 2010 Investigation, Soil/Sediment Sampling Results*: With the exception of two samples collected along drainage channels and identified in this section as sediment samples, it is not clear what LOCs (soil, sediment, or both) were used to evaluate samples identified as “soil/sediment samples.” Clarification should be provided.

Response 6: This was clarified more thoroughly in the 2010 skeet range data report. Additional clarification will be added to the RIWP text stating that some were evaluated as sediment and some as soil, dependent upon percent solids.

Comment 7: Section 3.2 – *Soil Sampling*: The justification for the location and depth of the subsurface soil sample being analyzed for PAHs should be presented, particularly because this is the only subsurface sample being analyzed for PAHs and it is expected to reveal the vertical extent of contamination.

Response 7: The location of the subsurface sample to be analyzed for PAHs (B1181SS-35) was selected because it was the most obvious PAH location impacted by skeet range activities (large accumulation of clay targets observed). An additional subsurface soil sample will be collected at location B1181SS-23 for PAH analysis, because it contained the highest PAH concentrations. However, the source of the PAHs at this location is believed to be the nearby asphalt road, as noted in the 2010 Data Report (Shaw, 2010). Other PAH exceedances identified in the western portion of the site may be attributable to the stockpiling of telephone poles at Site 19 (Shaw, 2010). The rationale for the subsurface sampling depth of 2.0 to 2.5 feet bgs is that PAHs tend to adhere to soil particles and not migrate vertically. If additional vertical delineation is necessary, it will be performed as part of the RA.

Comment 8: Section 3.3 - *Surface Water and Sediment Monitoring*: The text states that one sediment sample (B1181SD-7C), “will be collected from a depth of 2.0-2.5 feet bgs for the purpose of vertical delineation in an area of known sediment impacts.” However, according to Figure 5, which shows the previous and proposed sediment sampling locations, there has only been one sediment sample collected along this water feature, at a distance approximately 150 feet from the proposed sampling location. Therefore, it does not appear that sufficient data exist to conclude that this proposed location is within an area of known sediment impacts. This section should also indicate whether proposed surface water and sediment samples will be collocated.

Response 8: The proposed subsurface sediment sample will be changed to sample location B1181SD-3 where the highest concentration of lead was detected in sediment. The sediment sample originally proposed at B1181SD-7 will remain for additional characterization and delineation of surface sediment impacts. Some of these additional sediment sample locations will be collocated with the proposed surface water samples, while some locations will be sediment samples only. This will be clarified in the revised RIWP.

Comment 9: Section 4.2.2 – *Baseline Ecological Risk Assessment*: The text states that a Baseline Ecological Risk Assessment (BERA) will only be performed if it is determined that “ample habitat exists wherein ecological receptors can occur...” Use of the word “ample” is misleading. For an ecological risk assessment to be warranted, habitat at the Range only has to be of sufficient size and quality to support ecological receptors.

Response 9: The RIWP will be revised to state that that a BERA will only be considered if SLERA results suggest unacceptable ecological hazards, and it is determined that habitat at the Range is of sufficient size and quality to support viable populations of ecological receptors important to stakeholders. The potential for viable populations will be assessed using information on wildlife density and the size of the site (including habitat considerations), in order to estimate whether or not a sufficient number of breeding pairs (e.g., five) are expected to be present.

Comment 10: Table 1 – Sampling and Analysis Numbers: The analytical parameter/method listed for the 20 soil samples is indicated as munitions metals, lead, and PAHs. However, only a subset (7, 19, and 8 samples for each category, respectively) will be analyzed for each parameter. While mentioned in a footnote, it would be more transparent if the table listed the number of samples in each medium that will be analyzed for each parameter.

Response 10: See **Response to EPA Specific Comment 5**.

Comment 11: Figure 2 – *Historical Lead Concentrations in Surface Soil*: The thresholds used to identify different levels of contamination (<800 milligrams per kilogram [mg/kg], 800-8000 mg/kg, and 8000-80,000 mg/kg, and >80,000 mg/kg) have no relationship to the LOC, which is 600 mg/kg. The green color gives the impression that contaminant concentrations in samples represented by a green square are lower than the LOC. It would make more sense to use a value of <600 mg/kg as the lowest threshold, which would then indicate where measured concentrations of lead were below the LOC.

Response 11: The LOC, which is the New Jersey Non-Residential Direct Contact Soil Remediation Standard, is 800 mg/kg. Thus, the green squares do represent lead concentrations that are lower than the LOC. The source of the LOC will be added to the text and referenced in the revised RIWP.

Comment 12: Figures 3 and 4 – *2010 PAH Sampling and Analysis Area* and *2010 Lead Sampling and Analysis Area*: The meaning of the green lines on these figures should be indicated in the legends.

Response 12: The green lines on these figures are sample transects established in the field in order to collect samples at discrete intervals from the firing location. The green lines will be denoted as sample transects in the legend of Figures 3 and 4.

Comment 13: Figure 7 - *SLERA Conceptual Site Model*: The CSM for the SLERA does not include all potentially exposed ecological receptors. For example, virtually all mammal and avian receptors may be exposed to contaminants in surface water through ingestion. Further, amphibians, which are aquatic or semi-aquatic, are likely to be exposed to contaminants in surface water, sediment, and groundwater (through seeps and wetlands), but the CSM shows these exposure routes to be incomplete. Several mammalian and avian receptors may also be exposed to contaminated sediment by incidental ingestion (e.g., raccoons or sediment-probing birds such as herons or plovers feeding on benthic macroinvertebrates) or via dietary transfer through the aquatic food chain (e.g., fish, piscivorous birds and mammals; benthic-invertebrate feeding birds and mammals). These potential exposure routes should be included in the CSM and discussed in the text.

Response 13: The SLERA CSM will be revised to include the surface water ingestion pathway. Although amphibians may be exposed to COPECs in surface water and sediment, there are few surface water screening values for protection of these biota, and no readily-

available sediment screening values. The CSM will be revised to show that exposure of amphibians to COPECs in these media is a potentially complete exposure pathway, however, quantification of exposure and effects will only be performed for those chemicals that have readily-available toxicity reference values and/or surface water/sediment benchmarks specific to amphibians.

Although COPECs in groundwater may be discharging to surface seeps, measured concentrations in surface water and sediment will be used in the SLERA, and not measured concentrations in groundwater. There are no complete exposure pathways for ecological receptors to contact COPECs in groundwater, based on the groundwater monitoring program proposed for the Site.

The CSM will also be revised to reflect information to be added to the RIWP relative to the recommended ecological receptors (see **Response to BTAG General Comment 5**).