RESPONSE TO COMMENTS ON
DRAFT FINAL RI REPORT
BAINS GAP ROAD RANGES

RESPONSE TO COMMENTS

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Response to ADEM Comments on the
Draft-Final Remedial Investigation Report for the Bains Gap Road Ranges,
Range 24 Upper, Parcel 80Q, Range 21, Parcel 77Q, Range 22, Parcel 78Q, Former Mortar Range, Parcel 109Q, Range 27, Parcel 85Q
Fort McClellan, Alabama

Comments from Stephen A. Cobb, Chief – Governmental Hazardous Waste Branch, Land Division, received via e-mail on January 27, 2009.

The Alabama Department of Environmental Management (ADEM or the Department) has reviewed the Army's Responses to ADEM Evaluations on the Draft Remedial Investigation (RI) Report: Bains Gap Road Ranges, Range 24, Parcel 80Q; Range 21, Parcel 77Q; Range 22, Parcel 78Q and Former Mortar Range, Parcel 109Q; Range 27, Parcel 85Q. The following comments are not included because they have been resolved in Comment-Response evaluations:

General Comments: 1, 3, 10, 12, and 13
Specific Comments: 2, 5, 10, 18, 35, 36, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 59, 60, 61 62, 63, 64, 65, 68 73, 74, 75, 77, 81, 82, 84, 85, 86, 88, 89, 91, 93, 94, 100, 102, 103, 105, 107, 110, and 125.

ADEM evaluations are attached for your review and response.

[**Editor's note:** the following comments and responses have been preserved to document the chronological sequence of events. As such, they include ADEM's original comments on the draft RI report and subsequent evaluations of Army responses, as well as the Army's initial and final responses.]

Specific Comments

Comment 41: **Page 4-2, Section 4.1.1. Considering that EPA's current lead concentration in soil that represents a level below which the 95 percentile fetal blood lead concentration would not exceed 10 pg/dL for adult worker exposure is 780 mg/kg, please provide clarification on the differences between the industrial site specific screening levels (SSSL) of 880 mg/kg which is referenced in the Human Health and Ecological Screening Values and polynuclear aromatic hydrocarbon (PAH) Background Summary Report as EPA's default value and EPA's current published value. Also please clarify in the text how the recreational SSSL for lead, which is based on a youth, is protective of a child who may be recreating at a site with lead contamination.**

Response 41: This comment addresses two separate issues. The first issue concerns the basis of the SSSL for lead in industrial soil. The basis for the reviewer's statement that the current EPA acceptable lead concentration in soil for the adult worker is 780 mg/kg is unclear. The current EPA (2004) Region 9 PRG for industrial soil

is 800 mg/kg attributed to a recent analysis of NHANES III. The industrial soil PRG in the EPA (2002) PRG list was 750 mg/kg, attributed to the EPA adult blood lead model. The information provided by EPA in 2002 and 2004 is insufficient to permit further explanation of these computations. The SSSL for lead in industrial soil of 880 mg/kg is read directly from the graph in Figure 1 of the description of the adult blood lead model relating fetal blood lead concentration to the concentration of lead in soil for a heterogeneous population (EPA, 1996). From a practical perspective, there is no significant difference among these three values.

The second issue requests clarification how the SSSL for lead in recreational soil, based on a youth, is protective of a young child recreating on the site. Line 13 of page 4-2 of the RI report mentions the recreational site-use SSSL of 7,600 mg/kg for lead in soil. In fact, the SSSL, which is used only as a screening value, is 400 mg/kg. The value of 7,600 mg/kg is the cleanup level for lead in soil for recreational site use (please see Appendix J of the RI report).

As noted in the Installation-Wide Work Plan, no attempt was made to develop SSSLs for every plausible receptor; rather, site-use was categorized within a limited number of generalizations; e.g., residential, commercial/industrial or recreational, and SSSLs were computed for the most highly exposed receptor in each generalized site-use category. For example, the resident was the only receptor considered under residential site use, the groundskeeper was the only receptor considered under commercial/industrial site use, and the recreational site user (a youth living nearby) was the only receptor considered under recreational site use. This approach does not mean that no other receptors are plausible. For example, grandchildren may visit a residential site and stay for the summer. Several kinds of workers (other than the groundskeeper), customers and delivery personnel would visit commercial/industrial sites. And adults and children (as well as a youth) might visit a recreational site. Nonetheless, the single receptors chosen for evaluation for each of these scenarios (resident, groundskeeper and youthful recreational site user, respectively) were judged and approved to represent the upper bound on exposure, generally because their exposure frequency is expected to be greater than that for other potential receptors. An SSSL that is sufficiently protective for the most highly exposed individual is also protective for less highly exposed individuals.

References:

U.S. Environmental Protection Agency (EPA), 2004, ***Region 9 PRG Table***, San Francisco, California, October.

U.S. Environmental Protection Agency (EPA), 2002, ***Region 9 PRGs Table***, San Francisco, California, October.

U.S. Environmental Protection Agency (EPA), 1996, ***Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil***, Technical Review Workgroup for Lead, December.

ADEM Evaluation: Response is adequate and comment is resolved.

Response to Evaluation: As agreed during the October 2007 meeting with ADEM, the SSSL for lead in industrial soil will be revised to 800 mg/kg.

Also as agreed during the October 2007 meeting with ADEM, a young child recreational site user is included as a new receptor. The assumptions and equations for developing the SSSLs for this receptor, as well as cleanup levels for lead, are documented in Appendix J.

ADEM Evaluation: *On December 11-12, 2008, the Army hosted a meeting with ADEM, USEPA, U.S. Fish and Wildlife Services and their respective contractors. During that meeting, ADEM suggested a cleanup level of 2,144 mg/kg for a young child recreational site user (0-6 years old) was appropriate for a lead cleanup level, whereas the Army developed a cleanup level of 8,623 mg/kg for this potential receptor. It was noted that neither of these values would actually be used as cleanup levels since ecological risk-based remedial goals will be much lower and will drive the cleanup. Therefore, the comment is resolved.*

Final Response: During the aforementioned meeting, the question was then raised whether the young child recreational site user scenario was required at all since the youth recreational site user (7-17 years old) was determined by the BCT years ago to be the upper bound on risk for recreational exposures. The group agreed that the young child recreational site user scenario could be excluded from the document provided that the risk assessment was revised to state that the youth recreational site user (7-17 years old) was the upper bound on risk and, as such, any conclusions reached regarding the youth recreational site user would also be applicable to the young child. Young child exposures are assessed under the more conservative residential scenario.

Comment 84: **<u>Page 5-2 and 5-3, Section 5.1.1</u>. Please revise the section on methodology. Even though the text states that the EPA default dilution-attenuation factor (DAF) of 20 was used, methodology is presented for calculating a DAF. EPA selected a DAF of 20 based on the results of two different approaches as being protective of 0.5-acre sites. The exposure units evaluated are greater than 0.5 acres, therefore site-specific DAFs should be calculated for each hydrogeologic setting. A DAF of 1 was not derived using the EPA**

default values presented in this section, however; a DAF of 1 simply indicates that no dilution or attenuation is assumed. The use of a DAF of 20 is unlikely to be protective in areas where groundwater is present at shallow depths. Please calculate for each area using site-specific data to determine an appropriate DAF for each range or for areas within each with similar hydrogeology.

Response 84: Disagree. The use of the EPA default dilution attenuation factor (DAF) of 20 is an accepted methodology and is considered an appropriate risk screening basis for fate and transport consideration for the BGR Ranges remedial investigation. EPA selected the DAF 20 basis using a "weight of evidence" approach after considering results applied to over 300 groundwater sites. They conclude that the default values are conservative and likely to be protective for the majority of sites and conditions. A sensitivity analysis to the affect of a change in source area conducted by EPA (Appendix A, EPA, 1996) suggested that SSLs are "not particularly sensitive" to decreasing source area from 30 acres to 0.5 acres. If adsorption or degradation processes are expected to significantly attenuate contaminant concentrations at a site (e.g., for sites with deep water tables or soil conditions that attenuate contaminants), the option exists of using more sophisticated fate and transport models. Calculations for each area using additional assumptive data and or modeling to determine site-specific DAFs for each range is not considered appropriate for the BGR Ranges.

Reference:

U.S. Environmental Protection Agency (EPA), 1996, ***Soil-Screening Guidance, Technical Background Document***, EPA/540/R-95/128, May.

ADEM Evaluation: Response is adequate and comment is resolved.

ADEM Evaluation: *The contents of Chapter 5.0 would be simplified per the discussion held during the October 11-12, 2007 meeting for Iron Mountain Road/Bains Gap Road (IMR/BGR) Ranges. ADEM notes that site-specific groundwater data would be used to evaluate contaminant fate and transport. Please address.*

Final Response: Notes taken by Shaw during the above mentioned meeting indicate it was agreed that use of DAF_{20} SSLs was accepted as an appropriate risk screening basis for fate and transport consideration for the BGR RI. However, it was agreed that the text in Section 5.1.1 on derivation of DAF_{20} SSLs would be pared down or deleted. In an effort to better accommodate the use of site-specific data, partition coefficient (K_d) values where available for low pH soils (4.9) will be used in the calculations to evaluate contaminant fate and transport. The text and tables will be revised to reflect these changes.

Comment 87: **<u>Page 5-8, Section 5.2.2</u>. The use of a DAF soil screening level (SSL) is not the most effective way for screening sediments. Chemicals eliminated based on such a comparison should be evaluated in the risk assessment. The lead SSL is based on ingestion exposure and is not the best use as a DAF SSL. If lead was eliminated in soil for its potential to impact groundwater or in sediment based on a comparison to 400 mg/kg, it should be included as a COPC for the risk assessment. This comment applies to Section 5.2.2 in its entirety. Please address.**

Response 87: It is stated in the last paragraph of Section 5.1 on page 5-2 that "Threats to human or ecological receptors due to direct contact or ingestion are discussed in Chapters 6.0 and 7.0, and are not considered in this chapter."

ADEM Evaluation: Please further explain how this response addresses the Department's original comment.

Response to Evaluation: See response to Specific Comment 84.

ADEM Evaluation: *ADEM notes that the response to Specific Comment 84 does not address the use of a migration to groundwater SSL as the screening criteria for screening sediments. Also, the response does not address the use of the direct contact SSSLs as the screening criteria for lead for the migration to groundwater pathway. Please address.*

Final Response: It is agreed that the lead SSL of 400 mg/kg is based on an ingestion exposure and is not appropriate as the criterion for screening sediments. DAF_1 and DAF_{20} SSLs for lead have been calculated using EPA guidance (EPA, 1996a) and a partition coefficient (K_d) value of 3,373 L/kg (HSDB, 2009) and are used as the screening criteria for lead for the migration-to-groundwater pathway. The text and tables will be revised to reflect these changes.

Comment 96: **<u>Page 6-6 to 6-7, Section 6.1.1.3</u>. Considering that young children are more susceptible to lead exposure, please clarify in the text how the recreational exposure scenario is protective of young children who may be recreating with their parents. The recreational exposure scenario assumes that the recreational user is a 7- to 16-year old.**

Response 96: Please see response to Specific Comment 41. The main point of that response is that the recreational site user would be the more heavily exposed receptor. This is based on the assumption that the exposure frequency of a youth is expected to

be somewhat greater than that of an adult with adult responsibilities including job, home, and child care.

ADEM Evaluation: Response is adequate and comment is resolved.

Response to Evaluation: As agreed during the October 2007 meeting with ADEM, a young child recreational site user is included as a new receptor. The assumptions and equations for developing the SSSLs for this receptor, as well as cleanup levels for lead, are documented in Appendix J.

ADEM Evaluation: *On December 11-12, 2008, the Army hosted a meeting with ADEM, USEPA, U.S. Fish and Wildlife Services and their respective contractors. During that meeting, ADEM suggested a cleanup level of 2,144 mg/kg for a young child recreational site user (0-6 years old) was appropriate for a lead cleanup level, whereas the Army developed a cleanup level of 8,623 mg/kg for this potential receptor. The Army stated that the youth receptor (7-17 year old) was the more conservative approach for the trespasser scenario than the child receptor due to the potential time/opportunity for exposure. It was noted that neither of these values would actually be used as cleanup levels since ecological risk-based remedial goals will be much lower and will drive the cleanup. Therefore, the comment is resolved.*

Final Response: Please see response to evaluation for Comment 41 above.

Comment 111: **<u>Page 6-23, Section 6.2.1.4</u>. Although numerous samples were collected in soil, the various analyses selected limited the analytical data obtained from any given sample. Hot spots are not considered. Also, numerous modifications were made to the SSSLs to reduce their conservative bias. Please consider evaluating the areas where samples exceed the Tier 1 values for remedial options.**

Response 111: Several issues are mentioned in this comment. Regarding the first issue, limitations regarding the sampling and analysis program are addressed in Section 6.1.6. Regarding the second issue, hot spots are not identified and addressed directly, but the evaluation of exposure units for the construction worker and resident, where these receptors are assumed to be exposed to the maximum detected concentration, accomplishes the same purpose. Regarding the third issue, the SSSLs are conservative screening levels developed for COPC identification. They are not intended to be applied as cleanup levels; however, they can serve as the basis for cleanup level development because they incorporate the toxicity assessment and all the exposure assumptions of the receptors of interest. The fourth issue regarding areas where metals analyses

exceed Tier 1 values is unclear. This seems to imply no confidence in the Tier 2 and Tier 3 levels of the background evaluation, which seems to contradict the position taken in Specific Comment 100. The approved three-tiered background evaluation protocol was applied exactly as described in Section 6.1.2.2.

ADEM Evaluation: Please clarify in this section if maximum detected concentration (MDC) was used as the STC for the construction worker and resident.

Response to Evaluation: The maximum detected concentration (MDC) was not used as the STC for the construction worker and resident to characterize risk. "Evaluating the areas where samples exceed Tier 1 values for remedial options," is a risk management prerogative, not a risk assessment function. However, in response to EPA comments on these RI reports, the estimation of cleanup levels will be replaced by a typical Region 4 Remedial Goal Option (RGO) table, with RGOs developed for cancer risk of 1E-6 (i.e., the SSSL), 1E-5 and 1E-4, and RGOs developed for noncancer HI estimates of 0.1 (i.e., the SSSL), 1 and 3.

ADEM Evaluation: *The SSSL for noncancer compounds should be calculated based on a HI of 1.0 (not 1.49). For accuracy, please revise to the second significant digit for the HI values.*

Final Response: Agreed.

Comment 112: Page 6-25, Section 6.2.1.4. The use of 1.49 as the target HI is not appropriate for calculating SSSLs. For each route of exposure, the site-wide HI must be less than or equal to 1.0. Furthermore, the use of 1.49 is inconsistent with the target HI presented in the SSSL Report of 1.00 E+00. Please revise the risk assessment for all ranges accordingly.

Response 112: A target HI of 1, not 1.49, was used to calculate SSSLs. However, a target HI of 1.49 was used to calculate cleanup levels from the SSSLs because the cumulative HI for a given mechanism of toxicity (with target organ or target tissue as a surrogate for mechanism of toxicity), rounded to one significant figure, would not exceed the threshold of 1. Nonetheless, as requested by the reviewer, a target organ HI of 1 will be used to revise the calculated cleanup levels.

ADEM Evaluation: Response is adequate and comment is resolved. Please revise the text accordingly.

Response to Evaluation: A target HI of 0.1, not 1.49, was used to calculate SSSLs. Please see Response to Evaluation of Specific Comment 111 regarding calculating RGOs instead of cleanup levels.

ADEM Evaluation: *Please see response to Comment 111. The SSSL for noncancer compounds should be calculated based on a HI of 1.0 (not 1.49). For accuracy, please revise to the second significant digit for the HI values.*

Final Response: Agreed.

Comment 114: **<u>Page 6-32, Section 6.2.2.3</u>. ADEM guidance requires that the EU for evaluating construction worker exposure be placed over the area with the highest contaminant concentrations if the location of a future building is not known. Since a welcome center is planned for Range 21, the risk characterization for the construction worker should be revised to only include those data points in the area with the highest contaminant concentrations. Please revise appropriately.**

Response 114: As noted by the reviewer, the actual location of the future building is not known. Also, it is not known how many of the highest concentrations (the two highest? the 10 highest?) to include in the assessment. The approach taken for exposure unit evaluation, however, addresses construction worker exposure regardless of how the exposure units are drawn (i.e., regardless of where the future building is located.) Therefore, the Army believes that risk to the construction worker has been adequately characterized.

ADEM Evaluation: Please clarify in this section if maximum detected concentration (MDC) was used as the STC for the construction worker and resident.

Response to Evaluation: As explained in the Army's presentation on the Streamlined Risk Assessment (during the meeting with ADEM 11-12 October 2007), the MDC was used to identify all COPCs for this receptor. The MDC was not adopted as the STC for either the construction worker of the resident; however, the concentration of each site-related COPC in each sample, including the MDC of each COPC, was compared to the cleanup level for each COPC, thereby identifying each and every sample location where the concentration exceeded the cleanup level for each receptor. This was done for the construction worker and resident because it is well understood that a reasonable EU for these receptors would be far less than the area of a given range, yet data from the entire range (including lesser contaminated areas) was incorporated into the source-term concentration. This approach was taken because the data are insufficient to identify the future

location of the welcome center or other actual future EUs, or even to hypothesize plausible future EUs. The acceptance of this approach was confirmed during the October 2007 meeting.

At the FS stage, however, ambient concentrations can be compared with the RGOs described in response to Specific Comments 111 and 112 to address the EU issue.

ADEM Evaluation: *As discussed in the October 2007 meeting, the identification of the COPCs is a separate step from the development of STCs after the COPCs have been identified. Therefore, the risk assessment for the construction worker should be revised so that the EU represents the area of highest contaminant concentrations. Please address.*

Final Response: The purpose of a risk assessment in an RI report is to provide information to the risk managers to support the development of remedial alternatives and to support the ensuing risk management decisions (EPA, 1991). In a typical baseline risk assessment for the construction worker this is accomplished by the following:

- Identifying COPCs based on the MDC, so that no chemical that could contribute significantly to risk is overlooked.
- Calculating cumulative risk and comparing the cumulative risk estimates with the appropriate trigger levels to determine whether chemical of concern (COC) identification is necessary.
- Identifying the COCs.
- Developing remedial goal options (RGO) for the COCs.

Locating the EU for the construction worker over the area of highest concentration, as requested by the reviewer, is important in a typical baseline risk assessment so that the STCs and the resultant cumulative risk are not understated.

The streamlined risk assessment (SRA) approach adopted and implemented at FTMC since the mid-late 1990s operates somewhat differently to accomplish the same goals, as follows:

- Identifying COPCs for the construction worker in the same manner as in a typical baseline risk assessment.
- Calculating cumulative risk; however this step is unnecessary because cumulative risk estimates are not compared with trigger levels. For this reason the position of the EU and the resulting magnitude of the STC are immaterial.

- COCs are not identified; instead, cleanup levels are developed from the SSSLs for **ALL** the COPCs for the construction worker.
- Contaminant concentrations in each sample are compared with the cleanup levels.

The SRA approach permits identifying all areas where contaminant concentrations exceed cleanup levels regardless of how EUs are located. It is applied to the resident and construction worker, because a reasonable EU for these receptors would be somewhat smaller than the entire area represented by the data set. It is particularly useful when applied to shooting ranges where metals are the predominant contaminants, because the three-tiered background evaluation identifies each sample location where metals are present at concentrations exceeding background.

Reference:

U.S. Environmental Protection Agency (EPA), 1991, "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," Memorandum from DR Clay, Assistant Administrator, to Regional Directors, OSWER Directive 9355.0-30, 22 April.

RESPONSE TO COMMENTS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Response to U.S. Environmental Protection Agency Comments on Ecological Aspects of the Draft-Final Remedial Investigation Report for Bains Gap Road Ranges Fort McClellan, Calhoun County, Alabama

Comments from Doyle T. Brittain, Senior Remedial Project Manager, dated September 30, 2008.

General Comment

Comment 1: **Many of these comments are similar to those on the Draft-final RI report for the Iron Mountain Road (IMR) ranges. The current report was submitted to EPA a month later than the IMR report. In the interest of brevity, the comments from the IMR report will not be repeated here. Preparers, managers, and Army overseers are advised to consult EPA comments on the IMR ranges, which were transmitted in a July 22, 2008, letter from Doyle Brittain to Lisa Holstein.**

Response 1: Comment noted.

Specific Comments

Body of Report

Comment 1: **Section 5.0. Contaminant Fate and Transport. Section 5.0 neglects the discussion of the migration of contaminants in soils to surface water. Migration of contaminants to surface water can occur through surface water runoff, which can transport contaminants in the dissolved form or in the form of contaminants bound to sediment particles. Migration from soil to surface water can also occur through the migration of contaminants in shallow groundwater. EPA has recently published guidance on ground-water/surface-water interaction (USEPA 2008). This comment was motivated by the observation that lead levels in total surface water samples are above the State standard in areas where creeks flow through contaminated soils. Please expand the text of this section to address migration of contaminants to surface water.**

Response 1: Agreed. An expanded discussion of the potential for contaminant migration from soil to surface water and groundwater will be incorporated into Chapter 5, Contaminant Fate and Transport.

Comment 2: **Section 7.3, BERA Uncertainties, Uncertainties in the Lead Particle Ingestion Model, Pages 7-2 through 7-29. The text on Page 7-29 indicated that "although lead shot has been shown to be toxic to avian species, there is no information relating lead bullet fragments to avian toxicity." From the perspective of avian toxicity the distinction between lead shot and lead fragments is toxicologically irrelevant. Both lead fragments and lead shot represent a source of ingestion**

exposure to birds that can result in sickness or death. Researchers of the risks to birds do not draw a distinction between intact projectiles and fragments. For example, the paper by Fisher and others (2006), which reviewed lead toxicity to terrestrial birds from ammunition sources, did not draw a distinction between intact projectiles and lead fragments. Fisher et al. (2006) contained 29 references to scientific articles documenting avian poisonings by bullet fragments. To say that no information has been published relating bullet fragments to avian toxicity is simply untrue. Text of uncertainty section should be modified to remove the false statement.

Response 2: It is agreed that toxicologically, there is no difference between the ingestion of lead shot and lead bullet fragments. The difference between the two forms of lead is in the exposure potential. Fisher, et al. (2006), and all of the papers cited therein, refer to lead shot and bullet fragments that are within hunter-killed animal carcasses and gut piles that were left in the field and subsequently ingested by scavenging birds and animals. This exposure pathway is completely different than the potential exposure of birds to lead bullet fragments due to the ingestion of lead bullet fragments from the soil surface for the purpose of using the lead bullet fragments as grit in their digestive systems. Numerous papers have been published on the effects to birds from ingestion of lead shot as digestive system grit, but no papers have been identified that address the ingestion of lead bullet fragments as grit. The difference between lead shot and lead bullet fragments is in the shape and texture of lead shot (round and smooth) versus the shape and texture of lead bullet fragments (irregular and rough). It is unknown if birds would selectively avoid the ingestion of irregularly shaped, rough lead bullet fragments as digestive grit. Therefore, this exposure pathway remains uncertain.

The first bullet item under "Uncertainties in Lead Particle Ingestion Model:" will be revised to read: "Although avian species are known to ingest lead shot from the soil surface for use as digestive grit, there is limited information regarding either preferential ingestion of lead bullet fragments or avoidance of lead bullet fragments as digestive grit."

Appendix I – Geochemistry Evaluation

Comment 1: **Ratio plots were added per agreement on the draft RI report. No response is needed to address this comment.**

Response 1: Comment noted.

Comment 2: **Barium was detected at a concentration of 4,500 mg/kg in SAIC02-SB-BK-101 with a corresponding manganese concentration in the same sample of 19,000 mg/kg (Page I-3-4). This sample would appear to be an outlier. Please discuss the analytical uncertainty in the ICP-**

AES method (SW6010B) used to analyze for metals in soils, sediments, and waters. This method is prone to low-level false positives. It is especially problematic for metals such as thallium, silver, and selenium that normally occur at low concentrations in environmental media. The analytical method is subject to interference, which means that part of the instrument response spectrum associated with a macro constituent might be reported as a low-level hit of a micro constituent. Please discuss how the analytical uncertainty associated with interference could have affected the results of the geochemistry evaluation. Please review the data validation report for sample SAIC02-SB-BK-101 to determine the degree to which the anomalous results could have been caused by analytical uncertainties versus site-related contamination or naturally occurring background. Please discuss how the fact that the background metals were analyzed using a different analytical method than was used in the investigation of the BGR site will affect the interpretation of the geochemical evaluation with respect to laboratory interference.

Response 2: As explained in detail on page I-3-4 of Appendix I, the maximum background barium concentration (in sample SAIC02-SB-BK-101) is naturally elevated. Given the log-log scales used in the correlation plot of Figure 7, the sample only appears to lie above the trend established by the other samples in the plot. The ratio plot of Figure 8 more clearly reveals that sample SAIC02-SB-BK-101 has a Ba/Mn ratio that is well within the ratio range of the other background samples. In order for the barium to reflect site-related contamination, one would have to have added both barium and manganese to the sample in the same proportion (to maintain the Ba/Mn ratio), and that would be very difficult to do at 7 feet below ground surface, which is the depth from which the sample was collected.

Statistically, the barium and/or manganese concentrations of sample SAIC02-SB-BK-101 might be identified as an outlier during a quantitative outlier test, but EPA guidance (e.g., EPA, 2006) points out that a statistical outlier should be retained in a data set unless there is a good reason to reject the value: "…Discarding an outlier from a data set should be done with extreme caution, particularly for environmental data sets, which often contain legitimate extreme values" (Section 4.4.1, EPA, 2006). EPA recommends further investigation, based on scientific reasoning, to determine if outliers have a natural source or reflect transcription error, instrument malfunction, contamination, etc. The geochemical evaluation in Appendix I indicates that the barium and manganese concentrations of sample SAIC02-SB-BK-101 are natural. Geochemically, there is no reason to suspect that this sample is an outlier in the sense that it does not represent background conditions. Its barium and manganese concentrations are not anomalous or representative of contamination.

As requested, we have reviewed the data validation report, which is provided in the final background study report (SAIC, 1998). The barium and manganese concentrations of sample SAIC02-SB-BK-101 (4,500 mg/kg and 19,000 mg/kg, respectively) are both above their reporting limits and were unqualified during the data validation process. This indicates that there is very low analytical uncertainty associated with these concentrations. The sample was approved for use as part of the background data set and no reason was found to reject it during the background study.

The FTMC background samples and BGR site samples were analyzed using the same EPA SW-846 methods. The concentrations of elements such as barium and manganese would not be affected by any interference associated with analysis of trace elements such as thallium and selenium. Regardless of which ICP method is used, interelement correction factors are applied, which minimizes interelement interferences (cross-contamination between wavelengths).

Generally speaking, analytical uncertainty can affect elemental ratios, causing a higher degree of scatter on correlation plots and greater spread of samples along the x-axis of ratio plots. This happens to varying degrees, depending on the data set, and is most noticeable at the lower end of the concentration ranges, if the evaluated samples contain "J"-qualified concentrations below the reporting limit.

Any interference effects would have been qualified by the laboratory and examined further during the data validation process. During the geochemical evaluation, qualified analytical results are considered and explained, as appropriate. Please note that nondetect and rejected ("R") results are not evaluated during the geochemical evaluation.

References Cited in the Response:

Science Applications International Corporation (SAIC), 1998, Final Background Metals Survey Report, Fort McClellan, Anniston, Alabama, July.

U.S. Environmental Protection Agency (EPA), 2006, Data Quality Assessment: Statistical Methods for Practitioners, EPA QA/G-9S, EPA/240/B-06/003, Office of Environmental Information, February.

Appendix K – Baseline Ecological Risk Assessment

Comment 1: **This appendix did not change, apart from non-technical editorial changes, since the version presented in Appendix J of the Draft-final RI report for IMR ranges. The comments provided on Appendix J of**

the Draft-final RI report for IMR ranges suffice as review for the June 2008 Appendix K of the Draft-final RI for BRG ranges.

Response 1: Comment noted.

References

Fisher, I.J.; Pain, D.J.; and V.G. Thomas, 2006, A review of lead poisoning from ammunition sources in terrestrial birds. *Biological Conservation* 131: 421-432.

USEPA, 2008, Eco Update/Groundwater Forum Issue Paper: Evaluating Ground-water/Surface-water Transition Zones in Ecological Risk Assessment. Published by the U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington D.C. July 2008. http://www.epa.gov/oswer/riskassessment/ecoup/pdf/eco_update_08.pdf