March 15, 2005

Mr. Robert Thomson
U. S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

Subject: SWMU 39 RCRA Facility Investigation/Corrective Measures Study Report
Final Document, October 2004
Radford Army Ammunition Plant
EPA ID# VA1 210020730

Dear Mr. Thomson:

Enclosed are Radford Army Ammunition Plant (RFAAP) responses to the comments contained in your letter dated February 9, 2005 on the subject report. Several review comments continue to be made although RFAAP has provided what we believe is adequate rationale that supports our original conclusions and recommendations. In our attached response, we reiterate our position with additional information that discusses the impact that specific comments will have on this report as well as other reports yet to be submitted. After you have had the opportunity to review them we recommend we have a conference call to resolve them prior to report revision. During this call we can also discuss the timeframe for our response. We strongly recommend to hold this call prior to the RFAAP Installation Action Workshop scheduled for April 27-28, 2005.

Please coordinate with and provide any questions or comments to myself at (540) 639-8266, Jerry Redder of my staff (540) 639-7536 or Jim McKenna, ACO Staff (540) 639-8641.

Sincerely,

C. A. Jake, Environmental Manager
Alliant Ammunition and Powder Company LLC

Enclosure

w/o enclosure

c: Russell Fish, P.E., EPA Region III

w/enclosure

Jim Cutler
Virginia Department of Environmental Quality
P. O. Box 10009
Richmond, VA 23240-0009

05-815-63
JMcKenna/JJRedder

Durwood Willis
Virginia Department of Environmental Quality
P. O. Box 10009
Richmond, VA 23240-0009

E. A. Lohman
Virginia Department of Environmental Quality
West Central Regional Office
3019 Peters Creek Road
Roanoke, VA 24019

Tony Perry
U.S. Army Environmental Center
5179 Hoadley Road, Attn: SFIM-AEC-CDN
Aberdeen Proving Ground, MD 21010-5401

Karen Colmie Heckelman
U.S. Army Environmental Center, Office of Counsel
Beal Road, Bldg E4460
Aberdeen Proving Ground, MD 21010-5401

Keith Williams
U.S. Army Center for Health Promotion and Preventive Medicine
5158 Blackhawk Road, Attn: MCHB-TS-REH
Aberdeen Proving Ground, MD 21010-5403

Steve Wood
Corps of Engineers, Baltimore District
ATTN: CENAB-EN-HM
10 South Howard Street
Baltimore, MD 21201

bc: Administrative File
J. McKenna, ACO Staff
Rob Davie-ACO Staff
C. A. Jake
J. J. Redder
Env. File

Coordination: _____
J. McKenna

Response to USEPA Comments dated 09 February 2005
for
Final SWMU 39 RCRA Facility Investigation/Corrective Measures Study Report
October 2004

EPA Comment 1
Comment 9: EPA's review stated that the pH of the surface soil in the northern settling basin was 4.0, and the potential ecological impacts from the low pH should be evaluated. The Army's response states that the Report would discuss potential impacts to plants and invertebrates from this low pH soil. However, neither Section 4.2 nor Section 7.7.1 of the Report have any discussion regarding potential impacts from low pH.

RFAAP Response
During the revision of the document, the requested discussion was inserted into Section 7.1.4, as the more appropriate section.

EPA Comment 2
Comment 16: It was agreed that a separate spreadsheet can be used to calculate the UCL. However, the spreadsheet should use the same methodology used in the PROUCL. Refer to the PROUCL Users Manual and the UCL guidance (EPA 2002). Note that the bootstrap method is just one of many non-parametric methods used in the PROUCL to calculate the UCL for data that are not normally distributed.

RFAAP Response
At the outset of the project (WPAs 9 and 12, September 2002), the new UCL guidance and ProUCL software were reviewed. Although an early version of the software was obtained, it did not function properly. At that time, calculation spreadsheets were developed specifically for RFAAP. These spreadsheets have been linked to other RAGS, Part D spreadsheets for efficiency.

Use of our existing spreadsheets would maintain consistency in UCL calculations throughout the project. It should be noted that our process does follow UCL guidance, except for the number of non-parametric methods employed in the calculations. To date, four sites have been reviewed by USEPA (Building 4343, SWMU 58, SWMU 39, and the New River Unit Rail Yard). The RFIs for two of these (Building 4343 and SWMU 58) have been approved by USEPA. In addition, we have completed internal draft HHRAs and SLERAs for 12 additional RFAAP sites (SWMUs 31, 51, 48, 49, 50, 59, Former Lead Furnace Area, NRU areas: Building Debris Disposal Trench, Igniter Assembly Area, Bag Loading Area, Northern Burning Ground, Western Burning Ground,) that have not yet been submitted to USEPA. The effort involved in re-running the statistics for each site would amount to approximately 10 hours per site. Moreover, potential changes in 95% UCL values (used as EPCs in the risk calculations) would result in a "ripple effect" throughout the RAGS, Part D tables and the SLERAs. The effort required to re-run the risk calculations, revise the tables, and revise the text for both the HHRA and SLERA would be approximately 60 hours per site at a cost of approximately $6,000.00. Therefore to implement this comment for the above 15 sites that are under

contract to Shaw Environmental would require an additional 900 hours of effort at a cost of $90,000. Considering the ongoing effort at the three sites under contract to URS Corporation (SWMUs 40/71, 41, 54) represents an additional 180 hours of effort at a cost of approximately $18,000. Note the contractors' current operating budgets do not include this effort so additional funds if available would need to be programmed during the next IAP workshop. Assuming the funds will be available, the reprogramming could be accomplished during the April 2005 IAP workshop, but procurement of this additional effort realistically could not happen before FY06 thus delaying these reports for over a year. RFAAP does not believe that there is enough value added in switching the process at this time to justify the additional effort, cost and impact to schedules.

We have reviewed the *User Guide* for ProUCL Version 3.0 (dated April 2004). One limitation of the ProUCL software is stated in the Executive Summary, page xiii and Section F, page 57 of the *User Guide*:

"ProUCL does not handle left-censored data sets with non-detects, which are inevitable in many environmental applications. All parametric as well as non-parametric recommendations (as summarized in Tables 1 through 3 of the *User Guide*) to compute the mean, standard deviation, and 95% UCLs and all other statistics computed by ProUCL are based upon full data sets without censoring. It should be noted that for a mild or moderate number of non-detects (e.g., 15%), one may use the commonly used ½ detection limit (DL) proxy method to compute various statistics. However, the proxy methods should be used cautiously, especially when one is dealing with lognormally distributed data sets. For lognormally distributed data sets of small sizes, even a single value – small (e.g., obtained after replacing the non-detects by ½ DL) or large (e.g., an outlier) can have a drastic influence (can yield an unrealistically large 95% UCL) on the value of Land's 95% UCL. The issue of estimating the mean, standard deviation, and appropriate 95% UCL of the mean based upon left-censored data sets with varying degrees of censoring (e.g., 15%-50%, 50% to 75%, greater than 75%, etc.) is currently under investigation."

Because our data sets at RFAAP frequently have percentages of non-detects greater than 15% for some COPCs, we use ½ the reporting limit (RL) to represent the non-detect results. If we were to use the ProUCL software, the above limitation would contribute to the uncertainty involved in estimating exposure point concentrations (EPCs) for our risk assessments.

To confirm that the two methods are similar, we compared the 95% UCLs for SWMU 39 generated by ProUCL and by our spreadsheets. With some exceptions, our spreadsheets generated 95% UCL values that were either similar or more conservative than those computed by ProUCL. (Note that ½ the RL was used as the proxy value for non-detect results). For the HHRA (**Attachment 1**), the EPCs selected from ProUCL were greater than those from our spreadsheets for two out of ten COPCs in surface soil and three out of ten COPCs for total soil. For the SLERA (**Attachment 2**), the EPCs selected from ProUCL were greater than those from our spreadsheets for six out of 24 COPECs for surface soil.

We will continue to use the calculation spreadsheets that were specifically developed for the RFAAP project. At this point in the project we do not believe that changing the software or developing additional calculations adds value to the HHRA or the SLERA. Based on the above comparison between 95% UCLs generated by ProUCL and our spreadsheets, the use of ProUCL would not change the conclusions of the original risk assessment.

EPA Comment 3

Comment 17: The uncertainty in using a PEF for an industrial facility to calculate risk for a residential facility should be discussed in the Report. For example, discuss the impact on the final risk when using a PEF based on 3 acres vs. 0.5 acres.

RFAAP Response

The sampling and analysis program for SWMU 39 was designed to characterize the 2.6-acre site. The Q/C values from the *Soil Screening Leve*l (SSL) guidance are presented by source area, city, and climatic zone. References to the Q/C in this document are to "source area" and "site size". Thus, the 2.6-acre area was considered to be the source area for purposes of the PEF calculation.

Because the source area is larger than 0.5 acres used to represent residential lot and there were no plans for residential development, the sampling program was not designed to address 0.5-acre subareas or to define exposures areas for residential lots (as described in Section 4.1.4 of the SSL guidance). To address this uncertainty, we will assume that the sampling performed in the 2.6-acre area at the SWMU 39 is representative of concentrations in any one subarea of the site and use the Q/C term associated with a 0.5 acre area to calculate the PEF. This comparison will be discussed in the uncertainty section (Section 5.5) of the HHRA. This approach will also be used in subsequent HHRAs at RFAAP.

EPA Comment 4

Comment 20: EPA stated that it was unclear why this pre-screen is being performed to identify contaminants of potential ecological concern (COPEC) for food chain modeling in the screening ecological risk assessment (ERA), particularly when several screening values used to evaluate food chain effects are based on effects to earthworms and plants. The EPA BTAG recommended that food chain modeling be performed on all detected chemicals that have the potential to bioaccumulate. The Army's response states that this approach is conservative since the earthworm and plant screening values were lower than food chain values, and the list of bioaccumulative chemicals recommended by the EPA BTAG is applicable to sediment only. It must be noted the identified chemicals are considered to be bioaccumulative regardless of the media in which they are found. The list of bioaccumulative chemicals is also applicable to soil, and therefore, the same list should be used to evaluate food chain risks to terrestrial receptors. The EPA BTAG recommends that future risk assessments not use this pre-screen, and food chain modeling be performed on all bioaccumulative chemicals.

RFAAP Response

The list of "bioaccumulative chemicals" recommended by BTAG (that is based on an EPA document for sediment) does not, in fact, include all chemicals that may bioaccumulate in the terrestrial food chain. As shown in the SLERA, some chemicals not on the "bioaccumulative chemical" list (e.g., cobalt and thallium) are shown to bioaccumulate in plants, invertebrates. and/or small mammals/birds.

However, given BTAG's repeated objections on the use of the "prescreen," and due to a desire to expedite Agency acceptance of future SLERAs, the use of the prescreen will be eliminated for the food chain model and only "bioaccumulative chemicals" (as defined in the USEPA sediment guidance) will be included. Note that this change in the SLERA approach will only be initiated for future risk assessments that have not been already drafted by the contractor (i.e., SLERAs drafted to date include all sites from WPAs 9 and 12).

EPA Comment 5

Comment 21: EPA stated that based on a high level of uncertainty, either a baseline ecological risk assessment needed to be performed or ecologically-based remediation goals needed to be developed. The Army's response states that because the former lagoons will be filled with over two feet of clean soil, this will eliminate or reduce several ecological pathways. While the EPA BTAG still believes that there is considerable uncertainty whether cleaning up to human health criteria will be protective of all ecological receptors, placement of at least two feet of clean soil in the lagoons should reduce ecological exposure and risks to acceptable levels. However, the EPA BTAG recommends that the soil in the lagoons be limed to raise pH as discussed in the response to Comment 9 to reduce mobility of metals in the soil and reduce bioavailability to plants and other ecological receptors that may use deeper subsurface soils.

RFAAP Response

Since the soil with the low pH is proposed for removal, the document will be revised to indicate that six (three in each lagoon) post excavation samples will be collected and analyzed for pH. If the samples indicate low pH, lime will be added to the excavation prior to back filling.

We must point out that many of the uncertainties raised by the reviewers are created by using inexact techniques that we are required to use. Further we recognize that a Human Health Risk Assessment and a Screening Level Ecological Risk Assessment are not exact. Throughout the reports RAAP discusses the uncertainties of using the data, the assumptions, and the models. Since in most instances the most conservative, in fact overly conservative, inputs are used in the modeling and calculations, there may be uncertainty whether they estimate the true risk, but it is certain that if they don't it's because they consistently and dramatically over-estimate the real risk from the site. For this reason we do not feel the additional effort and expense is value added to perform either a baseline ecological risk assessment or to develop ecologically-based remediation goals.

Attachment 1
Comparison of ProUCL and RISK2000 UCL-Based Exposure Point Concentrations Used in the SWMU 39 HHRA

Exposure Point	Chemical of Potential Concern	Maximum Concentration (Qualifier)	ProUCL Exposure Point Concentration [1]			Risk 2000 Exposure Point Concentration [2]		
			Value	Units	Statistic	Value	Units	Statistic
Surface Soil (0-2')	TCDD-RME	2.07E-05	2.89E-05[3]	mg/kg	Approx. Gamma	2.07E-05	mg/kg	Max
	Aluminum	37400	25216	mg/kg	Student-t	25800	mg/kg	95%UCL-T
	Arsenic	7.26	4.1	mg/kg	Student-t	5.4	mg/kg	95%UCL-T
	Chromium	95.1	45.9	mg/kg	Approx. Gamma	46.8	mg/kg	95%UCL-T
	Copper	375	**351.8**	mg/kg	99% Chebyshev	117.7	mg/kg	95%UCL-BST
	Iron	52800	34557.9	mg/kg	Student-t	35207.2	mg/kg	95%UCL-T
	Lead	16500	10667.5	mg/kg	99% Chebyshev	12841.9	mg/kg	95%UCL-T
	Manganese	1380	689.4	mg/kg	Approx. Gamma	811.7	mg/kg	95%UCL-T
	Thallium	22.7	**17.0**	mg/kg	99% Chebyshev	4.3	mg/kg	95%UCL-BST
	Vanadium	92.7	63.2	mg/kg	Student-t	63.2	mg/kg	95%UCL-N
Total Soil (0-10')	TCDD-RME	2.07E-05	1.36E-05	mg/kg	Approx. Gamma	2.07E-05	mg/kg	Max
	Aluminum	37400	24904.3	mg/kg	Student-t	25200	mg/kg	95%UCL-T
	Arsenic	7.26	3.8	mg/kg	Approx. Gamma	4.3	mg/kg	95%UCL-T
	Chromium	95.1	42.4	mg/kg	Approx. Gamma	42.6	mg/kg	95%UCL-T
	Copper	375	**146.4**	mg/kg	95% Chebyshev	89.3	mg/kg	95%UCL-BST
	Iron	52800	33794.8	mg/kg	Student-t	34156.2	mg/kg	95%UCL-T
	Lead	16500	**7350.8**	mg/kg	99% Chebyshev	1710	mg/kg	95%UCL-BST
	Manganese	1380	572.3	mg/kg	Approx. Gamma	618.6	mg/kg	95%UCL-T
	Thallium	22.7	**11.8**	mg/kg	99% Chebyshev	3.1	mg/kg	95%UCL-BST
	Vanadium	92.7	63.1	mg/kg	Student-t	63.1	mg/kg	95%UCL-N

[1] ProUCL EPC UCL Statistics: Student's-t 95% UCL (Student-t); Approximate Gamma 95% UCL (Approx. Gamma); Chebyshev 95% UCL (95% Chebyshev); Chebyshev 99% UCL (99% Chebyshev).

[2] Risk 2000 EPC UCL Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); 95% UCL based on bootstrap statistic (95% UCL-Bst)

[3] Calculated ProUCL EPC value exceeds maximum detected concentration (MDC). The MDC would be selected as the EPC for the risk assessment.

NOTES:

Bold values indicate the ProUCL estimated EPC exceeds the Risk 2000 estimated EPC.

Non-detects: 1/2 detection limit was used for all NDs.

All bootstrap calulations use 5000 iterations.

mg/kg = milligram per kilogram.

Attachment 2
Comparison of ProUCL and RISK2000 UCL-Based Exposure Point Concentrations Used in the SWMU 39 SLERA

Exposure Point	Chemical of Potential Concern	Maximum Concentration (Qualifier)	ProUCL Exposure Point Concentration [1]			Risk 2000 Exposure Point Concentration [2]		
			Value	Units	Statistic	Value	Units	Statistic
Surface Soil (0-2')	TCDD-RME	2.07E-05	2.89E-05[3]	mg/kg	Approx. Gamma	2.07E-05	mg/kg	Max
	2,4-Dinitrotoluene	0.233	0.184	mg/kg	Student-t	0.202	mg/kg	95%UCL-Bst
	Diethylphthalate	0.059	0.201[3]	mg/kg	Student-t	0.059	mg/kg	Max
	Di-n-butyl phthalate	0.5225	**0.506**	mg/kg	97.5% Chebyshev	0.281	mg/kg	95%UCL-N
	Endrin	0.00379	N/R[4]	mg/kg	---	0.00379	mg/kg	Max
	Endrin aldehyde	0.000681	N/R[4]	mg/kg	---	0.000681	mg/kg	Max
	Endrin ketone	0.00282	N/R[4]	mg/kg	---	0.00282	mg/kg	Max
	Nitroglycerin	19.8	43.2[3]	mg/kg	99% Chebyshev	19.8	mg/kg	Max
	Aluminum	37400	25216	mg/kg	Student-t	25800	mg/kg	95%UCL-T
	Antimony	1.4	3.3[3]	mg/kg	97.5% Chebyshev	1.4	mg/kg	Max
	Beryllium	1.4	1.05	mg/kg	Student-t	1.05	mg/kg	95%UCL-N
	Chromium	95.1	45.9	mg/kg	Approx. Gamma	46.8	mg/kg	95%UCL-T
	Cobalt	29	17.9	mg/kg	Approx. Gamma	18.2	mg/kg	95%UCL-T
	Copper	375	**351.8**	mg/kg	99% Chebyshev	117.7	mg/kg	95%UCL-BST
	Iron	52800	34557.9	mg/kg	Student-t	35207.2	mg/kg	95%UCL-T
	Lead	16500	10667.5	mg/kg	99% Chebyshev	12841.9	mg/kg	95%UCL-T
	Manganese	1380	689.4	mg/kg	Approx. Gamma	811.7	mg/kg	95%UCL-T
	Mercury	0.102	0.061	mg/kg	Approx. Gamma	0.062	mg/kg	95%UCL-T
	Nickel	38.1	24.0	mg/kg	Approx. Gamma	24.0	mg/kg	95%UCL-T
	Selenium	1.2	**0.734**	mg/kg	95% Chebyshev	0.620	mg/kg	95%UCL-Bst
	Silver	1.35	**0.970**	mg/kg	95% Chebyshev	0.597	mg/kg	95%UCL-Bst
	Thallium	22.7	**17.0**	mg/kg	99% Chebyshev	4.3	mg/kg	95%UCL-BST
	Vanadium	92.7	63.2	mg/kg	Student-t	63.2	mg/kg	95%UCL-N
	Zinc	301	**120.0**	mg/kg	Modified-t	110.9	mg/kg	95%UCL-Bst

[1] ProUCL EPC UCL Statistics: Student's-t 95% UCL (Student-t); Modified-t 95% UCL, adjusted for skewness (Modified-t); Approximate Gamma 95% UCL (Approx. Gamma); Chebyshev 95% UCL (95% Chebyshev); Chebyshev 97.5% UCL (97.5% Chebyshev); Chebyshev 99% UCL (99% Chebyshev).

[2] Risk 2000 EPC UCL Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); 95% UCL based on bootstrap statistic (95% UCL-Bst).

[3] Calculated ProUCL EPC value exceeds maximum detected concentration (MDC). The MDC would be selected as the EPC for the risk assessment.

[4] N/R: ProUCL does not recommend a UCL.

NOTES:

Bold values indicate the ProUCL estimated EPC exceeds the Risk 2000 estimated EPC.

Non-detects: 1/2 detection limit was used for all NDs.

All bootstrap calulations use 5000 iterations.

mg/kg = milligram per kilogram.