March 15, 2005

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

Subject: New River Unit Investigation: Rail Yard Remedial Investigation, Draft 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 December 22, 2004 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.

Also enclosed are responses to comments from the Department of Environmental dated February 15, 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

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Response to USEPA Comments dated 22 December 2004
for
Draft Rail Yard Remedial Investigation Report
October 2004

General Comments

EPA Comment 1
Several chemicals were detected in each media of concern for which risk-based screening levels (U.S. EPA Region 3 Risk-Based Concentrations [RBCs]) were not available. It is stated in Section 5.1.3.3 (Sediment) that two organic constituents were retained as constituents of potential concern (COPCs) because there were no RBCs available for comparison. However, it does not appear that COPCs detected in soil or surface water were retained as COPCs for this reason, nor does it appear that an effort was made to use alternate screening criteria or screening criteria from surrogate compounds based on a quantitative structure-activity relationship, in order to quantitatively estimate potential risks and hazards posed by exposure to these chemicals. In addition, the exclusion of these constituents is not discussed in the Uncertainty Analysis (Section 5.5). Although the potential presence of these excluded constituents is not expected to result in additional quantitative estimates of risk and hazard which will substantively affect projected risk management decisions at the site, a discussion should be provided in Section 5.5 that outlines the potential effects on the quantitative risk assessment. Such contaminants which cannot be reliably excluded from the risk assessment must be retained as site COPCs in accordance with U.S. EPA policy and as a matter of the public record.

RFAAP Response
For surface soil, total soil, and surface water (Tables E-1, E-3, and E-7), RBCs were available for all detected compounds. Two organics in sediment (dichloroprop and PETN) did not have RBCs for comparison. Regarding the use of alternate screening criteria or surrogate compounds, we have been using the risk assessment web site for the Virginia Department of Environmental Quality (VDEQ) Voluntary Remediation Program (VRP) as a source of information for surrogate compounds. Although using surrogate compounds that have been developed by a regulatory agency was preferable to independently developing alternate values or surrogate compounds, no surrogate compounds were listed for dichloroprop and PETN. The uncertainty involved with eliminating chemicals from the quantitative risk assessment process will be further discussed in the Uncertainty Section (**Section 5.5**).

EPA Comment 2
From the information presented in the draft RI Report, it is unclear if the potential for groundwater contamination has been evaluated at the Rail Yard Site. Sediment sample results from the 2002 investigation indicate that soil screening levels (SSLs) for migration to groundwater were exceeded for arsenic, chromium and iron. Soil sample results from the 2002 Investigation indicate that arsenic exceeded the SSL. Please revise the draft RI Report to include a summary discussion of groundwater conditions at the site, the potential for groundwater contamination and of any previous groundwater investigations at the Rail Yard Site and/or adjacent sites. The investigative sections of the draft RI Report should at least discuss how potential groundwater contaminations at the Rail Yard Site will be addressed.

RFAAP Response

A section discussing SSLs and potential impact to groundwater will be added to the report. Normally, soil screening levels are not used to evaluate sediment since mobile constituents in sediment would follow a surface water preferred pathway and not soil transfer to groundwater. Arsenic in soil did exceed its SSL. However, analysis of background conditions indicates that levels of arsenic are generally below background for the RY and that concentrations of arsenic at the site are not related to RY activities. There are no monitoring wells at the NRU and therefore, there have been no previous groundwater investigations. Groundwater at the NRU is assessed by the sampling of two springs and the unnamed stream that drains the NRU. The stream/springs are logical discharge points for groundwater from the site. Analysis of spring and stream samples do not indicate that constituents detected at the RY are being mobilized into surface/groundwater. There is also no indication of active sources or large areas/concentrations of constituents of concern.

EPA Comment 3

The draft RI Report indicates that sediment and surface water samples were collected from the rail yard stormwater drainage system. In order to ensure that samples were collected from locations that were representative of the entire drainage system, a figure depicting the stormwater drainage system should be provided. Please revise the draft RI Report to include a figure depicting the stormwater drainage system at the Rail Yard. Alternatively, an existing RI Report figure (e.g., Figure 2-1) may be revised to include the requested information.

RFAAP Response

A figure depicting the stormwater drainage system at the Rail Yard (with surface water and sediment sample locations) will be included as requested.

Specific Comments

EPA Comment 4

Figure 2-1, Rail Yard Sampling Locations and Results: Analytical results for surface water sample RYSW04 presented on Figure 2-1 are inconsistent with the results presented in Table 3-4, Detected Analytes in Surface Water. Figure 2-1 lists a lead result of 553 mg/kg. However, Table 3-4 lists a lead result for sample RYSW04 as 1.1 mg/kg. Please revise Figure 2-1 or Table 3-4 to correct this discrepancy.

RFAAP Response

The analytical results in Table 3-4 for surface water sample RYSW04 are correct. The concentration of 553 ug/L was for iron, not lead. Figure 2-1 will be revised to correct this discrepancy.

EPA Comment 5

Section 2.5.1 on page 2-3 states that a facility-wide background study was performed to assess the levels of inorganic constituents naturally occurring in soil at the Installation. There should be a more complete description of the background data set. The values should be listed in a table and the location of the background samples should also be described.

RFAAP Response

A detailed description of the background data set and locations of the background samples can be found in the Facility-Wide Background Study Report (IT, 2001). A table listing the facility-wide point estimates, calculated as 95% UTLs, will be included as requested and the Background Report will be referenced.

EPA Comment 6

Section 2.5.1 on page 2-4 states that inorganics were not considered site-related unless the concentrations exceeded background concentrations as well as industrial and residential screening levels. It is unclear why inorganics needed to be above human health criteria to be considered site related. Exceedances of background concentrations should be sufficient justification.

RFAAP Response

The report will be revised to state that, in the Nature and Extent of Contamination section, constituents with concentrations below background are not considered to be the result of site activities. The Nature and Extent section uses exceedances of RBCs to evaluate fate and migration patterns for those chemicals of most concern. Therefore, constituents above background, but below RBCs are not tracked. The HHRA and SLERA evaluate risk and background concentrations are not used to screen out constituents in the risk assessments.

EPA Comment 7

Figure 2-1 presents a map of the site with sample locations from different investigations and chemical exceedance results. The figure only shows exceedances of human health criteria and background. The samples with exceedances of ecological criteria should also be shown on the figure so that the spatial distribution of these chemicals presenting potential ecological risks can be seen. This figure is also misleading and implies that these are the only chemicals of concern at the site, particularly for those samples with no exceedances.

RFAAP Response

A section discussing exceedances of ecological screening values will be added to the report. It is believed that the SLERA is the best place for presenting and discussing ecological risk.

EPA Comment 8

Section 3.0 presents a summary of the nature and extent of contamination. The results for soil and surface water only present the nature and extent relative to exceedances of human health criteria and background concentrations. Information on the nature and extent relative to ecological criteria should also be presented. This information would support the information presented in Figure 2-1.

RFAAP Response

See Response to Comment No. 7.

EPA Comment 9

Section 3.1.4, Modifications to the Sampling Plan: This section states that "manholes were inspected during the field investigation and found to lead to a terra cotta lined sewage pipe that

was free of sediment and water." It is unclear if this sewage pipe is still in use and if sewage pipe integrity surveys and/or sampling was performed in the area surrounding the sewer pipe. In addition, the location and extent of the sewer pipe is not clearly described in the draft RI Report. Please revise the RI Report to explain the current and historic use of the sewer pipe and the results of any integrity testing and/or related sampling activities. Also, please provide a figure to depict the location and extent of the sewer pipe and related components (e.g., catch basins, outfalls, etc.). Alternatively, an existing RI Report figure (e.g., Figure 2-1) may be revised to include the requested information.

RFAAP Response
The NRU sanitary sewer system is no longer in use. The text will be revised to include the known history and use of the sanitary system, integrity testing, and related sampling activities. As indicated in Response to Comment No. 3, a figure depicting the NRU drainage system illustrating the attempted sewer sample locations, retention ponds, outfalls, and flow direction will be provided.

EPA Comment 10
Section 3.2 on page 3-5 presents a summary of the nature and extent of contamination. The section states that metals results indicate that there were no residential RBC exceedances, and indicate that the bermed spur area of the RY does not represent an area of environmental concern. It is unclear how a conclusion of no environmental concern can be reached when no comparison to ecological criteria has been performed. Either the statement should be removed, or the data relative to ecological criteria should be presented to support the statement.

RFAAP Response
See Response to Comment No. 7.

EPA Comment 11
Section 3.2 on page 3-6 states that sample RYSS02 was collocated with previous sample SS-07 to verify elevated levels of barium (1,770 mg/kg) detected in that sample. This concentration was greater than the residential screening level (550 mg/kg). The section states that because the elevated barium could not be duplicated, this area does not appear to be impacted by RY activities. Just because the original concentration could not be duplicated, does not mean that the original sample is invalid. Unless there is an analytical error that resulted in the high barium concentration, the sample should not be ignored. If the sample is retained, the conclusion is not supported.

RFAAP Response
Text will be revised to indicate that the elevated sample concentration could not be duplicated and therefore, the contamination assessment would indicate that that this compound is not widespread through the RY.

EPA Comment 12
Section 3.2 on page 3-7 discusses the concentrations of contaminants relative to human health criteria. Despite exceedances of some residential human health criteria and no comparison to ecological criteria, the section concludes that there is no impact to surface water and sediment in the drainages in the southwest portion of the site. This conclusion is not supported based on the information presented.

RFAAP Response
See Response to Comment No. 7.

EPA Comment 13
Table 5-1: It is recommended that the industrial worker be evaluated further in the risk assessment. This can be done qualitatively using the residential adult risk and a risk-ratio approach.

RFAAP Response
This is the first site for which we have received this particular comment. At the inception of the project, exposure scenarios at RFAAP were developed to reflect representative current and anticipated future exposures at RFAAP. These same exposure scenarios have been consistently evaluated for each site. It is noted that land use is expected to remain industrial and a residential scenario is not considered to be a reasonably anticipated land use. However, the residential scenario was evaluated to assess "no further action" under CERCLA. Therefore, adult resident and child resident exposures at RFAAP are evaluated in the HHRA.

For the HHRAs at RFAAP, the potential exposure pathways that are quantitatively evaluated under current land-use conditions are summarized as follows:

- Incidental ingestion, dermal absorption, and inhalation of chemicals in surface soil by a maintenance worker.
- Incidental ingestion and dermal absorption of chemicals in sediment (where applicable) by a maintenance worker.
- Dermal absorption of chemicals in surface water (where applicable) by a maintenance worker.

Similarly, the following exposure pathways are evaluated for quantitative evaluation under future land-use conditions:

- Incidental ingestion, dermal absorption, and inhalation of chemicals in surface soil by a maintenance worker.
- Incidental ingestion, dermal absorption, and inhalation of chemicals in total soil by a maintenance worker.
- Incidental ingestion, dermal absorption, and inhalation of chemicals in total soil by an excavation worker.
- Incidental ingestion, dermal absorption, and inhalation of chemicals in total soil by a resident (adult and child).
- Incidental ingestion and dermal absorption of chemicals in sediment (where applicable) by a maintenance worker.
- Incidental ingestion and dermal absorption of chemicals in sediment (where applicable) by an excavation worker.
- Incidental ingestion and dermal absorption of chemicals in sediment (where applicable) by residents (adult and child).
- Dermal absorption of chemicals in surface water (where applicable) by a maintenance worker.

- Dermal absorption of chemicals in surface water (where applicable) by an excavation worker.
- Dermal absorption of chemicals in surface water (where applicable) by residents (adult and child) during wading in the spring, tributaries, and pond edges.
- Incidental ingestion and dermal absorption of chemicals in surface water (where applicable) by residents (adult and child) during swimming in the pond.

It is noted that a trespasser scenario was not quantitatively evaluated in the HHRA. As explained in **Section 5.2.1**, it is not likely that children would be able to trespass at the Installation due to security at the Installation (e.g., strict security at entry gates, guard towers, barbed-wire fences). It would also be difficult for an adolescent to trespass at the site. Even if an older adolescent were able to evade security measures, it would be difficult to do so on a routine basis. Therefore, a trespasser was not included as a receptor. However, hypothetical future exposures to children were considered in the residential scenario. The exposure parameters for residents are more conservative than those for children trespassers. Also, the maintenance worker scenario that is being evaluated would be similar to the limited exposure that an adolescent trespasser could experience at the site and would be protective of the trespasser.

An exposure scenario for the industrial worker can be considered in a similar manner as was done for the trespasser scenario. Given the nature and anticipated future use of the sites at RFAAP, the standard industrial scenario (e.g., exposure frequency of 250 days and exposure duration of 25 years) are not expected to apply. However, the exposure parameters for adult and child residents are more conservative than those for industrial workers and would be protective of the industrial worker. If the site passes a residential scenario, then it could be assumed that the site would pass the industrial scenario. If the site does not pass the residential scenario, a risk ratio approach will be used to evaluate a hypothetical industrial worker. This approach would be discussed in the uncertainty section. This rationale will be added to Table 5-1 and **Section 5.2.1.2** to be consistent with the treatment of the trespasser scenario.

EPA Comment 14

Section 5.1.2, Methodology for Selection of COPCs for Human Health, page 5-6: It is stated in the third bullet point on this page that health-based screening criteria for constituents in sediment and surface water are "represented by the USEPA Region III tap water RBCs corresponding to a carcinogenic risk adjusted by 10 ($1x10^{-7}$) or a HI of one for noncarcinogenic effects." However, the subsequent discussion on page 5-9 (Section 5.1.2.1) indicates that "chemicals present in surface water were compared to USEPA Region III RBCs for tap water corresponding to a carcinogenic risk of $1x10^{-6}$…[T]he tap water RBCs were increased by one order of magnitude to represent the types of exposures that are more likely to occur for this medium." A similar approach was proffered for sediment. In consideration of the reference to 10^{-7}-based RBCs from the preceding section, it is unclear if this reference to increasing the carcinogenic RBCs refers to an increase back to the original target risk basis of 10^{-6}. It is not clear to the reader what adjustments to the RBCs have been made. It appears from the latter discussion (predicated on an assumption of less frequent contact with surface water versus tap water, for example) that RBCs may have been adjusted above their original 10^{-6} target risk base to a target risk of 10^{-5}. Please revise the draft RI Report to resolve this discrepancy, and to more

clearly describe the screening criteria that were used to select COPCs for surface water and sediment (i.e., clearly discuss and provide justifications for the adjustments referenced in the second and third bullets on page 5-6). Please clarify the procedures utilized.

RFAAP Response
Section 5.1.2 will be revised to clarify the screening process as follows:

"Once the sampling data for the Rail Yard were grouped and summarized, COPCs for the HHRA were selected. The purpose of selecting COPCs is to identify those chemicals that are present as a result of past activities at the site and most likely to be of concern to human health. Therefore, the screening process eliminates from the HHRA:

- those chemicals present in surface soil and total soil at concentrations below conservative health-based screening levels, represented by the USEPA Region III RBCs for residential soil corresponding to a carcinogenic risk of 1x10-6 or adjusted to reflect one-tenth (0.1) of the hazard index (HI) for noncarcinogenic effects (USEPA, 2004a);
- those chemicals present in sediment at concentrations below conservative health-based screening levels, represented by the USEPA Region III RBCs for residential soil corresponding to a carcinogenic risk of 1x10-6 or adjusted to reflect one-tenth (0.1) of the hazard index (HI) for noncarcinogenic effects (USEPA, 2004a), which have been increased by a factor of ten to represent sediment exposures;
- those chemicals present in surface water at concentrations below conservative health-based screening levels, represented by the USEPA Region III RBCs for tap water corresponding to a carcinogenic risk of 1x10-6 or adjusted to reflect one-tenth (0.1) of the hazard index (HI) for noncarcinogenic effects (USEPA, 2004a), which have been increased by a factor of ten to represent surface water exposures; and …"

Section 5.1.2.1 will be revised to read:

"For the purposes of this HHRA, RBCs that were back-calculated using carcinogenic toxicity criteria were used directly as screening criteria, whereas RBCs that were back-calculated using noncarcinogenic toxicity criteria were adjusted downward by a factor of 10 in order to add a ten-fold measure of safety (i.e., to ensure that compounds that could combine to result in an HI greater than 1 for a specific target organ/critical effect were not eliminated from the assessment). If the maximum detected on-site chemical concentration was less than the RBC (or adjusted RBC for noncarcinogenic chemicals), the probability of developing cancer would be less than 1 in 1 million, and adverse noncarcinogenic effects would not be expected to occur. As a result, those chemicals detected at levels greater than RBCs (or adjusted RBCs) were retained for evaluation.

Because RBCs are not available for sediment, chemicals present in sediment were compared with USEPA Region III RBCs for residential soil corresponding to a carcinogenic risk of $1x10^{-6}$ or adjusted to reflect one-tenth (0.1) of the HI for noncarcinogenic effects (USEPA, 2004a). To be consistent with the *RFAAP Final*

Master Work Plan, Section 6.2.2, Selection of COPCs for the HHRA (URS, 2003), the residential soil RBCs were then increased by one order of magnitude to represent the types of exposures that are more likely to occur for this medium.

Because RBCs are not available for surface water, chemicals present in surface water were compared to USEPA Region III RBCs for tap water corresponding to a carcinogenic risk of $1x10^{-6}$ or adjusted to reflect one-tenth (0.1) of the HI for noncarcinogenic effects (USEPA, 2004a). To be consistent with the *RFAAP Final Master Work Plan*, Section 6.2.2, Selection of COPCs for the HHRA (URS, 2003), the tap water RBCs were then increased by one order of magnitude to represent the types of exposures that are more likely to occur for this medium. A complete list of the RBCs (or adjusted RBCs) used in this HHRA is presented in Table 5-2."

EPA Comment 15
Page 5-11: It is not recommended that the t-test be used in the logarithmic space for the background comparison of the means. Please keep this in mind for future reports. It is preferred that the Mann-Whitney or another appropriate non-parametric test be used.

RFAAP Response
The t-test has been applied in statistical comparisons throughout the project as well as in the *Facility-Wide Background Study Report*. The *Background Study* was intended to specify the statistical approach to be used for background comparisons throughout the course of the project and these procedures have been applied to previous reports. We will continue to use the same process, including the t-test, to maintain consistency in reports.

EPA Comment 16
Section 5.1.3.4, Surface Water, page 5-15: The last paragraph of this section provides information about 21 chemicals detected in surface water for which laboratory maximum detection limits exceeded risk-based screening levels. These chemicals were subsequently eliminated as potential COPCs and were not carried through into the risk characterization or uncertainty analysis. This list of chemicals includes arsenic, carcinogenic poly aromatic hydrocarbons (PAHs) (such as benzo(a)pyrene), trichloroethene (TCE) and vinyl chloride, all of which may contribute to adverse health effects and have the potential to result in quantitative estimates which substantively affect projected risk management decisions at the site.

Table E-8 provides a comparison of maximum detection limits of non-detected compounds in surface water to screening toxicity values. The "Range of Detection Limits" column, in most cases, appears to present routine laboratory reporting limits rather than method detection limits. Therefore, in most cases, the laboratory should be able to achieve lower numbers (even though it still may not be possible to detect chemicals at screening level concentrations). Screening values may have been reachable for vanadium and MCPP. Screening values for arsenic and PAH compounds may be reachable if alternative analytical methods were used, such as ICP-MS (for arsenic) or HPLC method 8310 for the PAHs.

The impact of excluding these potential COPCs from the risk assessment should be provided in a comprehensive uncertainty analysis that also evaluates the potential for these constituents to be present in surface water based on the potential for impact from contributing sources (including direct sources and the migration from soil to surface water or discharge of groundwater at the

groundwater-surface water interface). Ideally, these contaminants should remain site COPCs, inclusive of a qualitative assessment of their potential impacts to risk characterization and an attendant uncertainty analysis for consideration within the context of risk management decisions. Please revise the Report in Section 5.1.3.4, as well as Section 5.5 (Uncertainties in the HHRA), to include a detailed discussion of the potential impacts of excluding these potential COPCs based on elevated detection limits.

RFAAP Response

Chemical sensitivities are evaluated for each scoped project during the work plan development process. For each chemical, the values representing the method detection limits (MDLs) and the method reporting limits (MRLs) were compared during data evaluation procedures. The "Range of Detection Limits" column in Table E-8 presents the MRLs. Non-detects are reported at the MRL level in accordance with USACE Shell Requirements (USACE, Baltimore District. *Requirements for the Preparation of Sampling and Analysis Plans, Appendix I: Shell for Analytical Chemistry Requirements*, EM 200-1-3, February 2001). Because MRLs take into account sample characteristics, sample preparation, and analytical adjustments, these values are the most appropriate limits for evaluating non-detected compounds. MDLs represent the method/sample sensitivity limits for each analyte. With respect to the sensitivity of the analytical methods, samples at RFAAP have been collected and analyzed over several investigations. The most sensitive or appropriate methods were used for the recent investigations. Samples were collected and analyzed in accordance with approved work plans. In areas where previous sampling or site inspections indicated that PAHs might be a concern, the more sensitive PAH method was employed. However, in other general areas, the more general SVOC analysis was conducted for site characterization. The SVOCs analysis GC/MS method (USEPA SW-846 8270C) is not as sensitive as the 8270C Selective Ion Monitoring (SIM) method used for PAHs. This is why there were some MRLs greater than RBCs for PAHs for select samples in the RI Report. Given that the RFAAP sampling and analytical program has been ongoing over several years, it would be time-consuming and impractical to repeat the sampling and analytical efforts to achieve lower MDLs where applicable. The GC/MS SIM method is now preferred over the cited HPLC (SW-846 8310A) method due to its confirmatory nature (i.e. Mass Spectral Analysis) with similar sensitivities. Arsenic was analyzed by ICP/MS Method 6020 (cited) and MCPP analyzed by the GC method USEPA SW-846 8151A, which are the more current sensitive methods available. Vanadium MDL sensitivity limits for 6010B is usually around 1-10 ppb (10 ppb in 2002). The 2002 tap water RBC for vanadium was 260 ppb. Vanadium can be performed by 6020 ICP/MS to ensure greater sensitivity for surface water at 1 ppb level. A qualitative evaluation concerning the potential impact of excluding these compounds of potential concern (COPC) from the risk assessment will be added to the Uncertainty Section (**Section 5.5**).

EPA Comment 17

Section 5.2.3, Quantification of Dose Due to Chemical Exposures, pages 5-24 through 5-41: The same soil-to-skin adherence factors are proposed for evaluating the dermal effects of soil exposure and sediment exposure. However, the increased moisture content of wet sediment will increase the ability of sediments and soils to adhere to skin, and may also affect the relative percent of a chemical constituent absorbed into the skin, as compared to dry soils. Exhibit 3-3 of U.S. EPA's Risk Assessment Guidance for Superfund Part E, Supplemental Guidance for

Dermal Risk Assessment (RAGS Part E) (Activity Specific-Surface Area Weighted Soil Adherence Factors) provides different adherence factors for dry and wet soil conditions. The adherence factors provided for wet soil conditions are significantly higher than those provided for dry soil conditions. Therefore, it is suggested that exposure scenarios involving wading activities that would result in direct exposure to sediment be revised to use wet soil adherence factor values, as outlined below.

- Maintenance and Excavation Workers – suggest adherence factor of 0.6 mg/cm^2, based on "Staged Activity: Pipe Layers (wet soil)" from RAGS Part E, Exhibit 3-3.
- Adult Residents – suggest that the adherence factor be adjusted upwards from 0.7 mg/cm^2. Child resident adherence factor already references the suggested adherence factor for wet soil conditions.

RFAAP Response

The locations of sediment samples associated with the wading scenario were evaluated. Six of the samples were collected from incidental drainage areas on the site and five were collected from the stream and pond. Rather than run two different data sets for sediment, we will treat all sediment exposures as "wet soil" to be conservative. The adherence factors will be adjusted to reflect wet soil conditions. An adherence factor of 0.6 mg/cm^2 will be applied for the maintenance and excavation workers, as suggested. Although there are no specific adherence factors listed in Exhibit 3-3 (RAGS, Part E) for adult resident exposures to wet soil, we will use an adherence factor of 0.2 mg/cm^2. This value reflects the average value of the adherence factors for farmers, rugby players, archaeologists, and reed gatherers (based on geometric mean) that are likely to have similar exposures to wet soil. The same value (0.2 mg/cm^2) is also used as the adherence factor for children playing in wet soil.

The potential for over-estimating risk and hazard by treating all sediment sampling locations as "wet soil" will be discussed in the uncertainty section. It is noted that sediment will not be evaluated in the swimming scenario because the retention pond is deep enough that sediment would be likely to wash off rather than adhere to the skin.

EPA Comment 18

Section 5.2.3, Quantification of Dose Due to Chemical Exposures, Methodology for Deriving Dose Estimates, page 5-25: The particulate emission factor (PEF), used to quantify estimates of risk and hazard for an inhalation exposure route, was calculated using a methodology provided in U.S. EPA's Soil Screening Guidance (SSG), dated 1996. This guidance has been superseded by U.S. EPA's Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, released in December 2002. Although this supplemental guidance is intended as companion guidance to the 1996 SSG, it incorporates new dispersion modeling data into the residential scenario and provides guidance for evaluating risk to workers from exposures to soil contaminants during construction activity. The equation used to derive the PEF for commercial/industrial land use remains unchanged from the 1996 SSG, with the exception of the dispersion factor for wind erosion (Q/Cwind) which has been modified to reflect updated dispersion modeling. The use of outdated dispersion modeling information is not likely to have a significant impact on the quantitative estimates of risk and hazard for maintenance worker and residential populations. However, the 1996 SSG does not consider potential effects

of activities (such as construction work) that might be expected to generate particularly high fugitive dust emissions. The intake equation under these conditions is similar to the current PEF equation with the exception of the health-based limit subchronic toxicity value term (HBLsc). The PEFsc under construction/excavation conditions focuses exclusively on emissions from truck traffic on unpaved roads, which typically contribute the majority of dust emissions during such activities. Therefore, the quantification of dose for a construction/excavation worker receptor should be recalculated using the December 2002 Supplemental SSG.

RFAAP Response

This is the first site at RFAAP for which we have received this particular comment. We request that we maintain the methodology for calculating the Particulate Emission Factor (PEF) that was defined in the 1996 SSG to estimate fugitive dusts at the sites at RFAAP. First, previous risk assessments for RFAAP used the PEF calculations from the 1996 SSG to evaluate the inhalation pathway for the construction/excavation worker. Changing the methodology at this point would be inconsistent with the approach that has been used since the inception of the project. Second, the equation for the PEF in the 2002 Supplemental SSG requires site-specific input variables for construction vehicles that would be difficult to project for future construction projects at RFAAP (e.g., the numbers and weights of different kinds of construction vehicles and the sum of fleet kilometers traveled during the exposure duration). In addition, health-based subchronic toxicity values are not available for a majority of chemicals. Therefore, chronic toxicity values would most likely be used to estimate risk and hazard estimates. Given that the likelihood and the details of future construction projects at RFAAP are not known at this time, we do not believe that using such uncertain exposure assumptions and parameters would add value to the HHRAs at RFAAP.

EPA Comment 19

Page 5-24: Please consider using the PROUCL and/or the EPA UCL guidance to develop alternate choices for the non-parametric UCL calculations. Note that the bootstrap is not the only method that is available.

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 eight 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 the Rail Yard 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 one out of seven COPCs in surface soil, one out of seven COPCs for total soil, one out of five COPCs for sediment, and none out of one COPC in surface water. For the SLERA (**Attachment 2**), the EPCs selected from ProUCL were greater than those from our spreadsheets for four out of 26 COPECs for surface soil, three out of 41 COPECs for sediment, and one out of 18 COPECs in surface water.

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 20

Page 5-26: Please note that the Q/C used for the PEF calculation for the resident should be based on 0.5 acre subareas, not the entire area of the site (i.e. 30 acres).

RFAAP Response

The sampling and analysis program for the Rail Yard was designed to characterize the entire 30-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 30-acre area was considered to be the source area for purposes of the PEF calculation. It should also be noted that the use of a Q/C value for a 30-acre site results in greater on-site COPC air concentrations compared with using a Q/C value for 0.5-acre site. Therefore, the approach is conservative and protective of human health.

Because the source area is larger than 0.5 acres 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 30-acre area at the Rail Yard 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 21

Section 5.2.3, Quantification of Dose Due to Chemical Exposures, Dermal Absorption of Chemicals in Sediment by Child Residents, page 5-34: The exposed skin surface area for a child resident receptor's exposure to contaminated sediments was assumed to be 1,900 square centimeters (cm^2). It was assumed that a child's hands, forearms, lower legs and feet would be exposed to sediment. It is not clear why the head and face were not included in the assumed skin surface area, since they were included in the value for skin surface area for soil exposures (2,800 cm^2). Please revise the calculations and related portions of the Report text, adjusting the skin surface area for sediment exposures to 2,800 cm^2. Alternatively, provide additional discussion that adequately justifies the use of a skin surface area for children which excludes exposure of the head and face, differentiating between dermal exposures to sediment and soil.

RFAAP Response
A skin surface area of 1,900 cm^2 was originally chosen for sediment exposures to be consistent with the skin surface area used in the evaluation of surface water exposures. It is acknowledged, however, that the head and face could also be exposed to sediment because it could adhere to the skin while wading. Therefore, the skin surface area for sediment exposures will be revised to 2,800 cm^2, as requested.

EPA Comment 22
Section 6.2.1 on page 6-9 states that surface soil from 0 to 2 feet was considered and used to evaluate risk to ecological receptors. Soil was selected for use to focus on the soil depth interval expected to have the highest contaminant concentrations. Because the nature of the release was at the surface, soil from shallower depths (i.e., 0 to 6 inches) would be expected to have higher concentrations of contaminants. Using soil from 0 to 2 feet could therefore underestimate risk to ecological receptors. This uncertainty of using this historical data relating to detected concentrations should be discussed.

RFAAP Response
The issue of treating soil samples in the 0-2 foot range as surface soil has been discussed previously. The issue was discussed in the Draft SWMU 58 RFI Report EPA RTCs. The comment and response was:

"EPA Comment 8
Section 3.1.1.2, Procedures, page 3-2: It is stated in this section that soil for VOC analysis was collected from 0.5-1.0 feet using EnCore sampler. However, Table 3-1 indicates all surface soil samples, including VOCs and SVOCs, were collected from the depth of 0 to 0.5 ft below ground surface. Please clarify which is correct and revise the table or the text accordingly.

RFAAP Response:
Surface soil samples were collected from 0-0.5 ft bgs for all parameter groups except VOCs. The sample fraction for VOC analysis was collected from 0.5-1 ft bgs to ensure that constituents had not been volatilized.

It should be noted that this procedure was agreed upon as a result of teleconference negotiations that occurred with the USEPA and VDEQ during WPA 12 and MWP development. Meeting minutes regarding this issue from the 20 and 21 September 2001 teleconference are provided below.

6. Surface soil sampling depth, end use of data After some discussion on this issue, the group agreed on the following regarding surface soil sampling at RFAAP:

    - Future surface soil sampling, including that proposed in WPA's 9 and 12, would be defined as soil in the first six inches below the root mat.
    - Sampling for VOC compounds (where proposed) would occur from the interval between 6 and 12 inches in realization that the volatile nature of VOC compounds makes their detection in the 0-6 inch interval unlikely.

- Previous surface soil sampling, that until now had been 0 to 2 feet at Radford AAP, would still be considered valid for characterizing exposure and extent of contamination in the surface soil interval. Additional sampling at previous sampling locations would not be required.

For clarity, a footnote will be added to the table to reflect the fact that VOCs were collected from 0.5–1 ft bgs.

EPA Response: The Army's response is acceptable to EPA.

RFAAP Response: Acceptance of the response is noted."

Shallower soil would not necessarily have higher concentrations of contaminants, especially for those constituents that leach to deeper soil over time due to percolation from precipitation. Many ecological receptors would be expected to be exposed to COPECs throughout the 0-2 foot soil interval, as earthworms inhabit this entire zone and plant roots typically extend to a depth of two feet, and the ecological receptors considered in the SLERA are modeled to consume these earthworms and plants that are exposed to COPECs at these depths. The incidental soil ingestion pathway may be slightly underestimated for non-mobile COPECs due to use of soil from 0 to 2 feet. This uncertainty information will be added to the report.

EPA Comment 23
Section 6.6.3.1 on page 6-48 states that for aquatic organisms potentially exposed to contaminants in surface water, a weight-of-evidence approach was used where the more surface water benchmarks exceeded, the greater the potential for adverse effects. Section 6.7.2 then states that because none of the concentrations exceeded more than half of the available benchmarks, it is unlikely that water-dwelling organisms are impacted. There is no justification for using this approach, nor deciding that exceeding less that half of the benchmarks is acceptable, since the benchmarks are based on different receptors and endpoints, and were derived in different ways. This comment also applies to the evaluation of impacts from sediment, since the same approach was used.

RFAAP Response
The justification for this approach is that although different specific aquatic receptors may be addressed by each benchmark, the receptors are all aquatic species and thus relevant to the evaluation. It is acknowledged that for surface water, promulgated criteria such as national ambient water quality criteria and Virginia criteria should be weighted more than other non-promulgated benchmarks in an evaluation of potential surface water toxicity, and this change will be made in the report. For sediment, as none of the available benchmarks have been promulgated, all are equally relevant. Use of a 50% rule of thumb is reasonable, where the more surface water benchmarks exceeded, the greater the potential for adverse effects.

EPA Comment 24
Table 6-25 presents a summary of the wildlife environmental effects quotients (EEQ) and the risk drivers for different wildlife receptors. The evaluation used the 95% upper confidence limit

as part of the Tier 2 evaluation. This approach likely underestimates the risk from localized areas of contamination, because of the large size of the site (39 acres) relative to the small home ranges of some of the wildlife receptors (i.e., shrew, vole, robin). EPA BTAG is particularly concerned with the risk from polychlorinated biphenyls (PCB), which are found in soil where transformers were located. In addition, data on the extent of the PCB contamination in these locations are limited. Despite this limitation, risk to the shrew and robin was still predicted from exposure to PCBs from eating earthworms.

RFAAP Response

The Tier 1 approach was specifically used to avoid the potential underestimation of EEQs. Although the Tier 2 approach uses the 95% UCL as the exposure point concentration, due to the fact that a biased sampling plan was followed during site characterization that focused on those areas likely to be contaminated, it is unlikely that the Tier 2 EEQs underestimate ecological hazard. While individuals may be exposed to isolated soils with elevated COPEC concentrations, the overall receptor population will not be exposed to this degree. As stated in EPA (1999) *Issuance of Final Guidance: Ecological Risk Assessment and Risk Management Principles for Superfund Sites* (OSWER Directive No. 9285.7-28 P Memorandum):

> "Superfund remedial actions generally should not be designed to protect organisms on an individual basis (the exception being designated protected status species, such as listed or candidate threatened and endangered species or treaty-protected species that could be exposed to site releases), but to protect local populations and communities of biota."

EPA BTAG's concern with PCBs is noted; however, please see Response to Comment No. 27 that relates to PCBs.

EPA Comment 25

Section 6.7.3 on page 6-57 the statement "...summed EEQs are less than or equal to one" implies that there is no potential for risk when the EEQ equals one. When the EEQ is greater than or equal to one there is a potential for risk.

RFAAP Response

An EEQ of one, for an EEQ that is calculated using a NOAEL-toxicity reference value, equates to a finding of no potential risk because a NOAEL, by definition, is the no effect level. For EEQs based on LOAELs, it is agreed that an EEQ of 1 is associated with a potential risk. As the text in question refers to both NOAEL-based and LOAEL-based TRVs, the text will be revised accordingly.

EPA Comment 26

Section 6.8 on page 6-61 states that although 4,4'-DDE, alpha chlordane, gamma chlordane, and heptachlor epoxide were selected as contaminants of concern in sediment, these four pesticides were infrequently detected, with frequency of detections of 33%, 36%, 36%, and 18%, respectively. The spatial extent of contamination is a more important predictor of the potential for risk than the frequency of detection. The frequency of detection is insufficient justification for not considering these pesticides further.

RFAAP Response

The COPECs 4'-DDE, alpha chlordane, gamma chlordane, and heptachlor epoxide were detected in only 2, 4, 4, and 2 sediment samples, respectively, and were not detected in site soil, suggesting these pesticides are not an overriding concern at the site. A spatial evaluation reveals that these pesticides were detected in sediment samples collected southwest of the site along or near the unnamed creek (up to three samples – RYSD10, RYSD12, RYSD13) and at an isolated wet spot (RYSD09). These sediment samples were approximately 350 feet, 315 feet, and 525 feet apart. This information will be added to the report.

EPA Comment 27

Section 6.8 on page 6-61 states that there is considerable uncertainty when estimating concentrations of contaminants in earthworms from soil. The section states that the bioaccumulation factors (BAF) for PCBs may overestimate earthworm tissue concentrations, especially if soil organic carbon are greater than the average of 1.6% measured in the eight soil samples. The section then presents an alternative method for calculating a BAF for accumulation of PCBs by earthworms which results in a EEQs less than one. However, no information is presented stating why this method is more appropriate than the method that resulted in a HQ greater than one. This information only increases the uncertainty in the risk estimates, and supports the need for site specific bioaccumulation tests.

RFAAP Response

The alternative approach used from Jager (1998) is a more appropriate method because it is based on actual laboratory and field studies performed for PCBs. The initial method used in **Section 6.5.2** of the report is based on USEPA (2000) which was directly from the approach used by Connell and Markwell (1990). The Connell and Markwell (1990) approach, however, is suggested to be flawed, according to Jager (1998):

> "The same approach was proposed by Connell and Markwell (1990) for the soil solution-earthworm system, but, unfortunately, their empirical regression is not consistent with the lipid fraction in worms (their data suggest a lipid phase of 25% of the dry weight, whereas 4-6% is more realistic (page 2081)."

Finally, USEPA (2000) did not use the Jager (1998) data in the generation of the regression equation for estimating earthworm bioaccumulation of COPECs from soil because this section of the Soil Screening Level (SSL) Guidance (USEPA, 2000) was written prior to the publication of the Jager (1998) article, according to Sample (2004).[1]

This information will be added to the report.

EPA Comment 28

Section 6.8 on page 6-62 lists the most important biases that may result in an overestimation of risk. One of the biases listed as part of the uncertainty analysis is the inclusion of sample outliers in the estimation of exposure point concentrations for risk drivers. It is unclear how a sample outlier would be defined. However, just because a contaminant is found in a localized area (with

[1] Sample, B., 2004, personal communication between Brad Sample and Mark Weisberg, August 16. Note: Brad Sample wrote the soil to earthworm bioaccumulation portion of the SSL Guidance (USEPA, 2000).

low frequency of detection) released from a point source (i.e., PCBs from transformers), does not mean that it is an outlier. This is particularly true for a large site, where these localized areas of contamination may represent a significant exposure area for invertebrates and wildlife receptors. Clarification on this issue should be provided.

RFAAP Response
An explicit statistical test for outliers was not performed as part of the risk assessment; however, outlier tests such as Rosner's test, Dixon's test, and Grubbs' test do exist. If an observation is statistically determined to be an outlier, USEPA (1992) suggests determining an explanation for this outlier before its exclusion from further analysis. If an explanation cannot be found, then the observation should be treated as an extreme but valid measurement and it should be retained for further analysis.[2] As discussed in the uncertainty section of the report, outliers were not excluded, and therefore this approach may have resulted in an overestimation of exposure point concentrations.

This information will be added to the report to clarify the discussion of potential outliers.

EPA Comment 29
Section 6.9 on page 6-64 states that PCBs do not appear to be widespread through the site and the hazard quotients are acceptable, given the conservative characteristics of the hazard quotient method. Because of the uncertainty in the extent of PCB contamination, and the fact that no information is presented to support that the alternate BAF is more appropriate than the original BAF, EPA BTAG does not support the elimination of PCBs as a potential risk driver. In addition, as stated earlier, the exposure point concentrations used in the Tier 2 evaluation likely underestimate exposure and do not consider the spatial extent of risk across the three areas where PCBs were detected.

RFAAP Response
See Response to Comment No. 27 for a discussion on why the alternative BAF method is a more appropriate method. For a discussion of spatial extent issues, see Response to Comment No. 24. Based on these responses, Aroclor-1254 does not appear to be a significant hazard driver for wildlife populations at the Rail Yard.

EPA Comment 30
Section 6.9 on page 6-64 states that despite the fact that hazard quotients are greater than one for the shrew (selenium), mink (aluminum), and robin (cobalt), they were deemed acceptable, given the conservative characteristics of the HQ method. Methods using more realistic exposure factors were already used in the Tier 2 evaluation to make the food chain modeling less conservative. Despite this effort, hazard quotients were still greater than one. Therefore, the conclusion that the conservative characteristics of the HQ method deems hazard quotients greater than one acceptable is not supported by the information presented in the draft RI Report. Evaluating the spatial extent of risk would be useful for evaluating the extent of ecological risk that could potentially occur to wildlife receptors from these contaminants.

[2] US Environmental Protection Agency. 1992, *Statistical Training Course for Ground-Water Monitoring Data Analysis*, EPA/530-R-93-003, Office of Solid Waste, Washington, DC.

RFAAP Response

Section 6.9 states that the Tier 2 EEQs of 2.8 (shrew, selenium), 1.8 (mink, aluminum), and 1.3 (robin, cobalt) are deemed closed enough to 1.0 to be acceptable, especially given the conservative characteristics of the HQ method. The HQ method is conservative because HQs are not measures of risk, are not population-based statistics, and are not linearly-scaled statistics (see **Section 6.7.3** of the report). Therefore, an HQ above 1, even exceedingly so (which is not demonstrated for the Rail Yard, with EEQs of 1.3 to 2.8), does not guarantee that there is even one individual expressing the toxicological effect associated with a given chemical to which it was exposed (Tannenbaum, 2001, 2003; Bartell, 1996). The fact that more realistic exposure factors were used in the Tier 2 evaluation does not contradict the observation that the HQ method itself is a conservative risk assessment methodology.

The information presented above will be reiterated in the report. A spatial evaluation of selenium, aluminum, and cobalt will also be included, as recommended.

EPA Comment 31

Section 6.9 on page 6-64 states that based on the results of the screening ecological risk assessment (ERA), uncertainties discussed and the fact that no rare, threatened or endangered (RTE) species are present, remedial measures or further study to address ecological concerns are not warranted. Based on the comments below, the EPA BTAG does not agree that the ERA supports this conclusion. In addition, a high degree of uncertainty does not equate to the lack of ecological risk, only the need to reduce the uncertainty by continuing the ERA process. The lack of RTE species on the site, does not mean that ecological risk to other non-RTE species does not need to be addressed. Therefore, EPA BTAG does not support the conclusion of acceptable ecological risk, and the conclusion of no further action recommended in Section 7.0 on page 7-2.

RFAAP Response

As discussed in Response to Comment No. 24, the fact that no RTE species are expected at the Rail Yard means that local populations and communities of biota required protection, not individuals. Given the relatively low Tier 2 EEQs estimated for the Rail Yard, adverse impacts to local populations and communities are not expected. A spatial evaluation will be completed to confirm this finding (see Response to Comment No. 30).

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.

EPA Comment 32

Appendix E-1, Human Health Risk Assessment Tables. It does not appear that the most recent guidance documents were consulted during the preparation of the risk assessment. References for the exposure parameters presented in the Appendix E tables appear to rely on older guidance documents, many of which have been superceded by revised versions. Specifically, U.S. EPA's RAGS Part E, cited as 2001 was updated in March 2003 and August 2004. U.S. EPA's Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (2001) was finalized in December 2002. Finally, U.S. EPA's Child-Specific Exposure Factors Handbook (2002) is not used as a source of exposure parameter values for child receptors. This reference should be used for the selection of exposure parameter values to the greatest extent practicable, and where not superceded by subsequent guidance. Please revise the Report to reference the most current and applicable guidance.

RFAAP Response

The citation for the *Risk Assessment Guidance for Superfund, Part E* (Dermal Guidance), dated August 2004, will be added to the report. The same exposure factors and dermal exposure factors that are presented in the final guidance document have been used in the HHRA for the Rail Yard.

The citation for the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* will be updated in the reference section to reflect the December 2002 version of the document. This guidance was used as a source of exposure factors and assumptions for the construction worker scenario.

The *Child-Specific Exposure Factors Handbook* is designated as "Interim Draft" and the authors acknowledge that this document is still under development. The handbook provides child-specific exposure factors for various age groups. USEPA has proposed eleven distinct age groupings to be considered in risk assessments. (Note that none of these categories matches up with our current age groups of 0 to 6 years of age). According to the document, "…The age groups and the guidance on how to use them are currently under development and will be subjected to peer review. It is important to note that EPA will be directing efforts to revise this handbook to conform to the age grouping guidance as soon as the guidance is finalized. A revised handbook is expected in Fall 2003." Since the most current handbook available (via internet search) was dated September 2002, RFAAP does not believe it is appropriate to use this guidance at this time. When the final version of this handbook becomes available, we will request a separate discussion with USEPA to evaluate its applicability to and implementation in the HHRAs for RFAAP.

Attachment 1

Comparison of ProUCL and RISK2000 UCL-Based Exposure Point Concentrations Used in the Rail Yard 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 (0-4')	Aluminum	43600	25595.2	mg/kg	Student-t	25595.2	mg/kg	95%UCL-N
	Arsenic	13.2	8.0	mg/kg	Student-t	8.0	mg/kg	95%UCL-N
	Chromium	52.9	34.4	mg/kg	Student-t	34.4	mg/kg	95%UCL-N
	Iron	48400	34533.9	mg/kg	Student-t	34533.9	mg/kg	95%UCL-N
	Manganese	791	339.9	mg/kg	Approx. Gamma	377.2	mg/kg	95%UCL-T
	Vanadium	89.3	61.2	mg/kg	Student-t	61.2	mg/kg	95%UCL-N
	Aroclor 1254	1.19	**0.679**	mg/kg	99% Chebyshev	0.164	mg/kg	95%UCL-Bst
Total Soil (0-10')	Aluminum	43600	22877.3	mg/kg	Student-t	22877.3	mg/kg	95%UCL-N
	Arsenic	13.2	7.3	mg/kg	Student-t	7.3	mg/kg	95%UCL-N
	Chromium	52.9	31.7	mg/kg	Student-t	31.7	mg/kg	95%UCL-N
	Iron	48400	31930.3	mg/kg	Student-t	31930.3	mg/kg	95%UCL-N
	Manganese	791	319.7	mg/kg	Approx. Gamma	346.7	mg/kg	95%UCL-T
	Vanadium	89.3	57.6	mg/kg	Student-t	57.6	mg/kg	95%UCL-N
	Aroclor 1254	1.19	**0.599**	mg/kg	99% Chebyshev	0.144	mg/kg	95%UCL-Bst
Sediment	PETN	0.23	0.31[3]	mg/kg	Student-t	0.23	mg/kg	Max
	Arsenic	11.8	8.3	mg/kg	Student-t	9.8	mg/kg	95%UCL-T
	Dichloroprop	**0.353**	0.766[3]	mg/kg	97.5% Chebyshev	0.283	mg/kg	95%UCL-Bst
	Iron	79600	36845.4	mg/kg	Approx. Gamma	37114.6	mg/kg	95%UCL-T
	Vanadium	110	61.1	mg/kg	Approx. Gamma	61.5	mg/kg	95%UCL-T
Surface Water	MCPP	0.0463	0.0652[3]	mg/l	Student-t	0.0463	mg/l	Max

[1] ProUCL EPC UCL Statistics: Student's-t 95% UCL (Student-t); Approximate Gamma 95% UCL (Approx. Gamma); 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). Therefore, 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 Rail Yard SLERA

Exposure Point	Chemical of Potential Concern	Maximum Concentration	ProUCL Exposure Point Concentration [1]			Risk 2000 Exposure Point Concentration [2]		
			Value	Units	Statistic	Value	Units	Statistic
Surface Soil (0-4')	Aluminum	43600	25595.2	mg/kg	Student-t	25595.2	mg/kg	95%UCL-N
	Antimony	0.58	**0.350**	mg/kg	Modified-t	0.348	mg/kg	95%UCL-T
	Arsenic	13.2	8.0	mg/kg	Student-t	8.0	mg/kg	95%UCL-N
	Beryllium	2.46	**2.2**	mg/kg	97.5% Chebyshev	1.5	mg/kg	95%UCL-N
	Chromium	52.9	34.4	mg/kg	Student-t	34.4	mg/kg	95%UCL-N
	Copper	33.7	24.2	mg/kg	Student-t	26.4	mg/kg	95%UCL-N
	Cobalt	74.9	26.5	mg/kg	Approx. Gamma	32.2	mg/kg	95%UCL-T
	Lead	37.1	25.7	mg/kg	Student-t	25.7	mg/kg	95%UCL-N
	Iron	48400	34533.9	mg/kg	Student-t	34533.9	mg/kg	95%UCL-N
	Manganese	791	339.9	mg/kg	Approx. Gamma	377.2	mg/kg	95%UCL-T
	Mercury	0.235	0.113	mg/kg	Student-t	0.120	mg/kg	95%UCL-T
	Nickel	40.3	23.5	mg/kg	Student-t	23.5	mg/kg	95%UCL-N
	Selenium	1.0	0.627	mg/kg	Modified-t	0.693	mg/kg	95%UCL-Bst
	Thallium	0.5025	0.296	mg/kg	Student-t	0.296	mg/kg	95%UCL-N
	Vanadium	89.3	61.2	mg/kg	Student-t	61.2	mg/kg	95%UCL-N
	Zinc	92.0	39.8	mg/kg	Approx. Gamma	45.0	mg/kg	95%UCL-T
	2,4-Dinitrotoluene	0.065	0.118[3]	mg/kg	Modified-t	0.065	mg/kg	Max
	2-Butanone	0.016	0.005	mg/kg	Modified-t	0.005	mg/kg	95%UCL-Bst
	2-Methylnaphthalene	0.0047	0.283[3]	mg/kg	99% Chebyshev	0.005	mg/kg	Max
	4-Amino-2,6-Dinitrotoluene	0.0765	0.118[3]	mg/kg	Modified-t	0.077	mg/kg	Max
	Acetone	0.31	**0.248**	mg/kg	99% Chebyshev	0.051	mg/kg	95%UCL-Bst
	Aroclor 1254	1.19	**0.679**	mg/kg	99% Chebyshev	0.164	mg/kg	95%UCL-Bst
	Benzoic acid	0.17	0.805[3]	mg/kg	Modified-t	0.170	mg/kg	Max
	Carbazole	0.12	0.160[3]	mg/kg	Modified-t	0.120	mg/kg	Max
	Dibenzofuran	0.045	0.158[3]	mg/kg	Modified-t	0.045	mg/kg	Max
	Diethylphthalate	0.1495	0.157[3]	mg/kg	Modified-t	0.150	mg/kg	Max
Sediment	Aluminum	26700	20961.71	mg/kg	Student-t	20961.71	mg/kg	95%UCL-N
	Antimony	1	0.53	mg/kg	Student-t	0.65	mg/kg	95%UCL-Bst
	Arsenic	11.8	8.3	mg/kg	Student-t	9.8	mg/kg	95%UCL-T
	Barium	100	66.62	mg/kg	Student-t	68.24	mg/kg	95%UCL-T
	Beryllium	1.67	1.20	mg/kg	Student-t	1.24	mg/kg	95%UCL-T
	Chromium	79.5	43.60	mg/kg	Approx. Gamma	44.63	mg/kg	95%UCL-T
	Cobalt	15	11.70	mg/kg	Student-t	12.16	mg/kg	95%UCL-T
	Copper	23.4	18.66	mg/kg	Student-t	18.66	mg/kg	95%UCL-N
	Iron	79600	36845.4	mg/kg	Approx. Gamma	37114.6	mg/kg	95%UCL-T
	Manganese	831	418.01	mg/kg	Approx. Gamma	428.52	mg/kg	95%UCL-T

Attachment 2 (Continued)
Comparison of ProUCL and RISK2000 UCL-Based Exposure Point Concentrations
Used in the Rail Yard SLERA

Exposure Point	Chemical of Potential Concern	Maximum Concentration	ProUCL Exposure Point Concentration [1]			Risk 2000 Exposure Point Concentration [2]		
			Value	Units	Statistic	Value	Units	Statistic
Sediment	Nickel	24.5	17.62	mg/kg	Student-t	19.27	mg/kg	95%UCL-T
	Selenium	1.5	1.04	mg/kg	Student-t	1.09	mg/kg	95%UCL-T
	Thallium	0.39	0.30	mg/kg	Student-t	0.31	mg/kg	95%UCL-T
	Vanadium	110	61.1	mg/kg	Approx. Gamma	61.5	mg/kg	95%UCL-T
	2,4,5-T	0.0334	0.363[3]	mg/kg	97.5% Chebyshev	0.033	mg/kg	Max
	2,4,5-TP	0.104	0.369[3]	mg/kg	97.5% Chebyshev	0.104	mg/kg	Max
	2,4-D	0.209	0.742[3]	mg/kg	97.5% Chebyshev	0.209	mg/kg	Max
	2-Butanone	0.1	**0.10**	mg/kg	99% Chebyshev	0.021	mg/kg	95%UCL-Bst
	2-Methylnaphthalene	0.04	0.109[3]	mg/kg	Student-t	0.040	mg/kg	Max
	4,4-DDE	0.007855	0.006	mg/kg	Student-t	0.006	mg/kg	95%UCL-N
	4,4-DDT	0.004	0.003	mg/kg	Student-t	0.003	mg/kg	95%UCL-N
	Acenaphthene	0.059	0.116[3]	mg/kg	Student-t	0.059	mg/kg	Max
	alpha-BHC	0.0005635	0.003[3]	mg/kg	95% Chebyshev	0.001	mg/kg	Max
	alpha-Chlordane	0.0101	0.006	mg/kg	Approx. Gamma	0.010	mg/kg	Max
	Benzo(k)fluoranthene	0.08	0.085[3]	mg/kg	Student-t	0.080	mg/kg	Max
	Dalapon	0.107	5.4[3]	mg/kg	99% Chebyshev	0.107	mg/kg	Max
	delta-BHC	0.0012	0.003[3]	mg/kg	H-UCL	0.001	mg/kg	Max
	Dicamba	0.0497	0.728[3]	mg/kg	97.5% Chebyshev	0.050	mg/kg	Max
	Dichloroprop	**0.353**	0.766[3]	mg/kg	97.5% Chebyshev	0.283	mg/kg	95%UCL-Bst
	Dieldrin	0.0041	0.0034	mg/kg	Approx. Gamma	0.0041	mg/kg	Max
	Endosulfan II	0.000721	0.003[3]	mg/kg	95% Chebyshev	0.0007	mg/kg	Max
	Endrin	0.0125	**0.009**	mg/kg	97.5% Chebyshev	0.0074	mg/kg	95%UCL-T
	Endrin Ketone	0.00203	0.0024[3]	mg/kg	Approx. Gamma	0.0020	mg/kg	Max
	Fluorene	0.07595	0.1036[3]	mg/kg	Student-t	0.0760	mg/kg	Max
	gamma-Chlordane	0.013	0.0076	mg/kg	Approx. Gamma	0.0130	mg/kg	Max
	Heptachlor	0.00213	0.0024[3]	mg/kg	Approx. Gamma	0.0021	mg/kg	Max
	Heptachlor Epoxide	0.00726	0.0065	mg/kg	97.5% Chebyshev	0.0067	mg/kg	95%UCL-T
	MCPP	3.53	540.0[3]	mg/kg	99% Chebyshev	3.53	mg/kg	Max
	Nitroglycerine	0.459	0.33	mg/kg	Modified-t	0.35	mg/kg	95%UCL-T
	PETN	0.23	0.31[3]	mg/kg	Student-t	0.23	mg/kg	Max
	Phenanthrene	0.36	0.15	mg/kg	Approx. Gamma	0.36	mg/kg	Max
Surface Water	Aluminum	0.608	0.4505	mg/l	Student-t	0.6080	mg/l	Max
	Barium	0.0793	0.0682	mg/l	Student-t	0.0793	mg/l	Max
	Chromium	0.0055	0.0053	mg/l	Modified-t	0.0055	mg/l	Max
	Iron	0.553	0.4598	mg/l	Student-t	0.4598	mg/l	95%UCL-N
	2,4,5-TP	0.00005	0.00005[4]	mg/l	---	0.000050	mg/l	Max
	2,4-D	**0.00443**	0.00687[3]	mg/l	97.5% Chebyshev	0.002865	mg/l	95%UCL-Bst
	2,4-DB	0.000709	0.00105[3]	mg/l	Student-t	0.000709	mg/l	Max

Attachment 2 (Continued)
Comparison of ProUCL and RISK2000 UCL-Based Exposure Point Concentrations Used in the Rail Yard SLERA

Exposure Point	Chemical of Potential Concern	Maximum Concentration	ProUCL Exposure Point Concentration [1]			Risk 2000 Exposure Point Concentration [2]		
			Value	Units	Statistic	Value	Units	Statistic
Surface Water	2-Methylnaphthalene	0.000026	N/R[5]	mg/l	---	0.000026	mg/l	Max
	3-Nitrotoluene	0.00125	0.000906	mg/l	Approx. Gamma	0.001042	mg/l	95%UCL-T
	4,4-DDT	0.0000101	0.000010	mg/l	Modified-t	0.000010	mg/l	Max
	Benzoic acid	0.0093	0.0097[3]	mg/l	Student-t	0.0093	mg/l	Max
	Bis(2-ethylhexyl)phthalate	0.00575	0.007112[3]	mg/l	Approx. Gamma	0.005750	mg/l	Max
	delta-BHC	0.000012	0.000011	mg/l	Modified-t	0.000012	mg/l	Max
	Dieldrin	0.000007	0.000010[3]	mg/l	Student-t	0.000007	mg/l	Max
	Endrin aldehyde	0.000012	0.000011	mg/l	Modified-t	0.000012	mg/l	Max
	Endrin Ketone	0.000009	0.000010 [3]	mg/l	Student-t	0.000009	mg/l	Max
	MCPP	0.0463	0.0652[3]	mg/l	Student-t	0.046300	mg/l	Max
	Nitroglycerine	0.00061	0.00055	mg/l	Modified-t	0.000610	mg/l	Max

[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); 95% H-UCL (H-UCL).

[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). Therefore, the MDC would be selected as the EPC for the risk assessment.

[4] No UCL determined b/c there are no unique sample values (i.e., all values = 0.00005).

[5] 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.

Response to VDEQ Comments dated 15 February 2005
for
Draft Rail Yard Remedial Investigation Report
October 2004

VDEQ Comment 1
Figures: Figure 2-1 is intended to present a comprehensive view of the site and all associated sampling throughout the years yet only exceedences to human health criteria is depicted. A series of several maps that give additional detail on the site topography, storm sewer locations, contamination profiles (surface and subsurface), and ecological exceedences would be helpful.

It would also be clearer if the results for particular compounds or groups of compounds (e.g., PCBs, metals, etc.) including non-detects were shown on separate maps.

An overlay of sample locations on an aerial photograph would also be useful due to the size of the area that is being investigated.

RFAAP Response
A figure depicting the NRU drainage system illustrating site topography, storm sewer locations, retention ponds, outfalls, and flow direction will be provided. A section discussing exceedances of ecological screening values will be added to the Nature and Extent Assessment section of the report. However, it is believed that the SLERA is the best place for presenting and discussing ecological risk.

For clarity, aerial photographs depicting sample locations and results compared to RBCs for each parameter group (i.e., VOCs, SVOCs, explosives, etc.) will be added to the report.

VDEQ Comment 2
Groundwater: The *RI Report* does not address the potential for groundwater contamination. At minimum, the report should contain a discussion of the groundwater characteristics (flow, depth, etc.) and the potential migration of contaminants at the site. Any previous sampling that has been performed to determine impacts should be included. If no sampling has been performed, text should be provided to justify the lack of characterization of the groundwater.

RFAAP Response
There are no monitoring wells at the NRU and therefore, there have been no groundwater investigations. Groundwater at the NRU is assessed by the sampling of springs and the unnamed stream that drains the NRU. The stream/springs are logical discharge points for groundwater from the site. Analysis of a spring located at the head of the retention pond at the RY (RYSW02) and retention pond/stream samples (RYSW03, RYSW04, RYSW05, RYSW12, and RYSW13) do not indicate that constituents detected at the RY are being mobilized into surface/groundwater. There is also no indication of active sources or large areas/concentrations of constituents of concern.

VDEQ Comment 3

Sediment Samples: The draft *RI Report* indicates that surface water samples could not be collected from sampling locations RYSD08-10. It is unclear from the text and Figure 2-1 if these samples are truly sediment or if they are more representative of soil. Based on the analytical data, the sediment sample results (detection limits, detects) at these locations differ significantly from the other sediment sampling results. Please provide text to justify that these are locations are sediment and not just intermittently saturated soils.

RFAAP Response

Sediment samples RYSD08-10, and RYSD01 and RYSD07, were collected from engineered drainage control ditches that are ephemerally influenced by precipitation events. Although there was no standing water at the time the samples were collected because of drought conditions, the samples were positioned in a biased manner where samples targeted low lying, depositional areas. Thus, sediment and contaminant accumulation would be expected to occur at these locations. Based on this, the samples were considered to be representative of sediment. For clarification, additional text will be added to the report to justify the classification of these samples as sediment.

In the HHRA, rather than run two different data sets for sediment, all sediment exposures will be treated as "wet soil" to be conservative. The adherence factors will be adjusted to reflect wet soil conditions. An adherence factor of 0.6 mg/cm^2 will be applied for the maintenance and excavation workers. Although there are no specific adherence factors listed in Exhibit 3-3 (RAGS, Part E) for adult resident exposures to wet soil, we will use an adherence factor of 0.2 mg/cm^2. This value reflects the average value of the adherence factors for farmers, rugby players, archaeologists, and reed gatherers (based on geometric mean) that are likely to have similar exposures to wet soil. The same value (0.2 mg/cm^2) is also used as the adherence factor for children playing in wet soil.

The potential for over-estimating risk and hazard by treating all sediment sampling locations as "wet soil" will be discussed in the uncertainty section of the HHRA. It is noted that sediment will not be evaluated in the swimming scenario because the retention pond is deep enough that sediment would be likely to wash off rather than adhere to the skin.

In the SLERA, all of these samples were treated as sediments. During non-drought conditions they would be expected to be inhabited by aquatic macroinvertebrates and chemicals in the sediments would be expected to potentially contribute to the aquatic food chain via bioaccumulation. Therefore, a direct contact assessment was performed for aquatic invertebrates, and bioaccumulation of COPECs from sediment to aquatic invertebrates and subsequent ingestion by aquatic wildlife (e.g., mink and great blue heron) was performed.

In terms of analytical sensitivity, a further review of the detection limits and reporting limits for RYSD08-10 indicates that, with the exception of herbicides, which were diluted prior to analysis, analytical sensitivities are comparable to other sediment samples analyzed at the RY. With regards to sample results, the data is consistent with other sediment results, with the exception of RYSD08 for select metals.

VDEQ Comment 4

Surface Soil Depth: Several inconsistencies with the sampling depth of the surface soil data set were noted throughout the text and tables of the report. It appears that for the human health risk assessment, the surface soil data set incorporated soils down to 4 feet below ground surface whereas the ecological risk assessment incorporated soils down to 2 feet below ground surface. Human health and ecological risk assessments guidance recommend that surface soil be collected from the 0"-6" interval. Additional rationale on the basis for the inclusion of soils, from 2 and 4 feet below ground surface, into the surface soil data set should be provided or the deeper soils should be removed from the data set.

RFAAP Response

The surface soil data sets used for both ecological and human health risk assessments were identical. The text will be clarified to state this. As there was a combination of historic surface soil data collected from 0-2 feet and recent surface soil data collected from 0-6 inches, the zone 0-2 feet was selected for surface soil in order to include all the near-surface soil samples in the analysis. There were a few historic soil samples collected from 0-4 feet and from 1-3 feet (as discussed in Section 5.1.3.1). Again, to be inclusive, these samples were classified as surface soil and used in the assessments. Several of the 0-4 foot and 1-3 foot samples were inadvertently left off the SLERA sample list (Table 6-8); therefore, the following five samples will be added to the table under the surface soil column: RYSB4A, RYSB5A, RYSB6A, RYSB7A, and RYSB7AD (duplicate).

VDEQ Comment 5

Age of Samples: According to Section 3.1, data collected in 2002 was integrated with the 1998 data to form the risk assessment data set. It is unclear how data collected in 1997 is considered representative of 2005 site conditions.

RFAAP Response

The text in Section 3.1 will be revised to also indicate that the 1997 data was integrated with the 1998 and 2002 data to form a combined data set for evaluation in the *Nature and Extent of Contamination Assessment.*

Chemical sensitivities are evaluated for each scoped project during the work plan development process. For each chemical, the values representing the method detection limits (MDLs) and the method reporting limits (MRLs) are compared during data evaluation procedures. Due to a lack of sensitivity data, the 1997 and 1998 Gannett Fleming data was not included for evaluation in the human health or screening level ecological risk assessments. Text will be added to the risk assessments to clarify this.

With respect to the age of samples, it is believed that data collected from 1997 is, in fact, representative of current site conditions. The RY has been an inactive site since the 1960s and has remained unchanged since that time. In addition, to date, two sites (SWMU 58 and SWMU 39) containing data from 1992 have been reviewed by the VDEQ and USEPA. The RFI for SWMU 58 has been approved by the VDEQ and USEPA. There have been no Agency or Commonwealth concerns with respect to the age of samples at SWMU 39.

VDEQ Comment 6

Selection of COPC: The hierarchy and rationale for the selection of COPC should be further explained within the text. It appears that contaminants were not included as COPC if they did not exceed background concentrations and RBC values. Traditionally, exceedance of background is sufficient criteria for inclusion as a site related contaminant. With respect to background, additional tables and figures that provide a better description of the data set would be helpful.

RFAAP Response

The report will be revised to state that, in the Nature and Extent of Contamination section, constituents with concentrations below background are not considered to be the result of site activities. The Nature and Extent section uses exceedances of RBCs to evaluate fate and migration patterns for those chemicals of most concern. Therefore, constituents above background, but below RBCs are not tracked. The HHRA and SLERA evaluate risk and background concentrations are not used to screen out constituents in the risk assessments.

It should be noted that each of the tables and figures in the Nature and Extent of Contamination Assessment provide an evaluation of inorganic constituents compared to background. If an inorganic constituent is detected above the facility-wide background concentration (95% UTL), the detected concentration is shown as a bold value on the tables and figures.

The selection of COPCs for the purpose of the HHRA is detailed in Sections 5.1.2, 5.1.2.1, 5.1.2.2, and 5.1.2.3. In addition to screening against background concentrations, USEPA Region III allows for the use of RBCs as screening criteria. Per USEPA Region III's Risk Assessment Technical Guidance entitled "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening" (January 1993): "…The baseline risk assessment process is made more efficient by focusing the dominant contaminants and exposure routes at the earliest feasible stage" (USEPA, 1993). In addition, the USEPA approved the use of RBCs as screening criteria for the COPC selection process in the "Radford Ammunition Army Plant Site Screening Process" (USEPA, 2001) and "Final Master Work Plan" (URS, 2003). This approach has been applied throughout the project.

VDEQ Comment 7

Exposure Scenario: Current Maintenance and Industrial Workers should be evaluated as a potential receptor from exposure to soils during mowing or trenching activities.

RFAAP Response

The exposure scenarios for RFAAP were based on current and future land use at the Installation. As stated in Section 5.2.1, maintenance workers are the most likely receptors at the site. The maintenance worker scenario was intended to represent occasional grounds maintenance and inspection activities. Their exposure frequency is once per week or 50 days/year (assuming two weeks vacation) and exposure duration is 25 years. Examples of these maintenance activities at RFAAP will be added to the text.

Given the current land use at RFAAP, the Rail Yard is not routinely used or visited by workers on the Installation. Therefore, a current industrial worker scenario (indoor and outdoor) with the standard default values for exposure frequency (EF) of 225 days/year and exposure duration (ED) of 25 years does not apply and was not evaluated. Although land use at the Rail Yard is anticipated to be similar in the future, hypothetical future exposures to adult residents were considered in the residential scenario (Section 5.2.1.2). Because the exposure parameters for adult residents are more conservative, the exposure scenario for the adult resident would be protective of the industrial/commercial worker. If the Rail Yard passes the residential scenario, it will be assumed that the Rail Yard passes the industrial worker scenario. Conversely, if the Rail Yard does not pass the residential scenario, the industrial worker scenario will be evaluated using a risk-ratio approach in the Uncertainty Section (Section 5.5).

Currently, there are no trenching, excavation, or construction activities taking place at the Rail Yard. Therefore, no current excavation or construction worker scenario was considered in HHRA. However, trenching activities are addressed under the future construction worker scenario (Section 5.2.1.2).

The exposure scenarios specified in the HHRA for the Rail Yard have been consistently evaluated for all sites throughout the project. As stated, a current maintenance worker was evaluated for the Rail Yard. There is no new information regarding land use that would warrant the addition of a current industrial worker and current excavation or construction worker.

VDEQ Comment 8
Input Parameters: Additional justification should be provided standard EPA default values are not selected as input parameters in the risk assessment calculations.

RFAAP Response
For the HHRA, USEPA default factors were obtained from various USEPA guidance documents, which were cited in the discussion for each exposure scenario in Section 5.2.3 and Appendix E-1, Tables E-13 through E-20. For non-standard scenarios such as exposures to sediment and surface water while wading in the stream or swimming in the pond, best professional judgment was used to develop the exposure scenario and develop the input parameters. The rationale for the site-specific parameters is also presented in Section 5.2.3, where applicable.

Additional justification will be provided when standard EPA default values are not selected as input parameters in the SLERA risk assessment calculations.

VDEQ Comment 9
NFA Ecological: Based on the limited data set, the conclusion of No Further Action – Ecological is not supported by the sample results. It is recommended that additional ecological work be performed to lessen the uncertainty and better define the risk to the ecological receptors.

RFAAP Response
The number of samples collected for characterization of the Rail Yard is sufficient, especially as many sample locations were selected using a biased sampling approach,

increasing the likelihood of detecting contamination. A recommendation of No Further Action based on the results of the SLERA is supported by the sample results and the detailed evaluation presented in the uncertainty analysis. The use of alternative bioaccumulation values for key COPECs demonstrates that the estimated wildlife EEQs are generally acceptable, as the Tier 2 LOAEL-based EEQs are all less than 3. It should be noted that the alternative bioaccumulation factors are from either USEPA publications (i.e., chromium) or from peer-reviewed literature (i.e., Jager et al., 1998) that present an approach more appropriate than that used in the original assessment. Although concentrations of aluminum and 4,4'-DDT in surface water exceed promulgated water quality criteria, this finding does not trigger the requirement for additional ecological work. These exceedances are likely due to suspended particles (total, not filtered surface water samples were collected), background conditions, and/or anthropogenic sources of pesticides.