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LETTER TRANSMITTING FINAL REMEDIAL INVESTIGATION REPORT AND RESPONSES  
TO COMMENTS FOR FIREFIGHTER TRAINING AREA, LIGHTER AMPHIBIOUS RESUPPLY  
CARGO (LARC) 60 MAINTENANCE AREA, AND AUTO CRAFT AREA FORT STORY VA  
9/10/2002  
MALCOLM PIRNIE

September 10, 2002

**0077**

Ms. Joanna Bateman  
Remedial Project Manager  
U.S. Army Transportation Center  
Building 1407, ATZF-PWE  
Fort Eustis, Virginia 23604-5332

Re: Final Remedial Investigation Report  
Redline/Strikeout Version for Review  
Fort Story Sites  
Contract DACA31-94-D-0017, D.O.s 17, 20, and 24

Dear Ms. Bateman:

Malcolm Pirnie is pleased to provide to Fort Eustis this **Final Remedial Investigation Report** (Redline/Strikeout Version) and responses to comments (RTC) for the FTA, LARC 60, and Auto Craft sites at Fort Story, Virginia. Two copies of the report and RTC have been submitted to VDEQ for review and comment.

We have also enclosed two copies of the Final QCS/AR Addendum for the 2000 sampling event.

It has been a pleasure to provide this document to Fort Eustis. We look forward to further discussions relative to this project.

Very truly yours,

MALCOLM PIRNIE, INC.

  
Anthony K. Pace  
Project Manager

akp  
0285-588-330

Enclosures

C: S. Wilcox, VDEQ w/encl (2 copies)

Comment on the draft "Remedial Investigation Report  
Firefighter Training Area, LARC 60 Maintenance Area,  
Auto Craft Building Area, Fort Story" December, 1995.

1. Page 2-10: Section 2.2.10 Investigation Derived Waste Management-Please find attached the Department of Environmental Quality Policy regarding investigation derived wastes.
2. Page 2-14: The PA/SI for several sites included in this RI indicated that pesticides or PCBs were detected. This class of compounds were not evaluated in the RI. Some explanation should be provided as to the reason for not evaluating the pesticide/PCB fraction in this RI. Comments on the ecological risk will also address this point.
3. Page 2-18: It is noted that samples were not collected north of the site. In a comment provided by the staff in October, 1991 it was suggested that the area north of the site be further investigated, even though the contaminant levels were low. Some additional discussion of the determination not to sample in the north area seems appropriate.
4. Page 3-1: Physical Characteristics. This section states that the land features at Fort Story consist of sand ridges, sand flats, and wetland areas. These areas as well as the Chesapeake Bay and Atlantic Ocean are all potential targets and should be addressed in an ecological assessment.
5. Page 3-2, Section 3.1.3: This section states that "surface water on Fort Story is conveyed by drainage ditches or storm water lines to the Chesapeake Bay on the northwestern portion of the facility, to the Atlantic ocean on the northeast portion of the base, to wetland areas adjacent to Broad Bay on the southern portion of the facility". These areas are all potential targets and need to be addressed in an ecological assessment with sampling results included and continued monitoring.
6. Page 3-10: It is not clear why no inorganic analyses were performed for the upgradient well at the Firefighter Training Area.
7. Page 3-11: The first paragraph on this page indicates that arsenic was not detected in the upgradient wells. However, the table on the previous page indicates an arsenic concentration of 40.01 mg/L in well MW-118. The data validation summary table indicates that arsenic was undetected at this well. Please clarify.

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8. Page 3-12: Section 3.1.6. Ecology-This section should address fauna as well as flora. It is difficult, or impossible, to know if receptors are exposed to the contaminated media when it is unknown what potential receptors exist on or near the sites. It is recommended that a species inventory be performed at Fort Story to establish potential receptors. Performing site specific inventories would not account for terrestrial animals that range over larger areas.
9. Page 4-1: Section 4 Nature and Extent of Contamination-The results of the quality assurance checks by the U.S. Army Corps of Engineers New England Division (NED) Laboratory should be provided and discussed.
10. Page 4-1: Section 4.1.1 Definition of ARARs-Attached is a preliminary identification of Commonwealth of Virginia ARARs. This information identifies state statutes and regulations which may serve as ARARs. As the site proceeds to the feasibility phase these ARARs may be refined or expanded.
11. Page 4-6: Section 4.3.1 Surface and Subsurface Soils-Is access to this site(s) sufficiently restricted to justify the use of the industrial soil screening criteria?
12. Table 4-5: Fire Training Pit Soils Data-Volatile Organic Compounds. The concentration of acetone in SB04-022 may be sufficient to result in transfer from soil to groundwater.
13. Table 4-5: The concentrations of fluoranthene and pyrene at all sampled soils levels in SB04-022 exceed the Biological Technical Assistance Group (BTAG) screening levels for ecological risk (100 ppb for fluoranthene and pyrene).
14. Table 4-5: The total metals data indicate that levels of arsenic in several soil samples at the Fire Training Pit exceed the EPA Region III Risk Based Concentration (RBC) for residential soils.
15. Table 4-5: From an ecological risk perspective chromium, copper, lead and zinc may pose some concern at the Fire Training Pit and should be compared to the BTAG screening levels.
16. Table 4-6: Fire Training Area-Sediment. The concentration of lead exceeds the BTAG screening level for ecological risk in SD04-001.
17. Page 4-16: Fire Training Area-Groundwater. It is indicated that vinyl chloride concentrations detected by onsite methods could not be confirmed by offsite lab analysis. How

did the New England Division Lab data compare to the onsite lab and the Savannah Lab? Vinyl chloride is a degradation product of perchloroethylene (PCE) and trichloroethylene (TCE) and could be present in future samples even if not confirmed at this time.

18. Page 4-20: This section of the report mentions a change in flow direction from previous determinations. Does this statement relate to the issue in the PA/SI on pages 2-37 and 2-38 concerning a groundwater divide? Please clarify.
19. Table 4-9: Soil Results for the LARC 60 Area. While the data indicate the concentrations are less than the industrial screening level, some consideration should be given to the residential level proposed by EPA since Fort Story is not a restricted access Area. This issue of residential versus industrial will be addressed in the risk assessment section.
20. Table 4-9: Levels of methylene chloride greater than 10 ppb would have the potential to transfer from soil to groundwater. A number of soil boring samples contained methylene chloride concentrations greater than this level and the impact on groundwater should be discussed. The levels of TCE in several samples were also at concentrations at which groundwater would be impacted. Please address TCE in the discussion.
21. Table 4-9: The levels of arsenic in SB06-001 (0-1 ft) and (5-7 ft) exceed the EPA region III RBC for residential exposure in soil of 0.37 mg/kg.
22. Page 4-23: Twenty-nine soil samples had total petroleum hydrocarbons as heavy oils at concentrations greater than the screening level of 100 mg/kg. What is the impact of these concentrations on the site?
23. Table 4-11: Surface Water Results. The surface water data should be compared to Virginia's Surface Water Standards VR 680-21-00, May 20, 1992.
24. Table 4-12: The groundwater data in Table 4-12 indicates tetrachloroethene (PCE) and trichloroethene (TCE) have MCLs of 5 ppb. Concentrations of PCE and TCE in MW-117 exceed the 5 ppb MCL. Please discuss the impact of these compounds.
25. Table 4-12: The concentrations of total and dissolved arsenic in MW-117 exceeds the Virginia Groundwater Standard as well as the EPA Region III RBC. This should be addressed.
26. Page 4-34: Was vinyl chloride detected in the samples sent to the New England Division Laboratory?

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27. Table 4-13: The MCLs for cis 1,2-DCE, toluene, TCE and PCE were exceeded in several groundwater samples. Please discuss the significance of these compounds in groundwater.
28. Table 4-13: Metals concentrations in Table 4-13 should be compared to the Virginia Groundwater Standards. The following metals appear to exceed the standards in one or more groundwater samples: arsenic, cadmium, chromium, lead, and zinc.
29. Page 4-38: While the concentration of PCE, TCE, or DCE may not exceed the 1% to 10 % rule of thumb, the level of solvents present would suggest that the groundwater may be contaminated with DNAPL and if the sampling was expanded the non-aqueous phase may be located.
30. Page 4-39: Some discussion of vinyl chloride as a degradation product seems appropriate since vinyl chloride is one of the final breakdown product of PCE and TCE.
31. Table 4-14: The concentration of methylene chloride and TCE in SB07-001 (0-1 ft) would indicate a potential transfer to groundwater.
32. Table 4-14: The levels of semivolatile organic compounds in soil should be compared to the EPA soil screening levels for transfer from soil to groundwater.
33. Table 4-14: Arsenic exceed the residential screening concentrations for soils compared to the EPA Region III RBC Tables.
34. Page 6-3: Ecological Risk Assessment. A significant exposure pathway which has been overlooked includes groundwater to surface water (i.e., Chesapeake Bay and the Atlantic Ocean) where aquatic receptors could be exposed. Groundwater flow information obtained from the monitoring wells (including the direct push technology) indicates contaminated groundwater from the Fire Training Area (FTA) likely discharges to the Chesapeake Bay, and contaminated groundwater from the LARC 60 Area and the Auto Craft Area likely discharge to the Atlantic Ocean. A preliminary evaluation using EPA Region III's interim guidance should be conducted. The groundwater Contaminants of Potential Concern (COPCs) and the BTAG aquatic marine values should be used to calculate an EEQ (or hazard quotient). The calculated EEQ will dictate whether additional studies are necessary (e.g., modelling studies).
35. Page 6-3: Ecological Risk Assessment

The collection of pesticide and PCB data has been excluded from the Remedial Investigation at all three sites. Data presented in the Preliminary Assessment Report Addendum for Fort Story, VA shows DDT and its metabolites were detected in the surface soil at all three sites. It is also noted that PCBs were detected in the sediments at Site 8, which comprises the drainage outfall line for the LARC maintenance area. Since these chlorinated compounds were detected during an earlier study, this by itself is a valid reason to have included these compounds in the RI. These compounds generally play a significant role in the evaluation for ecological risk. This is considered a data gap.

36. Page 6-3: Ecological Risk Assessment  
Relative to the number of surface soil samples/soil borings collected at each site, limited samples were analyzed for total metals. This concern is raised since the metals that have been detected in the surface soils and sediments appear to be the COPCs driving the ecological risk. In fact, when EEQ's are calculated for these contaminants, many of the calculated numbers are well above the values established in the Region III guidance which suggest there is potential for moderate ( $EEQ \geq 10$ ) to extreme risk ( $EEQ \geq 100$ ). With limited metals data, the extent of contamination may not be fully delineated.
37. A shortage of metals data also precludes the use of the 95% Upper Confidence Level (UCL). In order to calculate a statistically valid UCL, a minimum of 7 independent data points at each site for that medium are necessary. This is important because the EEQ calculations derived by VDEQ are based on the maximum concentrations which may be overly conservative (unless hot spots exist).
38. Page 6-5: The third paragraph on this page indicates that there is no opportunity for human contact with subsurface soils as long as they are not disturbed. For the future use scenario, it should be assumed that construction activities may occur in the future and subsurface soils could be brought to the surface and be available for direct contact.
39. Table 6-1: The Region III risk based concentrations (RBCs) should be adjusted to a target hazard quotient of 0.1 for noncarcinogens. (Divide noncarcinogen RBCs by 10.)
40. The RBC values for arsenic on this table are for noncarcinogenic effects. The RBC for carcinogenic effects should also be included.
41. Table 6-2: The values shown as the minimum and maximum

- detected concentrations for aluminum in filtered samples have been qualified "R" in the data validation summary tables. It is not clear why they have been included on this table.
42. It is not clear why the frequency of detection column shows a total of three dissolved samples. The summary tables show four samples with and "F" suffix. Does the "F" indicate that the samples were filtered?
  43. It is not clear why the detected range for barium is shown as 0.021 - 0.052 mg/l. Sample number 4MW-2SF had a detection of barium of 0.14 mg/L. Please clarify.
  44. As noted above, the RBCs on this table should also be adjusted to a target hazard quotient of 0.1
  45. Table 6-3: The RBCs on this table should also be adjusted to a target hazard quotient of 0.1 and the RBC for carcinogenic effects for arsenic should also be included. The more conservative of the RBCs for the thallium compounds may be used as a surrogate RBC for thallium.
  46. Page 6-7: The exposure assessment should also describe site access controls and surrounding land use. For example, is there housing on the installation? Is the site fenced? Could children or other trespassers access the site?
  47. Page 6-8 (Current Situation): Since the aquifer is apparently capable of supporting non-potable uses, at a minimum, the risk due to exposure to groundwater during nonpotable use should be assessed quantitatively for any contaminant that exceeds the screening level.
  48. Page 6-8 (Future Land Use): Since the decisions concerning base closure are not made by the facility, continued government ownership cannot be assumed. For risk assessment purposes, the most conservative scenario (residential) should be assumed for future use of the installation. In addition, military and civilian workplace scenarios should be assessed.
  49. Page 6-8 (Human Health Evaluation Summary): If the results of the risk-based screen change due to the above comments, a quantitative assessment of risk should be performed for any contaminants that exceed the screening levels. The conclusions should be revised as appropriate.
  50. Page 6-10, Section 6, Baseline Risk Assessment FTA site: This section indicates that "because the site has been

highly disturbed from numerous training and operational activities (little or no vegetation is present), and no minimal habitat is available, no pathways for exposure are present. Therefore, no impacts to the environment through contact with surface soils from the site are expected". Due to the lack of vegetative cover, soil contaminants are likely to be transported through the air pathway.

51. Page 6-10, Section 6, Baseline Risk Assessment FTA site: This section indicates that several metals were detected at concentrations above EPA Region III BTAG screening levels in the lowland area. This section also indicates that "because sediment is covered with a minimum of three inches of pine needles and leaves, no exposure pathway is identified for wildlife to the sediment in the lowland area". It is not clear how this would prevent exposure to wildlife. Please provide an explanations to how wildlife and ecological receptors would not be at risk. It is also a valid pathway for the transport and migration of contamination.
52. Page 6-11: The third paragraph on this page indicates that there is no opportunity for human contact with subsurface soils as long as they are not disturbed. For the future use scenario, it should be assumed that construction activities may occur in the future and subsurface soils could be brought to the surface and be available for direct contact.
53. Table 6-7: As noted above, the RBCs on this table should also be adjusted to a target hazard quotient of 0.1 and the RBC for carcinogenic effects for arsenic should also be included. This will effect the conclusion on the top of page 6-12.
54. Table 6-8: As noted above, the RBCs on this table should also be adjusted to a target hazard quotient of 0.1 and the RBC for carcinogenic effects for arsenic should also be included. This will result in additional contaminants exceeding the screening levels.
55. The maximum values listed on Table 6-8 for arsenic, barium, cis-1,2-dichloroethene, trichloroethene, tetrachloroethene, and xylenes could not be verified from the summary tables. Please clarify.
56. It also appears that two detections of 4-methyl-2-pentanone were not included on the hazard assessment table.
57. Table 6-9: As noted above, the RBCs on this table should also be adjusted to a target hazard quotient of 0.1

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58. Table 6-10: Summary tables for surface water samples could not be located to verify the table values. Federal Ambient Water Quality Criteria for manganese should also be included on this table.
59. Page 6-14: The third paragraph on this page indicates that additional impacts to groundwater quality due to leaching of tetrachloroethene (PCE) would not be anticipated since the concentration exceeded the soil screening level in only one sample. However, PCE is a contaminant of potential concern in groundwater. Therefore the potential for leaching to groundwater should not be ruled out at this time.
60. Page 6-14, Section 6: This section states that "Methylene chloride is a common laboratory contaminant which may account for the widespread detection in site soils". While it is true that methylene chloride is a common laboratory contaminant, it should not show widespread detection in soils. Was methylene chloride detected in samples sent to the New England Lab? Were lab blanks analyzed which would indicated the level of lab contamination?
61. Page 6-15: The exposure assessment should also describe site access controls and surrounding land use as discussed in a previous comment. Could children or other trespassers wade in the ditch at this site?
62. Page 6-15 (Current Situation): Since the aquifer is apparently capable of supporting non-potable uses, the risk due to exposure to groundwater during nonpotable use should be assessed quantitatively for any contaminants exceeding the screening level.
63. Page 6-16 (Future Land Use): Since the decisions concerning base closure are not made by the facility, continued government ownership cannot be assumed. For risk assessment purposes, the most conservative scenario (residential) should be assumed for future use of the installation. In addition, military and civilian workplace scenarios should be assessed for contaminants that exceed the screening levels.
64. Page 6-16 (Human Health Evaluation Summary): If the results of the risk-based screen change due to the above comments, a quantitative assessment of risk should be performed. The conclusions should be revised as appropriate.
65. Table 6-15: The concentrations shown for fluoranthene, pyrene, and benzo(g,h,i)perylene could not be verified from the summary tables. For metals, it is not clear why there

is only one sample when two are shown on the summary table. If these are duplicate samples, why were they taken on different days? Please discuss how duplicate samples were treated for risk assessment purposes. Why is the nickel detection not included in the hazard assessment? Why is the maximum arsenic concentration shown as 1.3 mg/kg when sample SSB07-004-24 had a detection of 1.5 mg/kg?

66. As noted above, the RBCs on this table should also be adjusted to a target hazard quotient of 0.1 and the RBC for carcinogenic effects for arsenic should also be included. This will result in additional contaminants exceeding the screening levels.
67. Arsenic, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene should be listed as contaminants of potential concern on this table.
68. Page 6-19: The second paragraph on this page indicates that there is no opportunity for human contact with subsurface soils as long as they are not disturbed. For the future use scenario, it should be assumed that construction activities may occur in the future and subsurface soils could be brought to the surface and be available for direct contact.
69. The last paragraph on this page (and the top of the following page) indicates that PAHs were less than the RBCs although the previous paragraph indicates that some PAHs exceeded RBCs. The last paragraph should be modified accordingly.
70. While it is probably true that the levels of PAHs detected at this site are consistent with leaching from asphalt, the levels would also be consistent with used motor oil. Is there any way to definitively link the contaminants to the asphalt cover? It would be preferable to assess risk for those contaminants that exceed RBCs. However, if the installation chooses not to, it should be noted that any decision document related to this site should include a provision to maintain the integrity of the asphalt cover.
71. Page 6-21: The first paragraph on this page states that there is only minimal potential for barium to impact groundwater quality since it was only detected in one sample above the soil screening level. However, metals were analyzed in only a limited number of samples. It is therefore difficult to justify this statement.
72. Page 6-21: The exposure assessment should also describe site access controls and surrounding land use. For example,

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is there housing on the installation? Is the site fenced?  
Could children or other trespassers access the site?

73. Page 6-21 (Current Situation): Since the aquifer is apparently capable of supporting non-potable uses, the risk due to exposure to groundwater during nonpotable use should be assessed quantitatively for any contaminants exceeding the screening level.
74. Page 6-22 (Future Land Use): Since the decisions concerning base closure are not made by the facility, continued government ownership cannot be assumed. For risk assessment purposes, the most conservative scenario (residential) should be assumed for future use of the installation. In addition, military and civilian workplace scenarios should be assessed for contaminants that exceed the screening levels.
75. Page 6-22 (Human Health Evaluation Summary): If the results of the risk-based screen change due to the above comments, a quantitative assessment of risk should be performed. The conclusions should be revised as appropriate.
76. A section presenting an uncertainty analysis should be added to the risk assessment.
77. Page 6-22: Section 6 Baseline Risk Assessment, Ecological Assessment. According to this section, on-site vegetation and wildlife inventories were not conducted as part of this investigation. Ecological inventories should be developed for all of the sites in this investigation.
78. Page 6-23, Section 6, Groundwater/Soil: This section states that "groundwater probably discharges to the Atlantic Ocean", but that "no impacts to the environment through groundwater contact are expected, and no potential ecological risk will be conducted". Due to the Atlantic Ocean being a potential target, an ecological risk assessment should be done to determine the effect, if any that these contaminants are having on it. This section also states that because the site is partially paved and little vegetative cover exists, that no impact to the environment through contact with the surface soils from the site are expected. Due to the lack of vegetative cover, soil contaminants are possibly transported through the air pathway.
79. Table 6-18: In the ERA portion of Section 6 for the Auto Craft Building Area, Table 6-18 does not identify many of the PAHs as "Potential Concern?" Please note that 10 of

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these compounds exceed the Fauna BTAG screening levels plus the majority have EEQs >10.

80. Section 7: This section may need revision after revision of the baseline risk assessment.
81. Section 8: The no further action recommendations cannot be supported until human health risk is adequately assessed at the sites. The groundwater at the LARC 60 site is a particular concern. In the section on fate and transport, it was noted that levels of degradation products of tetrachloroethene (PCE) have increased since the PA/SI. Note that vinyl chloride, a degradation product of PCE, is more toxic than the original compound and may be a concern in the future. Therefore, at the very least, continued groundwater monitoring should be considered.

**RESPONSE TO VDEQ COMMENTS  
DRAFT RI FOR FTA, LARC 60 AND AUTO CRAFT SITES  
FORT STORY, VA**

COMMENT	RESPONSE
1	Page 2-10: Analytical data obtained from the containerized soil and purge water indicated that the material was not classified as a hazardous waste with the drums subsequently managed as a solid waste. The text will be revised to reflect the results of the analytical data. Future projects at these sites will include IDW management pursuant to the requirements of the VDEQ Policy.
2	Page 2-14: Neither pesticides nor PCBs were detected at concentrations greater than trigger levels established during the PA/SI, and therefore, they were not identified as contaminants of concern and were not included in the RI. In addition, the levels detected during the PA/SI are consistent with levels expected due to normal application in industrial areas for pest and weed control, and not from uncontrolled spills or leaks. The text will be revised to reflect these issues.
3	<p>Page 2-18: It is not clear which site (FTA or Auto Craft) the reference is made since the text at the top of page 2-18 refers to the Auto Craft site while the text at the bottom of the page refers to the FTA site. It is assumed that since Figures 2-10 and 2-11 show the location of samples collected from the area north of the Auto Craft site that the reference is for the FTA.</p> <p>FTA Site - The northern area of the site was investigated in this RI with four DPT points (#1 through #4), one monitoring well (4MW-1), six surface soil (SS-23 through SS-28), and six soil borings (SB-1 through SB-6) sampled in this area of the site with low levels of various contaminants detected. If the area that VDEQ is referencing is the area north of the site then it is unclear why investigations are required there. No samples were collected from the area north of the road (north of where 4MW-1 and SB-1 were installed during this RI) during previous investigations and no documentation is present that suggests that area was used for industrial operations, storage or past disposal.</p>
4	Page 3-1: Agreed. A detailed revised ecological risk assessment (ERA) addressing these issues will be conducted. The findings (Section 7.0 of the RI Report) will be submitted to VDEQ for review prior to issuance of the Final RI Report.
5	Page 3-2: Same as response to Comment #4. We believe that there is sufficient analytical data located within drainage areas and conveyances to assess ecological risk. However, if the ERA indicates that there is a potential risk to downstream receptors (i.e., Chesapeake Bay and/or Atlantic Ocean), then additional investigations may be required. The need for additional sampling (if required) will be stated in Section 9, Recommendations.
6	Page 3-10: Based on the estimated groundwater flow direction stated in the PA/SI, monitoring well 4MW-1 was installed as the upgradient location with all parameters including inorganics analyzed for. However, based upon our evaluation, the groundwater flow direction was determined to be towards the Chesapeake Bay to the north. This change in direction makes 4MW-1 a downgradient well and 4MW-4 the upgradient well, however, inorganics were not analyzed at 4MW-4. The text will be revised to reflect this.

COMMENT	RESPONSE
7	<p>Page 3-11: There was a typo in the table on Page 3-10. The total arsenic concentration should have read &lt;10 not 40.01. The table will be revised.</p>
8	<p>Page 3-12: The discussion on ecology will be expanded to include fauna including the identification of endangered species for the Fort Story area. A species inventory was conducted by the USACE in 1993 for the Fort Story/Cape Henry region. This list is included as an appendix to the Draft Fort Story Integrated Natural Resource Management Plan prepared by Horne Engineering and Environmental Services in June 1995.</p> <p>A full fauna survey of Fort Story is not expected to be conducted as part of the ERA. In conjunction with the database established in the Horne report, a biological survey for each site will be conducted. Each site's ecology will be described based on vegetative community. Qualitative vegetative surveys would be performed to note vegetation diversity and abundance (e.g., line intercept or quadrant sampling). Additional faunal surveys (herpetological, avian, and mammalian) would be conducted in the field through limited trapping and incidental occurrence verification. A full list of species that could occur on the base will be included. This list would be compiled from the existing information.</p> <p>By conducting surveys at each site and utilizing the list of species for the region, receptor species can be selected with certainty and species' use of each site can be more accurately determined and fewer assumptions made during the risk modeling process. VDEQ states that site-specific inventories would not account for terrestrial animals that range over larger areas. However, the potential exposure to contaminants for these animals would be reduced due to their larger range and typically these animals are not selected as indicator species. The selection of a species with a smaller range is more conservative and therefore, preferable since the potential risk of exposure is greater</p>
9	<p>Page 4-1: If the results of the USACE NED laboratory analysis are greater for specific compounds than the original sample, the greater results will be reported in the tables in Section 4.0. The raw data results of the NED QA sampling are provided in Appendix D of the Quality Control Summary/ Analytical Results Report (QCS/ARR) and their impacts on data quality discussed in Section 4.2 of the QCS/ARR. Section 4.0 of the RI Report discusses the nature and extent of contamination, not a review of data quality which is discussed in the QCS/ARR.</p>
10	<p>Page 4-1: Agreed. If any of the sites proceed to a Feasibility Study, the ARARs will be refined to a more site-specific basis.</p>
11	<p>Page 4-6: All discussions in Section 4.0 regarding comparison to industrial soil screening criteria are preliminary in nature. The results are compared to the industrial screening criteria only as a means for discussion of the severity or significance of the concentrations detected. The text will be revised to reflect this.</p> <p>The human health risk assessment discusses both the industrial and residential screening criteria and is the primary means for determining impacts. Although screening to residential criteria will be conducted for "future land use" scenario, no residential development at these sites are planned or expected.</p>
12	<p>Table 4-5: As discussed in Section 2.2.9, the acetone is probably the result of decon with isopropyl alcohol</p>

COMMENT	RESPONSE
13	Table 4-5: Agreed. The revised ERA will address these chemicals.
14	<p>Table 4-5: Residential criteria will not be compared to in Section 4.0. However, the forum for comparison of soil concentrations to residential criteria will be the risk assessment and data will be compared against industrial and residential values in this assessment.</p> <p>The tables in the risk assessment section and associated text will be revised to reflect the RBC for industrial (3.8 mg/kg) and residential soils (0.43 mg/kg) for arsenic as a carcinogen.</p>
15	Table 4-5: Agreed. Same as response to Comment #13.
16	Table 4-6: Agreed. Same as response to Comment #13.
17	Page 4-16: Vinyl chloride was not detected by the USACE NED laboratory in the QA sampling. The text will be revised to reflect this. A discussion of potential degradation to vinyl chloride will be made in the fate and transport section of the report.
18	Page 4-20: As stated on page 4-20 and in the third paragraph on page 3-9, our investigations were limited to the site and adjacent to the site. No evaluation of the suspected groundwater divide discussed in the PA/SI could be made. As shown on Figure 2-3 in the PA/SI and Figure 3-5 in the RI report, the FTA site is located on a relatively flat groundwater area with minimal gradient. There is insufficient data available to determine the exact location of the groundwater divide. However, because groundwater elevations are greater in wells (4MW-3 and 4MW-4) south of the site than wells on the site, the groundwater divide may be south of 4MW-4. The text will be revised to reflect this.
19	Table 4-9: A comparison to residential criteria is provided in the risk assessment. The site is a fenced, operational area with no potential for exposures for trespassers (none indicated) or the general public, and therefore, residential exposures will not be assessed for the "Current Situation". However, an assessment of risk for residential exposures will be made for the "Future Land Use" scenario even though there is no expected residential development.
20	Additional discussions related to methylene chloride and TCE leachability will be added to the Fate and Transport Section.
21	Table 4-9: Comparison to residential criteria for arsenic is provided in the risk assessment section, but as discussed for Comment #14, the text and tables will be revised to include the carcinogenic RBC for arsenic.
22	Page 4-23: 100 mg/kg is a Virginia UST comparison value not a screening level. As discussed in paragraph 2 on page 6-12 of the risk assessment, impacts to the site are evaluated based on the concentrations of the hazardous constituents associated with petroleum hydrocarbons, primarily BTEX and PAHs. No additional text is required.

COMMENT	RESPONSE
23	<p>Table 4-11: As stated in the response to Comment #11, the comparisons made in Section 4.0 are only as a means to describe the significance of the concentrations of chemicals detected. Surface water quality criteria are used in the risk assessment to evaluate the contaminants detected in surface water.</p> <p>A revised ERA will evaluate the data versus the BTAG screening levels and federal and state surface water quality criteria for aquatic organisms.</p>
24	<p>Table 4-12: Discussions of these compounds' impacts on the site are discussed in the risk assessment. The text in Section 4.0 describes the nature and extent of contaminant, not associated impacts.</p>
25	<p>Table 4-12: Total and dissolved arsenic impacts are discussed in the risk assessment and fate and transport sections. The text in Section 4.0 describes the nature and extent of contaminant, not associated impacts.</p>
26	<p>Page 4-34: Vinyl chloride was not detected by the USACE NED laboratory. The text will be revised to reflect this.</p>
27	<p>Table 4-13: The impacts associated with volatile organics in groundwater at the LARC 60 site are discussed in the risk assessment. Migration potential is discussed in the fate and transport section.</p>
28	<p>Table 4-13: As previously stated, the screening in Section 4.0 is to provide some general significance to the data, not to screen the data. A discussion of metal concentrations in groundwater to all standards and criteria including the Virginia Groundwater Standards is provided in the risk assessment, however, only dissolved data is used because this indicates the component that could potentially migrate to receptors.</p> <p>As stated in the last paragraph on page 2-19, due to the high-suspended solids present due to the DPT sampling procedure, no dissolved samples could be collected. However, data collected from the monitoring wells indicated that no dissolved cadmium, chromium or lead were detected indicating that these metals detected in the total samples from the wells and DPT points are associated with sediment not groundwater. Zinc was detected in only 1 dissolved sample and at concentrations less than all standards and criteria. Arsenic was identified as a chemical of potential concern in the risk assessment due to its high dissolved concentrations. Additional text will be added to the fate and transport section further discussing the relationship between the total and dissolved data.</p>
29	<p>Page 4-38: The highest concentrations measured were within the former UST pit where the leaks probably occurred. If the concentrations of the chlorinated organics are not above 1% of the solubility limit at this location, it is unlikely that a DNAPL is present. Numerous groundwater samples have been collected in the shallow and deeper areas of the water table aquifer downgradient of the pit and no DNAPL has been detected. Additional groundwater monitoring in this area is unnecessary.</p>
30	<p>Page 4-39: Agreed. The text will be revised to include a discussion for potential degradation to vinyl chloride. This information will also be included in the fate and transport section.</p>

COMMENT	RESPONSE
31	Table 4-14: A detailed discussion of the potential leachability and transfer to groundwater for these compounds is provided in Section 5.
32	Table 4-14: They are compared in the risk assessment on page 6-20.
33	Table 4-14: The industrial and residential RBC for arsenic as a carcinogen will be added to the risk assessment and further evaluations will be made to discuss its impacts.
34	Page 6-3: Agreed. A revised ERA will include all of these factors and potential receptors.
35	Page 6-3: As stated in the response to Comment #2, neither pesticides nor PCBs were detected at concentrations greater than trigger levels established during the PA/SI, and the levels detected during the PA/SI were consistent with levels expected due to normal application in industrial areas for pest and weed control, and not from uncontrolled spills or leaks. However, a subsequent field investigation included the collection and analysis of soil and groundwater samples for pesticides and PCBs. This data has been included in the revised report.
36	Page 6-3: As stated on page 4-2 in the Final Work Plan dated December 1994, due to their infrequent detection during the PA/SI with concentrations typically lower than the trigger levels, only 20 percent of soil samples were analyzed for total metals to determine whether significant levels were present. If the results of the ERA indicate that metals are at unacceptable levels due to adverse risks to the environment then additional investigation to establish the extent of metal contamination may be necessary.
37	Agreed. The use of the 95th UCL is preferred over the use of maximum concentrations in order to more accurately assess risk. However, because of the 20% screening conducted for metals, insufficient numbers of samples are available to calculate UCLs and maximum concentrations will be used for the quantitative risk assessment calculations.
38	Page 6-5: Agreed. A "future land use" scenario to include potential exposure to soils through residential activities will be evaluated in the revised risk assessment.
39	Table 6-1: The EPA Region III RBCs for non-carcinogens will be adjusted to a target hazard quotient of 0.1 by dividing the RBCs by a factor of 10 because of the detection of multiple contaminants within each media.
40	RBCs for arsenic have been revised to reflect Sept 2001 RBC Table info.
41	Aluminum not identified as a COPC in groundwater in revised assessment.
42	The "F" designated denotes filtered or dissolved samples. The data summary tables in the QCS/ARR provide the results of MW-211F which is a duplicate sample of MW-112F, thereby, showing 4 samples instead of the 3 shown in Table 4-7 and 6-2 of the RI report. The tables in

COMMENT	RESPONSE
	the RI report show the highest concentration of a given compound detected, whether in the original, duplicate or QA split sample. All analytical data will be reviewed again to ensure that the highest concentration detected for each contaminant is presented in the data tables in Sections 4.0 and 6.0.
43	Tables and text will be revised to show barium concentration of 0.14 mg/l for 4MW-2F.
44	Same as response to Comment #39.
45	Table 6-3: Same as response to Comment #39. The correct RBC for arsenic will be added to the table. The RBCs for thallium have been used.
46	Page 6-7: The exposure assessment discusses site conditions and controls. No additional text to be included.
47	Page 6-8: Since there are no current potable or non-potable users of the groundwater at Fort Story, no quantitative analysis will be conducted for the "Current Situation". An evaluation of the potable use of the aquifer will be made for the "Future land Use" scenario. Only dissolved antimony and manganese exceeded the EPA RBCs for tap water and non-potable exposure would not seem to be of concern.
48	Page 6-8: Residential exposures (including adult and children exposures to groundwater, soil, and sediment) for the "future land use" scenario will be evaluated for the revised human health risk assessment.
49	Page 6-8: Agreed. A quantitative evaluation will be conducted if screening levels are exceeded and exposure pathways are complete.
50	Page 6-10: This pertains to the ecological risk assessment and those habitat issues and exposures have been included in Section 7.
51	Page 6-10: A revised ERA will be conducted that addresses these issues.
52	Page 6-11: Same as response for Comment #38.
53	Table 6-7: Same as response to Comment #39. Arsenic RBCs have been revised.
54	Table 6-8: Same as response to Comment #39 for RBCs adjustment and same as response to comment #53 for arsenic RBC.

COMMENT	RESPONSE
55	Tables in section 6 have been revised to reflect appropriate concentration ranges.
56	Section 6 tables have been checked and revised as appropriate.
57	Table 6-9: Same as response for Comment #39.
58	Table 6-10: Summary tables for surface water samples were included in the QCS/ARR.
59	Page 6-14: In addition to PCE only exceeding the SSL in 1 of 49 samples, PCE was only detected in 3 of 49 samples. Although PCE is a COPC in groundwater, soil results indicate that the majority of PCE may have already leached out due to a high infiltration rate associated with the sands present in the subsurface. The exceedence of the one PCE result does not justify continued analysis.
60	Page 6-14: Methylene chloride was detected in the USACE NED split samples, however, they had a "B" designation indicating that it was also detected in the lab blank samples. The QC data including lab blanks did not demonstrate widespread methylene chloride detects.
61	Page 6-15: Same as response to Comment #46.
62	Page 6-15: Same as response to Comment #47.
63	Page 6-16: Same as response to Comment #48.
64	Page 6-16: Same as response to Comment #49.
65	<p>Table 6-15: The fluoranthene result of 5,800 ug/kg and benzo(g,h,i)perylene result of 2,000 ug/kg at SB07-001-01 are correct. The summary table result does not include the results from a dilution sample run. The pyrene result of 11,000 ug/kg reported in Table 4-14 and 6-15 exceeded the calibration range, however, as a conservative approach, the number was used in the risk assessment evaluation. The summary table in URS' Data Validation Report only reports the 9,000 ug/kg result because it was within acceptable reporting quality.</p> <p>Table 6-15 is an evaluation of surface soils. Only 1 metal result was available for surface soils.</p> <p>The greatest concentration whether in original, duplicate, QA split or dilution sample was used in the risk assessment.</p> <p>The nickel result will be added to Table 4-14 and evaluated in the hazard assessment in the revised risk assessment. As previously stated, this hazard assessment addresses potential exposures to surface soils, the arsenic detect of 1.5 mg/kg was in sample SB07-004-24 which is a subsurface sample collected at a depth of 2 to 4 feet below land surface. The evaluation of subsurface soil contaminant concentrations will be addressed in the future land use scenario for construction activities.</p>

COMMENT	RESPONSE
66	Same as response to Comment #39 and Comment #53.
67	Arsenic will be added to the COPC list in the revised risk assessment. However, as stated on page 6-19, the PAHs present are the result of leaching from the asphalt. They will be included as COPCs but will be discussed in the uncertainty section.
68	Page 6-19: A future scenario to include exposure through construction activities will not be quantitatively evaluated because the PAH concentrations are not above EPA RBCs for industrial soils.
69	The last paragraph will be revised to state exceedances of the RBCs for some PAHs.
70	The sampling location (SB07-001) is upgradient of the former Auto Craft building with no historical evidence that any petroleum hydrocarbons were spilled or leaked at this area. However, the PAHs have been included in the revised risk assessment as COPCs.
71	Barium was not detected above EPA RBC values and will not be evaluated further.
72	Page 6-21: Same as response to Comment #46.
73	Page 6-21: Same as response to Comment #47.
74	Page 6-22: Same as response to Comment #48.
75	Page 6-22: Same as response to Comment #49.
76	A discussion on the uncertainty will be added to the revised risk assessment.
77	Page 6-22: Ecological inventories will be included in the revised ERA in Section 7.
78	Page 6-23: The revised ERA address potential exposures at receptors in the Chesapeake Bay and Atlantic Ocean and through the soil to air pathway as discussed in Section 7.
79	Table 6-18: Agreed. The revised ERA will evaluate exposures to the PAHs.
80	Section 7: This section will be revised based on the results of the revised risk assessment.
81	Section 8: This section will be revised based on the results of the revised risk assessment.

Comments on the responses to comments on "Remedial Investigation Report Firefighter Training Area, LARC 60 Maintenance Area, Auto Craft Building Area, Fort Story December, 1995".

6. The response adequately explains why there were no inorganics analyzed for 4MW-4. However, it does not explain what will be done to fill the resulting data Gap.
35. Were the trigger levels in the PA/SI adequate to determine that there is no potential for either human health or ecological risk? Were data provided that verify that pesticide levels were consistent with levels resulting from pest control (i.e. anthropogenic background). The soil boring within the LARC Maintenance Area contains the DDT metabolite, p,p'DDD at a concentration of 2.9 mg/kg. Additional discussion regarding this issue should be included in the RI document. Additional investigation of all three sites would adequately address the original comment.
36. Were the trigger levels used in the PA/SI adequate to determine that there is no potential for either human health or ecological risk?
59. This explanation should be included in the text of the report.
65. What is the source of the results for fluoranthene, benzo(g,h,i)perylene, and pyrene provided in the report? Surface soil sample SB07-004-24 is apparently mislabeled in the data summary table. This should be corrected or explained.
- 67., 68., 70. The report should provide a reference that would verify the assumption that the PAHs detected in this area are due to leaching from the asphalt.

**RESPONSE TO SECOND SET OF VDEQ COMMENTS  
DRAFT RI FOR FTA, LARC 60 AND AUTO CRAFT SITES  
FORT STORY, VA**

COMMENT	RESPONSE
6	<p>The only dissolved metal at the FTA site that exceeded EPA RBC values for tap water in the risk assessment was dissolved manganese. Although we have not fully delineated the extent of metals in groundwater, based on the relatively low concentrations present, we do not believe that collecting an additional groundwater sample for metals in the upgradient well will provide critical data for the site.</p>
35	<p>Additional soil and groundwater samples were collected in 2000 for pesticide/PCB analysis and the results of this sampling effort are provided in the revised RI Report.</p>
36	<p>The trigger levels for the metals in the PA/SI were based on background data collected from soil borings at Fort Story. BTAG screening levels and EPA RBC values for residential soils for many metals are lower than background levels, and therefore, may not be a true indication of risk caused by site activities. It should be noted that the BTAG screening levels were not in place at the time of the PA/SI.</p> <p>However, if the results of the ecological risk assessment indicate that metals are at unacceptable levels due to adverse risks to the environment then additional investigation to establish the extent of metal contamination may be necessary. However, the concentrations of the metals detected during the RI were typically consistent with facility and regional background data. Further discussions related to risk and comparisons to background will be provided in the RI Report.</p>
59	<p>Agreed. This rationale and discussion have been provided in the revised Final RI Report.</p>
65	<p>The source of fluoranthene and benzo(g,h,i)perylene in the tables and text of the report are dilution analysis conducted by the laboratory. However, as previous stated in our initial response to comments, these dilutions did not meet URS' data validation acceptance criteria, and therefore, they did not report them in their data summary tables provided in the appendices to the QCS/AR Report. Since these two compounds did not exceed the calibration range in the original run, the data from the original run is considered the valid result not the data from the dilution run, therefore, URS only reported the original sample results. We reported the dilution results in our data tables (Tables 4-14 and 6-15) and used these higher numbers as a more conservative approach to risk evaluation.</p> <p>The pyrene result of 11,000 ug/kg reported in Table 4-14 and 6-15 exceeded the calibration range in the original run, however, as a conservative approach, the number was used in the risk assessment evaluation. The summary table in URS' Data Validation Report only reports the 9,000 ug/kg result for the dilution run because it was within acceptable reporting quality and the 11,000 ug/kg result did not meet acceptable validation criteria. In summary, to be on the conservative side, we utilized the maximum concentration detected from original or dilution runs whether the higher number was validated or not, and URS only reported the validated number in their data tables in the appendices. A copy of the laboratory sheet for the original and dilution run are attached for your information.</p> <p>SB07-004-24 is mislabeled as "SSB07-004-24" in the data summary tables. This will be explained in the Final RI Report with a reference to the data summary tables in the QCS/AR Report.</p>

COMMENT	RESPONSE
67, 68, 70	<p>A Health and Safety Survey for "The Use of Petroleum Asphalt in the Paving Industry" was conducted by the University of Texas at Austin, Center for Transportation Research, to assess the environmental health impacts of asphalt paving operations. A summary of the study is provided as follows.</p> <p>A determination of the amount of asphaltic material leached from a simulated road surface under conditions approaching normal rainfall was conducted. Asphalt was mixed and poured into 12 inch square steel plates at 140 degrees C and cured at 21 degrees C for various lengths of time. Simulated rainfall was applied by use of a fine sprinkler hose at an average rate of 1.5 inches per hour. The runoff from one hour of simulation was processed to obtain an asphalt residue.</p> <p>The study showed that considerable asphaltic material could be washed from a road surface during the first few days after application. Although the study reported results in the pounds of asphaltic material that could be washed away, due to the high PAH concentrations in coal tar pitches including 43,000 parts per million (ppm) for fluoranthene, 31,000 ppm for phenanthrene, 29,000 ppm for pyrene, etc., high levels of contaminants are discharged to the environment.</p> <p>Because the asphalt at the Autocraft site is permeable and standing water (as observed during the field investigation) is present on the asphalt after a rain event, it follows that after application, not only was there runoff containing PAHs, water permeated through the asphalt with significant amounts of PAHs leaching into the underlying soils.</p> <p>This information will be included in the text of the revised RI Report.</p>