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JEB FORT STORY, VA
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LETTER OFFERING COMMENTS AND ATTACHED RESPONSE TO COMMENTS ON DRAFT
REMEDIAL INVESTIGATION, HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENTS
FIREFIGHTER TRAINING AREA, LIGHTER AMPHIBIOUS RESUPPLY CARGO (LARC) 60
MAINTENANCE AREA, AND AUTO CRAFT AREA FORT STOR

8/31/2000

COMMONWEALTH OF VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

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COMMONWEALTH of VIRGINIA

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August 31, 2000

Mr. Dan Musel
U.S. Army Transportation Center
ATZF-PWE, Building 1407
Fort Eustis, VA 23604-5332

RE: Draft Report, Remedial Investigation
Human Health and Ecological Risk Assessments
Firefighter Training Area
LARC 60 Maintenance Area
Auto Craft Building Area

Dear Mr. Musel:

Thank you for the opportunity to review the above referenced document. Comments have been broken down into five sections. There is a section for comments applicable to all three human health risk assessments, and one section specific to each site. There is a fifth section for the ecological risk assessment.

Comments Applicable to all Three Sites Human Health Risk Assessment (HHR)

1. Section 6.2.1, page 6-4 – At the bottom of the page, the phrase “EPA criteria” is used. Please clarify by specifying the criteria used. This phrase was used in the LARC 60 and Auto Craft sections as well.
2. Page 6-9, second paragraph, last sentence – Concluding that there are no exposed populations under current conditions is inaccurate. “Exposures, under current conditions will not exceed risk based limits” would be a more appropriate statement. It is recommended that this sentence be deleted wherever it is used throughout the document as it is inaccurate and, possibly, misleading.

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3. ✓ When calculating risks and exposures, it is preferred to assume that the adult resident lived 6 years at the site as a child and 24 years as an adult. This is somewhat more conservative, though more in line with the concept of reasonable maximum exposure.
4. DPT data is not generally accepted for use in human health risk assessments beyond the screening level.
5. ✓ The fraction ingested should assume 100% from the contaminated area as the assumption for the resident and the construction worker.

Firefighter Training Area (FFT) – Human Health Risk Assessment (HHR)

1. The HHR for the FFT did not address the construction worker scenario. While conducting the calculations checks, I also performed a default based calculation for the construction worker and commercial/industrial worker scenarios using maximum detected concentrations for arsenic (As), manganese (Mn), thallium (Tl), and tetrachloroethene (TCE). The calculated cancer risks did not exceed $1E-5$, and the hazard quotient totals did not exceed 1.0.
2. The practical quantitation limit (PQL) for vinyl chloride was 10 ug/kg for all of the groundwater samples; whereas, the MCL is 5 ug/kg. Based upon information provided during our meeting on August 10, 2000, the actual detection limit for vinyl chloride was 2 ug/kg; therefore it has been shown not to be present at levels exceeding the MCLs.
3. Regional background data is not sufficient to demonstrate that concentrations at the site are within background limits. As, Tl, and Mn were included as COPCs in my calculations. Use of the maximum concentrations of As, Mn, Tl, and TCE, for all pathways for soil, and groundwater did not result in a target organ hazard quotient in excess of 1.0.
4. Use of the 95% UCL applies only when multiple samples from the same location are being evaluated. In this case it is not appropriate. Please use the maximum value for all constituents where sufficient data is not available on a well by well basis. The only significant change will be the use of 78ug/l for TCE. Total cancer risks approached $1E-4$ when using this value for TCE.
5. Section 6.2.1, Page 6-5, Inorganics -- The last sentence of the first paragraph states that a

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summary of the background data for the Firefighter Training area (FFT) can be found in Appendix H. Appendix H contains a chart that duplicated the information presented in this paragraph. Please include a discussion of the number of samples taken to determine background, the sample locations and the individual sample results. A summary table would suffice.

6. Page 6-5, VOCs – Use of the frequency of detection to eliminate benzene as a COPC is questionable. However, since use of the groundwater will have to be restricted due to the presence of another VOC, tetrachloroethene, TCE, it will not significantly affect the ultimate decision making process.
7. Vinyl chloride is a decomposition product of TCE. Though it was not detected the groundwater should continue to be monitored, as the presence of detectable amounts of vinyl chloride would most likely elevate the maximum cancer risk above $1E-4$.
8. ✓ When recalculating the risks using the maximum concentrations, it was noted that different assumptions were used in the shower model presented in the report than are used in the VDEQ model. The results for volatile intakes was significantly higher with our model; however, the results did not exceed 1×10^{-4} for cancer to any target population. An electronic copy of the shower model has been sent via e-mail to Tony Pace at Malcom Pirnie.
9. ✓ When recalculating the Hazard Quotients for the different intake pathways using the most recent oral reference dose for manganese, 0.02 mg/kg/day, instead of the former value of 0.005 mg/kg/day, there were no pathways exceeding a hazard quotient of 1.0.
10. Given the levels of risk demonstrated, it is suggested that groundwater monitoring continue until such time as it can be reliably demonstrated that TCE and vinyl chloride are not present above MCLs. It has been noted that the most recent sets of groundwater monitoring data have not detected either TCE or vinyl chloride.

LARC 60 Maintenance Area (LARC) – Human Health Risk Assessment (HHR)

1. ✓ Page 6-32, 3rd paragraph – The last sentence states that there are no exposed populations. This is not an accurate statement. The paragraph provides the necessary information. The concluding statement is best left out as it is misleading. Similar statements are made in other sections of this document and should be corrected.

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- ✓ Page 6-33, 3rd paragraph under Future Land Use – The report should consider wading in surface water (the ditch) as a potential future exposure route for children and adults.
- ✓ The report should also address construction worker risk from incidental soil ingestion, skin absorption, particle inhalation, and groundwater volatilization. Before any construction work were to occur at this site involving subsurface excavation, this scenario should be evaluated to ensure that no unacceptable risks are present for the workers. The commercial industrial worker scenario should also be evaluated.
- ✓ 4. Page 6-46, Uncertainty – It is agreed that a larger data set for dissolved metals in groundwater would reduce the uncertainty regarding the risks posed by manganese and arsenic in the groundwater. However, it has not been demonstrated that these levels are consistent with background levels of these chemicals.
- ✓ 5. The updated reference dose for manganese will significantly reduce the hazard quotient, though it will still exceed 1.0 due to arsenic. Future groundwater sampling would need to demonstrate, statistically, that the concentrations reflect background in order to remove manganese and arsenic from the list of COPCs. Use of the maximum concentrations of the organic COPCs, as recommended, will also elevate the hazard quotient value.
- ✓ 6. The use of the 95% UCL is not applicable to the current set of groundwater data for the LARC site. It is appropriate for use when multiple samples have been obtained from the same well. Use of the maximum concentration data will significantly increase the contribution of the organic COPCs to cancer risk.
- ✓ 7. Section 6.35 – Use of maximum levels for the COPCs, will likely change the contribution to the exposure hazard index from arsenic and manganese to the organic COPCs.
- ✓ 8. Section 6.35 - Use of maximum levels for the COPCs, will likely change the contribution to the total cancer risk from arsenic and manganese to the organic COPCs.
9. ✓ Section 6.35 – No demonstration has been made in the document that natural attenuation would be sufficient to reduce the concentrations of contaminants below the MCLs.
10. Due to the relatively high concentrations in one particular area, and the high risks posed by

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these concentrations, it appears reasonable to conduct some sort of remedial action at the site.

Auto Craft Building Area – Human Health Risk Assessment (HHR)

1. There is some confusion regarding which wells / DPT sample locations the various detected compounds were from. When trying to compare the data in Table 6-26 of this report to the data in Tables 4-15 and 4-16 of the Remedial Investigation Report dated December 1995, it did not appear to match. It was not clear if there was another round of sampling. **Please reference the raw data sources for all data used for FFT, LARC, and Auto Craft risk assessments in the text or as a footnote to a table. It is important to be able to check the validated data and know the locations of the wells / DPT points.**
2. Again, use of the 95% UCL across different wells is not appropriate at this site. Please use the maximum values for groundwater.
3. Please provide additional information to support the conclusion that the PAHs found in the surface soil originated from the asphalt pavement. Discussions of types of activities that produce PAHs and the fact that they are known not to have occurred at this site would be supportive.
4. When the updated reference dose for manganese is used, and when maximum concentrations for COPCs are applied, the total exposure hazard index does not exceed 1.0.
5. When the maximum groundwater contaminant concentration values are used along with the more conservative parameters (shower model and all pathways included), the maximum target population total lifetime cancer risk is calculated to be in the order of $1E-5$. Levels of contaminants detected at this site do not appear to pose an unacceptable risk to human health.

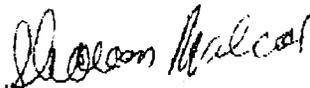
Ecological Risk Assessment

A cursory review of the ecological risk assessment has been performed. There are no comments at this time; however, ecological issues may be reopened in the future.

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Please contact me at 804-698-4143 to discuss your plans to address the comments provided. Based on recent discussions it appeared that you intended to take some remedial action at the LARC 60 site and develop a feasibility study and decision document for all three sites. I would like to discuss the upcoming activities with you and clarify any questions you may have regarding the comments in this letter.

Very truly,



Sharon Wilcox
Federal Facilities Restoration Program

cc: Erica Dameron, VDEQ
Durwood Willis, VDEQ
Rob Thompson, Region III, EPA
Milton Johnston, TRO
File: Fort Story, 2000
Chronological

**RESPONSE TO 3rd SET OF VDEQ COMMENTS (SHARON WILCOX REVIEWER)
DRAFT RI FOR FTA, LARC 60 AND AUTO CRAFT SITES
FORT STORY, VA**

COMMENT	COMMENT AND RESPONSE
COMMENTS APPLICABLE TO ALL THREE SITES HUMAN HEALTH RISK ASSESSMENT	
1	<p>Comment: Section 6.2.1, page 6-4: At the bottom of the page, the phrase “EPA criteria” is used. Please clarify by specifying the criteria used. This phrase was used in the LARC 60 and Auto Craft sections as well.</p> <p>Response: The phrase “EPA criteria” has been changed to “EPA RBC criteria” throughout Section 6.</p>
2	<p>Comment: Page 6-9, 2nd paragraph, last sentence: Concluding that there are no exposed populations under current conditions is inaccurate. “Exposures, under current conditions will not exceed risk based limits” would be a more appropriate sentence. It is recommended that this sentence be deleted wherever it is used throughout the document as it is inaccurate and possibly misleading.</p> <p>Response: This phrase has been revised throughout the text as proposed above.</p>
3	<p>Comment: When calculating risks and exposures, it is preferred to assume that the adult resident lived 6 years at the site as a child and 24 years as an adult. This somewhat more conservative, through more in line with the concept of reasonable maximum exposure.</p> <p>Response: This changed has been made for all 3 sites.</p>
4	<p>Comment: DPT data is not generally accepted for use in human health risk assessments beyond the screening level.</p> <p>Response: The risk assessment has been revised to only include the groundwater data from the permanent monitoring wells. The DPT was not used in the revised assessment.</p>
5	<p>Comment: The fraction ingested should assume 100% from the contaminated area as the assumption for the resident and the construction worker.</p> <p>Response: This change has been made for all 3 sites.</p>
COMMENTS on FTA SITE HUMAN HEALTH RISK ASSESSMENT	
1	<p>Comment: The HHR for the FTA did not address the construction worker scenario. While conducting the calculation checks, I also performed a default based calculation for the construction worker and commercial/industrial worker scenarios using maximum detected concentrations for arsenic, manganese, thallium, and tetrachloroethene. The calculated cancer risks did not exceed 1E-5 and the hazard quotient totals did not exceed 1.0.</p> <p>Response: Since no chemical concentrations exceeded the EPA RBCs for industrial soils, there is no need to calculate industrial or construction worker exposures.</p>

COMMENT	COMMENT AND RESPONSE
2	<p>Comment: The PQL for vinyl chloride was 10 ug/kg for all of the groundwater samples, whereas the MCL is 5 ug/kg. Based upon information provided during our meeting on August 10, 2000, the actual detection limit for vinyl chloride was 2 ug/kg, therefore, it has been shown not to be present at levels exceeding the MCLs.</p> <p>Response: Agreed.</p>
3	<p>Comment: Regional background data is not sufficient to demonstrate that concentrations at the site are within background limits. As, Tl, and Mn were included as COPCs in my calculations. Use of the maximum concentrations of As, Mn, Tl, and TCE for all pathways for soil and groundwater did not result in a target organ hazard quotient in excess of 1.0.</p> <p>Response: Wherever possible in the assessment, a comparison of site metals data is compared against the background data collected by Montgomery Watson during the PA/SI, however, they did not analyze for all metals. In these cases, a comparison to regional background data was made solely for comparison. If concentrations of metals exceeded RBCs or MCLs, they were identified as COPCs and carried through the quantitative risk assessment.</p>
4	<p>Comment: Use of the 95% UCL applies only when multiple samples from the same location are being evaluated. In this case it is not appropriate. Please use the maximum value for all constituents where sufficient data is not available on a well by well basis. The significant change will be the use of 78 ug/l for TCE. Total cancer risks approached 1E-4 when using this value for TCE.</p> <p>Response: Section 6.5.1 of the RAGS manual states that the 95 percent UCL should be utilized to assess risk from a particular medium for each chemical. This provides for a reasonable exposure assessment. Also, TCE was not detected in the FTA monitoring well data so no assessment of it has been conducted.</p>
5	<p>Comment: Section 6.2.1, page 6-5 Inorganics: The last sentence of the 1st paragraph states that a summary of the background data for the FFT can be found in Appendix H. Appendix H contains a chart that duplicated the information presented in this paragraph. Please include a discussion of the number of samples taken to determine background, the sample locations, and the individual sample results. A summary table would suffice.</p> <p>Response: The text and tables from the Montgomery Watson Fort Story PA/SI has been added to Appendix H for the background samples.</p>
6	<p>Comment: Page 6-5, VOCs: Use of frequency of detection to eliminate benzene as a COPC is questionable. However, since use of the groundwater will have to be restricted due to the presence of another VOC, TCE, it will not significantly affect the ultimate decision making process.</p> <p>Response: As noted in the revised assessment (using well data only), neither benzene nor TCE were detected in the wells and therefore, are not COPCs in the assessment.</p>
7	<p>Comment: Vinyl chloride is a decomposition product of TCE. Though it was not detected, the groundwater should continue to be monitored, as the presence of detectable amounts of vinyl chloride would most likely elevate the maximum cancer risk above 1E-4.</p> <p>Response: Neither vinyl chloride nor TCE were detected in the monitoring wells during sampling in 1995 and 2000, therefore, no further monitoring is necessary.</p>

COMMENT	COMMENT AND RESPONSE
8	<p>Comment: When recalculating the risks using the maximum concentrations, it was noted that different assumptions were used in the shower model presented in the report than are used in the VDEQ model. The results for volatile intakes was significantly higher with our model; however, the results did not exceed 1E-04 for cancer to any target population. An electronic copy of the shower model has been sent via e-mail to Tony Pace at Malcolm Pirnie.</p> <p>Response: Received e-mail but did not use for FTA site because only COPCs in groundwater were metals with minimal volatility expected.</p>
9	<p>Comment: When recalculating the HQs for the different intake pathways using the most recent oral reference dose for manganese, 0.02 mg/kg/day, instead of the former value of 0.005 mg/kg/day, there were no pathways exceeding a HQ of 1.0.</p> <p>Response: Updated RfD for manganese used in the revised risk assessment.</p>
10	<p>Comment: Given the levels of risk demonstrated, it is suggested that groundwater monitoring continue until such time as it can be reliably demonstrated that TCE and vinyl chloride are not present above MCLs. It has been noted that the most recent sets of groundwater monitoring data have not detected either TCE or vinyl chloride.</p> <p>Response: Neither TCE nor vinyl chloride has been detected from monitoring well samples during the 1995 and 2000 sampling events, therefore, no further monitoring is necessary.</p>
COMMENTS on LARC 60 SITE HUMAN HEALTH RISK ASSESSMENT	
1	<p>Comment: Page 6-32, 3rd paragraph – The last sentence states that there are no exposed populations. This is not an accurate statement. The paragraph provides the necessary information. The concluding statement is best left out as it is misleading. Similar statements are made in other sections of this document and should be corrected.</p> <p>Response: This statements have been deleted.</p>
2	<p>Comment: Page 6-33, 3rd paragraph under Future Land use – The report should consider wading in surface water (in the ditch) as a potential future exposure route for children and adults.</p> <p>Response: Text has been added to this section discussing the possible scenario.</p>
3	<p>Comment: The report should also address construction worker risk from incidental soil ingestion, skin absorption, particulate inhalation, and groundwater volatilization. Before any construction work were to occur at this site involving subsurface excavation, this scenario should be evaluated to ensure that no unacceptable risks are present for the workers. The commercial industrial worker scenario should also be evaluated.</p> <p>Response: Because the EPA RBCs for industrial soils were not exceeded for the surface and subsurface soils and the sediment, there is no need to evaluate these exposure scenarios.</p>

COMMENT	COMMENT AND RESPONSE
4	<p>Comment: Page 6-46, Uncertainty – It is agreed that a larger data set for dissolved metals in groundwater would reduce the uncertainty regarding the risks posed by manganese and arsenic in groundwater. However, it has not been demonstrated that these levels are consistent with background levels of these chemicals.</p> <p>Response: Agreed. No mention of metals data as compared to background has been provided in the uncertainty section. In fact, several of the samples (primarily MW-117) have metals concentrations clearly above background.</p>
5	<p>Comment: The updated reference dose for manganese will significantly reduce the HQ, though it will still exceed 1.0 due to arsenic. Future groundwater sampling would need to demonstrate, statistically, that the concentrations reflect background in order to remove manganese and arsenic from the list of COPCs. Use of the maximum concentration of the organic COPCs, as recommended, will also elevate the HQ value.</p> <p>Response: Updated RfDs have been used in the revised assessment. At this point, as discussed in the revised report, manganese and arsenic have not been removed from the list of COPCs.</p>
6	<p>Comment: The use of the 95th UCL is not applicable to the current set of groundwater data for the LARC site. It is appropriate for use when multiple samples have been obtained from the same well. Use of the maximum concentration data will significantly increase the contribution of the organic COPCs to cancer risk.</p> <p>Response: See response to FTA comment #4. However, due to the statistical variation in the data, which resulted in a non-parametric evaluation, the maximum concentration was utilized for the majority of the COPCs in groundwater.</p>
7	<p>Comment: Section 6.3.5 – Use of maximum levels for the COPCs, will likely change the contribution to the exposure hazard index from arsenic and manganese to the organic COPCs.</p> <p>Response: See revised assessment for changes.</p>
8	<p>Comment: Section 6.3.5 – Use of maximum levels for the COPCs, will likely change the contribution to the total cancer risk from arsenic and manganese to the organic COPCs.</p> <p>Response: See revised assessment for changes.</p>
9	<p>Comment: Section 6.3.5 – No demonstration has been made in the document that natural attenuation would be sufficient to reduce the concentrations of contaminants below the MCLs.</p> <p>Response: References to this have been removed from the text.</p>
10	<p>Comment: Due to the relatively high concentrations in one particular area, and the high risks posed by these concentrations, it appears reasonable to conduct some sort of remedial action at the site.</p> <p>Response: A feasibility study (including a groundwater treatability study) will be initiated shortly to discuss possible remedial options for the groundwater at the site.</p>

COMMENT	COMMENT AND RESPONSE
COMMENTS on AUTO CRAFT BUILDING AREA HUMAN HEALTH RISK ASSESSMENT	
1	<p>Comment: There is some confusion regarding which wells/DPT sample locations the various detected compounds were from. When trying to compare the data in Table 6-26 of this report to the data in Tables 4-15 and 4-16 of the RI Report, dated December 1995, it did not appear to match. It was not clear if there was another round of sampling. Please reference the raw data sources for all data used for FFT, LARC, and Auto Craft risk assessments in the text or as a footnote to a table. It is important to be able to check the validated data and know the locations of the wells/DPT points.</p> <p>Response: As previously discussed, the revised report only includes the monitoring well data in the quantitative risk assessment.</p>
2	<p>Comment: Again, use of the 95% UCL across different wells is not appropriate at this site. Please use the maximum values detected.</p> <p>Response: Due to the limited number of wells at the site, the maximum groundwater values are used in the revised risk assessment.</p>
3	<p>Comment: Please provide additional information to support the conclusions that the PAHs found in the surface soil originated from the asphalt pavement. Discussion of types of activities that produce PAHs and the fact that they are known not to have occurred at this site would be supportive.</p> <p>Response: 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. 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 Auto Craft 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>The above information has been included in the text of Section 6.4.1 of the RI Report. However, it should be noted, that these PAHs were quantitatively evaluated in the revised risk assessment but their presence and mitigating factors are discussed in the Uncertainties section.</p>
4	<p>Comment: When the updated reference dose for manganese is used, and when maximum concentrations for COPCs are applied, the total exposure index does not exceed 1.0.</p> <p>Response: The updated reference doses for the COPCs have been included in the revised risk assessment.</p>

COMMENT	COMMENT AND RESPONSE
5	<p><u>Comment:</u> When the maximum groundwater contaminant concentration values are used along with the more conservative parameters (shower model and all pathways included), the maximum target population total lifetime cancer risk is calculated to be in the order of 1E-5. Levels of contaminants detected at this site do not appear to pose an unacceptable risk to human health.</p> <p><u>Response:</u> Revised risk assessment agrees.</p>

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REMEDIAL INVESTIGATION REPORT
Volume I of II (Text, Figures, and Tables)

Firefighter Training Area
LARC 60 Maintenance Area
Auto Craft Building Area

Installation Restoration Program
Fort Story, Virginia

U. S. Army Transportation Center
Fort Eustis, Virginia

and

U.S. Army Corps of Engineers
Baltimore District

September 2002

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REMEDIAL INVESTIGATION REPORT
Volume II of II (Appendices)

Firefighter Training Area
LARC 60 Maintenance Area
Auto Craft Building Area

Installation Restoration Program
Fort Story, Virginia

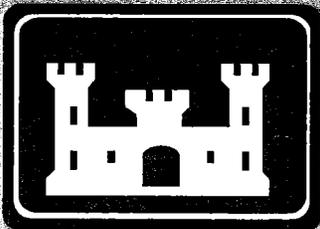
U. S. Army Transportation Center
Fort Eustis, Virginia

and

U.S. Army Corps of Engineers
Baltimore District

September 2002

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**QUALITY CONTROL SUMMARY/
ANALYTICAL RESULTS REPORT
ADDENDUM**

March/June 2000 Field Investigations

**Remedial Investigation
Firefighter Training Area
LARC 60 Maintenance Area**

**Installation Restoration Program
Fort Story, Virginia**

**U. S. Army Transportation Center
Fort Eustis, Virginia**

and

**U.S. Army Corps of Engineers
Baltimore District**

September 2002



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