APPENDIX H

PRELIMINARY RISK ASSESSMENT

Technical Memorandum

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To: Former Personnel and Equipment Decontamination Station, Pelham Range, Parcel 206(7), Fort McClellan
Preliminary Risk Assessment File

Date: 23 November 2001

Subject: **PRELIMINARY RISK ASSESSMENT FOR SUBJECT SITE**

This memorandum provides a Preliminary Risk Assessment (PRA) for exposure to surface soil, subsurface soil, surface water and sediment at the Former Personnel and Equipment Decontamination Station, hereinafter referred to as the Decon Station. The PRA is an abbreviated version of the Streamlined Risk Assessment (SRA) developed as a uniform and economical approach to evaluating hundreds of similar sites at Fort McClellan (FTMC). It is assumed that the reader is familiar with FTMC and the fundamentals of the SRA protocol. The reader is referred to the Installation-Wide Work Plan (IT, 1998) for more detail. All the comparison and computational operations of the PRA are performed within EXCEL® spread sheet tables. The results of each step are described below.

Media of Interest and Data Selection Data consist of 2 depositional soil samples and 3 surface soil samples (collectively evaluated as surface soil), 3 subsurface soil samples, 3 surface water samples and 1 sediment sample analyzed for metals, volatile organic compounds, semivolatile organic compounds, and chemical warfare agent residues and decomposition products. The validated data are summarized in Tables 5-1 through 5-4 from the Site Investigation (SI).

Site-Related Chemical Selection Site-related chemicals are those presumed to be released because of activities performed by the army during operation of FTMC. They are identified in Table 1 (surface soil), Table 2 (subsurface soil), Table 3 (surface water) and Table 4 (sediment) by comparing the maximum detected concentration (MDC) of each chemical with its background screening criterion (BSC), computed as two times the mean of the background data set, in accordance with EPA (2001) Region IV guidance. BSCs were taken from Tables 5-1 through 5-4 from the SI. Upper tolerance limits (UTL), the highest metal concentrations reasonably considered to be within background, are also included in Tables 1 through 4 for information, but were not used to select site-related chemicals. UTLs provide a more refined statistical approach than BSCs for comparing site and background data. UTLs were developed for the entire FTMC facility, combining data from the Main Post and Pelham Range. The UTLs for total soil were adopted for subsurface soil.

Chemical of Potential Concern Selection Chemicals of potential concern (COPC) are site-related chemicals whose MDCs exceed their site-specific screening levels (SSSL), and which may contribute significantly to risk. The SSSLs are receptor-, medium-, and chemical-specific risk-based concentrations that capture all the exposure assumptions and toxicity assessment of a

full-blown baseline risk assessment. COPCs are selected for both cancer risk and noncancer effects when the data permit (Tables 1 through 4).

Receptor Scenario Selection The proposed land reuse plan states that the Decon Station will be used for activities associated with Pelham Range. The most common reuse for parcels on Pelham Range is for training National Guard personnel. Therefore, it is assumed that the most plausible receptor for the Decon Station is a National Guardsperson (Goetchius, 2001). An on-site resident is also included as the upper-bound evaluation of exposure and risk, and to provide additional perspective. SSSLs for both receptor scenarios were used to select COPCs for surface and subsurface soil. A National Guardsperson is unlikely to experience significant exposure to surface water and sediment. A resident, however, may have significant exposure to these media. The assumptions for residential and recreational site user exposure to surface water and sediment are identical; therefore, recreational site user SSSLs were used for COPC selection for surface water and sediment.

Risk Characterization Risk characterization combines the exposure assumptions and toxicity assessment (incorporated in the SSSLs) with the exposure-point concentration (EPC) to quantify the incremental lifetime cancer risk (ILCR) and noncancer hazard index (HI). ILCR and HI estimates are computed for each COPC in each medium, and are summed to yield a total ILCR and total HI for each receptor scenario. The PRA differs from an SRA in that no attempt is made to estimate an EPC that reflects a conservative estimate of average concentration for use in risk assessment. Ordinarily, the 95 percent upper confidence limit on the mean (UCL) is used for this purpose. Instead, the MDC is adopted as the EPC, which imparts a conservative bias to the PRA.

The only plausible receptor scenario for the Decon Station is the National Guardsperson. Aluminum was the only chemical selected as a COPC for National Guardsperson exposure to surface soil (Table 1) or subsurface soil (Table 2). The HI estimates (1.95E-1 for surface soil and 1.63E-1 for subsurface soil are well below the threshold level of 1. As noted above, National Guardsperson exposure to surface water or sediment is not expected to be significant; therefore, the National Guardsperson was not evaluated for exposure to these media. It is concluded that National Guardsperson exposure to surface soil, subsurface soil, surface water and sediment at the Decon Station is unlikely to result in unacceptable cancer risk or adverse noncancer health effects. The site can be released for this purpose requiring no further action.

The on-site resident was also evaluated as the upper-bound on exposure and risk and to provide additional perspective. COPCs selected for residential exposure to surface soil include aluminum, antimony and iron (Table 1). No COPCs were selected for cancer risk; therefore, no ILCR was estimated for exposure to surface soil. The total HI for exposure to surface soil of 2.22E+0 exceeds the threshold value of 1, due largely to iron. The MDC for iron, however, falls below its UTL and within the range of background (data not shown) (SAIC, 1998), and it was judged that the presence of iron reflects background conditions rather than a site-related release. Therefore, only the HI of 5.24E-1, the sum of the HIs for aluminum and antimony, is attributed to exposure to surface soil.

COPCs selected for residential exposure to subsurface soil are limited to aluminum (Table 2). No COPCs were selected for cancer risk; therefore, no ILCR was estimated for exposure to

subsurface soil. The total HI for exposure to subsurface soil of 3.06E-1 falls below the threshold value of 1.

The resident theoretically could be exposed to surface soil, subsurface soil, surface water and sediment. As noted above, residential exposure to surface water and sediment would be identical to that of the recreational site user. The only COPC selected in surface water was arsenic, which may be present as the result of degradation of certain chemical warfare agents. Arsenic was selected as a COPC for cancer risk but not for noncancer hazard. The total ILCR for exposure to surface water of 5.24E-6 due entirely to arsenic is within the EPA (1990) risk management range. No HI was estimated for exposure to surface water. COPCs were not selected in sediment for the recreational site user; therefore, sediment is not considered further in the residential evaluation.

The total ILCR for the resident summed across all media is 5.24E-6, which is within the risk management range. The total HI for the resident summed across all media is 8.30E-1, which is below the threshold level of 1. It is concluded that residential exposure to surface soil, subsurface soil, surface water and sediment at the Decon Station is unlikely to result in unacceptable cancer risk or adverse noncancer health effects. The site can be released for residential use or for unrestricted use requiring no further action.

References

IT Corporation (IT), 1998, ***Installation-Wide Work Plan***, Final, Fort McClellan, Calhoun County, Alabama, Prepared for U.S. Army Corps of Engineers, Mobile District, August*

Science Applications International Corporation (SAIC), 1998, ***Final Background Metals Survey Report***, prepared for U.S. Army Corps of Engineers, Mobile District, July.

U.S. Environmental Protection Agency (EPA), 1990, "National Oil and Hazardous Substances Pollution Contingency Plan," ***Federal Register*** 55(46): 8666-8865.

U.S. Environmental Protection Agency (EPA), 2001, ***Region 4 Human Health Risk Assessment Bulletins – Supplement to RAGS, Interim Human Health Risk Assessment Bulletins***, Waste Management Division, EPA Region 4, Atlanta, GA, on line.

*Note: the Installation-Wide Work Plan was revised in September 2001 but has not yet been released for distribution. The description of the protocol and application of the SRA, however, was not substantively changed.

Table 1

Preliminary Risk Evaluation for Exposure to Surface Soil
Former Personnel and Equipment Decontamination Station, Parcel 206(7)

Fort McClellan, Calhoun County, Alabama

Chemical	MDC	BSC	UTL	Site-Related Chemical?[a]	Res Soil SSSL-c[b]	Res Soil SSSL-n[c]	Res Cancer COPC?[d]	Res Noncancer COPC?[e]	Res ILCR[f]	Res HI[g]	NG Soil SSSL-c[h]	NG Soil SSSL-n[i]	NG Cancer COPC?[d]	NG Noncancer COPC?[e]	NG ILCR[j]	NG HI[k]
METALS																
Aluminum	2.86E+04	1.63E+04	2.14E+04	2.86E+04		7.80E+03		2.86E+04		3.67E-01		1.47E+04		2.86E+04		1.95E-01
Antimony	4.89E+00	1.99E+00	2.64E+00	4.89E+00		3.11E+00		4.89E+00		1.57E-01		1.04E+02				
Arsenic	8.32E+00	1.37E+01	2.54E+01		4.26E-01	2.34E+00					3.70E+00	7.96E+01				
Barium	3.64E+02	1.24E+02	1.94E+02	3.64E+02		5.47E+02						1.43E+03				
Beryllium	1.61E+00	8.00E-01	8.68E-01	1.61E+00		9.60E+00					3.42E+01	4.42E+01				
Calcium	2.89E+03	1.72E+03	3.54E+03	2.89E+03												
Chromium	3.34E+01	3.70E+01	6.44E+01			2.32E+01					6.85E+00	2.26E+02				
Cobalt	1.03E+01	1.52E+01	3.25E+01			4.68E+02						6.30E+01				
Copper	4.32E+01	1.27E+01	2.25E+01	4.32E+01		3.13E+02						1.06E+04				
Iron	3.98E+04	3.42E+04	5.54E+04	3.98E+04		2.34E+03		3.98E+04		1.70E+00		7.96E+04				
Lead	2.17E+01	4.01E+01	6.38E+01			4.00E+02						8.80E+02				
Magnesium	6.15E+03	1.03E+03	9.60E+03	6.15E+03												
Manganese	1.20E+02	1.58E+03	4.66E+03			3.63E+02						1.53E+02				
Mercury	7.60E-02	8.00E-02	3.22E-01			2.33E+00						7.12E+01				
Nickel	2.95E+01	1.03E+01	2.00E+01	2.95E+01		1.54E+02					3.42E+02	5.00E+03				
Potassium	2.59E+03	8.00E+02	6.01E+03	2.59E+03												
Selenium	7.58E-01	4.80E-01	1.28E+01	7.58E-01		3.91E+01						1.33E+03				
Silver	1.21E+00	3.60E-01	1.13E+00	1.21E+00		3.91E+01						1.33E+03				
Sodium	1.03E+02	6.34E+02	5.63E+02													
Vanadium	5.03E+01	5.88E+01	9.94E+01			5.31E+01						1.65E+03				
Zinc	7.84E+01	4.06E+01	7.37E+01	7.84E+01		2.34E+03						7.90E+04				
VOCs																
2-Butanone	1.50E-02			1.50E-02		4.66E+03						1.48E+05				
Acetone	1.50E-01			1.50E-01		7.76E+02						2.58E+04				
Ethylbenzene	7.40E-03			7.40E-03		7.77E+02						2.57E+04				
Methylene chloride	3.90E-03			3.90E-03	8.41E+01	4.66E+02					8.92E+02	1.55E+04				
p-Cymene	2.80E-03			2.80E-03		1.55E+03						5.17E+04				
Total ILCR, HI										2.22E+00						1.95E-01

All concentrations expressed as mg/kg.
MDC = maximum detected concentration; BSC = background screening criterion; UTL = 95% upper tolerance limit (incorporates data from Main Post and Pelham Range).
VOCs = volatile organic compounds.
[a] MDC presented only if it exceeds BSC.
[b] Site-specific screening level based on cancer risk for residential exposure to soil.
[c] Site-specific screening level based on noncancer hazard for residential exposure to soil.
[d] MDC presented only if it exceeds SSSL-c.
[e] MDC presented only if it exceeds SSSL-n.
[f] Incremental lifetime cancer risk for resident exposed to chemical in soil.
[g] Hazard index for noncancer effects for resident exposed to chemical in soil.
[h] Site-specific screening level based on cancer risk for National Guardsperson exposure to soil.
[i] Site-specific screening level based on noncancer hazard for National Guardsperson exposure to soil.
[j] Incremental lifetime cancer risk for National Guardsperson exposed to chemical in soil.
[k] Hazard index for noncancer effects for National Guardsperson exposed to chemical in soil.

Table 2

Preliminary Risk Evaluation for Exposure to Subsurface Soil
Former Personnel and Equipment Decontamination Station, Parcel 206(7)

Fort McClellan, Calhoun County, Alabama

Chemical	MDC	BSC	UTL	Site-Related Chemical?[a]	Res Soil SSSL-c[b]	Res Soil SSSL-n[c]	Res Cancer COPC?[d]	Res Noncancer COPC?[e]	Res ILCR[f]	Res HI[g]	NG Soil SSSL-c[h]	NG Soil SSSL-n[i]	NG Cancer COPC?[d]	NG Noncancer COPC?[e]	NG ILCR[j]	NG HI[k]
METALS																
Aluminum	2.39E+04	1.36E+04	1.80E+04	2.39E+04		7.80E+03		2.39E+04		3.06E-01		1.47E+04		2.39E+04		1.63E-01
Arsenic	4.41E+00	1.83E+01	3.24E+01		4.26E-01	2.34E+00					3.70E+00	7.96E+01				
Barium	1.99E+02	2.34E+02	2.42E+02			5.47E+02						1.43E+03				
Beryllium	1.78E+00	8.60E-01	1.50E+00	1.78E+00		9.60E+00					3.42E+01	4.42E+01				
Calcium	1.67E+03	6.37E+02	2.41E+03	1.67E+03												
Chromium	2.93E+01	3.83E+01	5.63E+01			2.32E+01					6.85E+00	2.26E+02				
Cobalt	3.47E+01	1.75E+01	3.63E+01	3.47E+01		4.68E+02						6.30E+01				
Copper	4.93E+01	1.94E+01	2.59E+01	4.93E+01		3.13E+02						1.06E+04				
Iron	3.97E+04	4.48E+04	5.63E+04			2.34E+03						7.96E+04				
Lead	2.33E+01	3.85E+01	6.05E+01			4.00E+02						8.80E+02				
Magnesium	9.03E+03	7.66E+02	5.54E+03	9.03E+03												
Manganese	2.83E+02	1.36E+03	4.12E+03			3.63E+02						1.53E+02				
Mercury	6.90E-02	7.00E-02	1.71E-01			2.33E+00						7.12E+01				
Nickel	8.65E+01	1.29E+01	2.07E+01	8.65E+01		1.54E+02					3.42E+02	5.00E+03				
Potassium	2.61E+03	7.11E+02	5.78E+03	2.61E+03												
Sodium	2.94E+02	7.02E+02	6.23E+02													
Vanadium	3.14E+01	6.49E+01	9.05E+01			5.31E+01						1.65E+03				
Zinc	1.42E+02	3.49E+01	7.13E+01	1.42E+02		2.34E+03						7.90E+04				
VOCs																
Acetone	3.20E-02			3.20E-02		7.76E+02						2.58E+04				
Methylene chloride	1.80E-03			1.80E-03	8.41E+01	4.66E+02					8.92E+02	1.55E+04				
Total ILCR, HI										3.06E-01						1.63E-01

All concentrations expressed as mg/kg.
MDC = maximum detected concentration; BSC = background screening criterion; UTL = 95% upper tolerance limit (values for total soil; incorporates data from Main Post and Pelham Range).
VOCs = volatile organic compounds.
[a] MDC presented only if it exceeds BSC.
[b] Site-specific screening level based on cancer risk for residential exposure to soil.
[c] Site-specific screening level based on noncancer hazard for residential exposure to soil.
[d] MDC presented only if it exceeds SSSL-c.
[e] MDC presented only if it exceeds SSSL-n.
[f] Incremental lifetime cancer risk for resident exposed to chemical in soil.
[g] Hazard index for noncancer effects for resident exposed to chemical in soil.
[h] Site-specific screening level based on cancer risk for National Guardsperson exposure to soil.
[i] Site-specific screening level based on noncancer hazard for National Guardsperson exposure to soil.
[j] Incremental lifetime cancer risk for National Guardsperson exposed to chemical in soil.
[k] Hazard index for noncancer effects for National Guardsperson exposed to chemical in soil.

Table 3

Preliminary Risk Evaluation for Exposure to Surface Water
Former Personnel and Equipment Decontamination Station, Parcel 206(7)

Fort McClellan, Calhoun County, Alabama

Chemical	MDC	BSC	UTL	Site-Related Chemical?[a]	Rec SW SSSL-c[b]	Rec SW SSSL-n[c]	Rec Cancer COPC?[d]	Rec Noncancer COPC?[e]	Rec ILCR[f]	Rec HI[g]
METALS										
Aluminum	7.17E-01	5.26E+00	1.70E+01			1.53E+01				
Arsenic	3.83E-03	2.10E-03	1.05E-02	3.83E-03	7.31E-04	4.70E-03	3.83E-03		5.24E-06	
Barium	1.37E-02	7.53E-02	1.13E-01			1.10E+00				
Calcium	1.54E+00	2.52E+01	6.41E+01							
Copper	4.59E-03	1.27E-02	7.16E-02			6.23E-01				
Iron	1.16E+01	1.96E+01	4.12E+01			4.70E+00				
Lead	2.81E-03	8.60E-03	4.73E-02			1.50E-02				
Magnesium	1.28E+00	1.10E+01	2.44E+01							
Manganese	3.50E-01	5.65E-01	1.83E+00			6.40E-01				
Sodium	6.38E-01	3.44E+00	1.52E+01							
Vanadium	5.75E-03	1.52E-02	3.56E-02			7.90E-02				
Zinc	2.11E-02	4.03E-02	1.82E-01			4.65E+00				
VOCs										
Acetone	4.50E-03			4.50E-03		1.57E+00				
Tetrachloroethene	3.40E-03			3.40E-03	1.54E-02	1.14E-01				
Trichloroethene	5.20E-04			5.20E-04	8.80E-02	8.30E-02				
cis-1,2-Dichloroethene	5.80E-04			5.80E-04		1.49E-01				
Total ILCR, HI									5.24E-06	

All concentrations expressed as mg/L.
MDC = maximum detected concentration; BSC = background screening criterion; UTL = 95% upper tolerance limit (incorporates data from Main Post and Pelham Range).
VOC = volatile organic compounds.
[a] MDC presented only if it exceeds BSC.
[b] Site-specific screening level based on cancer risk for recreational site user exposure to surface water.
[c] Site-specific screening level based on noncancer hazard for recreational site user exposure to surface water.
[d] MDC presented only if it exceeds SSSL-c.
[e] MDC presented only if it exceeds SSSL-n.
[f] Incremental lifetime cancer risk for recreational site user exposed to chemical in surface water.
[g] Hazard index for noncancer effects for recreational site user exposed to chemical in surface water.

Table 4

Preliminary Risk Evaluation for Exposure to Sediment
Former Personnel and Equipment Decontamination Station, Parcel 206(7)

Fort McClellan, Calhoun County, Alabama

Chemical	MDC	BSC	UTL	Site-Related Chemical?[a]	Rec SD SSSL-c[b]	Rec SD SSSL-n[c]	Rec Cancer COPC?[d]	Rec Noncancer COPC?[e]	Rec ILCR[f]	Rec HI[g]
METALS										
Aluminum	2.36E+04	8.59E+03	1.43E+04	2.36E+04		1.15E+06				
Arsenic	3.26E+00	1.13E+01	2.01E+01		5.58E+01	3.59E+02				
Barium	1.23E+02	9.89E+01	1.91E+02	1.23E+02		8.36E+04				
Beryllium	8.39E-01	9.70E-01	1.24E+00			1.50E+02				
Calcium	5.57E+02	1.11E+03	2.81E+03							
Chromium	2.52E+01	3.12E+01	6.33E+01			2.79E+03				
Cobalt	6.78E+00	1.10E+01	2.19E+01			6.72E+04				
Copper	2.43E+01	1.71E+01	3.68E+01	2.43E+01		4.74E+04				
Iron	2.34E+04	3.53E+04	5.19E+04			3.59E+05				
Lead	2.22E+01	3.78E+01	7.64E+01			4.00E+02				
Magnesium	1.83E+03	9.06E+02	2.20E+03	1.83E+03						
Manganese	1.05E+02	7.12E+02	2.05E+03			4.38E+04				
Nickel	1.32E+01	1.30E+01	3.16E+01	1.32E+01		1.76E+04				
Potassium	2.58E+03	1.01E+03	2.79E+03	2.58E+03						
Silver	1.01E+00	3.20E-01	1.05E+00	1.01E+00		6.07E+03				
Sodium	1.08E+02	6.92E+02	7.38E+02							
Vanadium	4.49E+01	4.09E+01	6.67E+01	4.49E+01		4.83E+03				
Zinc	1.12E+02	5.27E+01	1.11E+02	1.12E+02		3.44E+05				
VOCs										
2-Butanone	1.40E-02			1.40E-02		6.23E+05				
Acetone	1.40E-01			1.40E-01		1.03E+05				
Benzene	8.50E-03			8.50E-03		3.16E+03				
Carbon disulfide	7.30E-03			7.30E-03		1.04E+05				
Methylene chloride	4.00E-03			4.00E-03	9.84E+03	6.33E+04				
SVOCs										
Benzo(a)pyrene	4.20E-01			4.20E-01		8.93E+00				
Total ILCR, HI										

All concentrations expressed as mg/kg.
MDC = maximum detected concentration; BSC = background screening criterion; UTL = 95% upper tolerance limit (incorporates data from Main Post and Pelham Range).
VOCs = volatile organic compounds; SVOCs = semivolatile organic compounds

[a] MDC presented only if it exceeds BSC.

[b] Site-specific screening level based on cancer risk for recreational site user exposure to sediment.

[c] Site-specific screening level based on noncancer hazard for recreational site user exposure to sediment.

[d] MDC presented only if it exceeds SSSL-c.

[e] MDC presented only if it exceeds SSSL-n.

[f] Incremental lifetime cancer risk for recreational site user exposed to chemical in sediment.

[g] Hazard index for noncancer effects for recreational site user exposed to chemical in sediment.