APPENDIX I

STREAMLINED HUMAN HEALTH RISK ASSESSMENT

Technical Memorandum

From: Paul F. Goetchius, DVM

To: Fort McClellan (FTMC)
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Risk Assessment File

Date: 14 January 2002

Subject: **RISK ASSESSMENT AT SUBJECT SITE**

The purpose of this memorandum is to briefly interpret the results of a streamlined risk assessment (SRA) for the Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), hereinafter referred to as Parcel 154(7). 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 SRA are performed within EXCEL® spread sheet Tables 1 through 14. The results of each step are described below.

Media of Interest and Data Selection Media of interest include surface soil (0 to 1 foot below ground surface [ft bgs]) (Table 1), total soil (all soil to a depth of 5 ft bgs) (Table 4), and groundwater (Table 8). All media were analyzed for a wide range of parameters.

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 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. Site-related chemicals in surface soil (Table 2) and total soil (Table 5) include a few metals, the organochlorine pesticide DDT and its residues, and several semivolatile organic compounds (SVOC) and volatile organic compounds (VOC). Site-related chemicals in groundwater include a few metals, a larger number of organochlorine pesticides, two nitroaromatic compounds, one SVOC and a few VOCs. The appearance of a large number of organochlorine pesticides was surprising because these chemicals generally exhibit low solubility and low mobility in soil. They tend to have very high chemical affinity for soils containing a high proportion of clay minerals (ATSDR, 2000), such as the soils in which the four wells sampled for this exercise are located.

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. Contamination of surface soil was sufficiently light that none of

the chemicals were selected as COPCs (Table 3). It is concluded that exposure to surface soil at Parcel 154(7) is unlikely to pose an unacceptable risk under any standard site-use assumption, and surface soil is not further evaluated in this exercise. COPCs in total soil are limited to two metals and benzo(a)pyrene (Table 6). COPCs for groundwater include five metals, five organochlorine pesticides, one nitroaromatic compound and one VOC (Table 10).

Receptor Scenario Selection Information regarding the proposed reuse for Parcel 154(7) was not available for this exercise. Therefore, it was assumed that residential development was possible, and the on-site resident was the only receptor evaluated. The on-site resident is generally accepted as the upper-bound on exposure and risk, and represents a worst-case evaluation of the site.

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 quotient (HQ) or hazard index (HI). ILCR and HI estimates are computed for each chemical in each medium, and are summed to yield a total ILCR and total HI for each receptor scenario.

Generally, ILCR estimates are summed across exposure routes, COPCs and media to yield a total ILCR for a receptor exposed to all relevant media at the site. EPA (1990) considers ILCR estimates below 1E-6 to be negligible, ILCR estimates from 1E-6 to 1E-4 to fall within a risk management range, and ILCR estimates above 1E-4 to be generally unacceptable. EPA (1989, 2001) states that risk values should be rounded to one significant figure to reflect the uncertainty about their estimation. For example, a calculated ILCR of 9.50E-7 would be rounded to 1E-6 and interpreted as falling within the risk management range. Similarly, a calculated ILCR of 1.49E-4 would be rounded to 1E-4 and interpreted as falling within, but not exceeding, the risk management range.

HQ values for noncancer effects are generally summed in the same manner to yield a total HI. However, EPA (1989) acknowledges that a total HI may exaggerate the potential for noncancer effects, because the assumption of additivity is probably valid only for chemicals that operate by the same mechanism of toxicity. Data regarding mechanism of toxicity are sparse, so target organ or threshold effect is usually used as a surrogate for mechanism of toxicity. When the total HI summed across COPCs and media exceeds the threshold level of 1, separate HI values may be estimated for each target organ for comparison to the threshold level. HI values may be rounded in same manner as ILCR values. In other words, an HI of 1.49E+0 would be rounded to 1 and interpreted as not exceeding the threshold level. ILCR and HI estimates in this document are presented in scientific notation with two places to the right of the decimal. Rounding is done only if needed to facilitate interpretation.

The ILCR and HI estimates for residential exposure to total soil, groundwater, and summed across both media are presented in Tables 7, 11 and 12, respectively. The total ILCR of 3.03E-5 summed across both media (Table 12) falls near the middle of the risk management range, indicating that exposure to soil and groundwater is unlikely to yield unacceptable cancer risk. The total HI, however, exceeds the threshold value of 1, due largely to COPCs in groundwater.

Segregating HI by target organ (Table 13) identifies only the skin and liver as having HI values, after rounding, exceeding the threshold level of 1. The target organ analysis shows that HI values associated with COPCs in total soil are insignificant, and it is concluded that residential exposure to soil at Parcel 154(7) is unlikely to yield unacceptable cancer risk or noncancer hazard.

Thallium in groundwater with an HI of 5.90 is the main chemical of concern (COC) for both target organs whose HI values exceed the threshold. Endrin aldehyde, 2-amino-4,6-dinitrotoluene and chloroform are the other COCs contributing to the HI of 6.98 for the liver (Table 13). Remedial goal options (RGO) are developed for the COCs in Table 14. It is noted that source-term concentrations (STC) of endrin aldehyde, 2-amino-4,6-dinitrotoluene and chloroform are below their RGOs for an HI of 1, suggesting little potential for adverse effects. Furthermore, the STCs of endrin aldehyde and chloroform are below their maximum contaminant levels, indicating that these chemicals are within compliance levels.

Conclusions Thallium in groundwater emerges as the only significant COC at Parcel 154(7). It is noteworthy that the MDC of 6.00E-3 mg/L is only slightly above the 95 percent upper tolerance limit of 4.16E-3 mg/L (Table 9), suggesting that thallium is present at near background levels. Thallium was also detected at low levels in the soil at Parcel 154(7) (Tables 2 and 5). It is suggested that the identification of thallium in groundwater reflects contamination of the water with sediment from the surrounding soil rather than a site-related chemical release. This assumption is supported by turbidity readings of 150, 300, 300 and 500 nephelometric turbidity units (NTU) in the four wells at the time of sampling. Readings above 10 NTU are generally interpreted as reflecting contamination with sediment, and it appears that the wells at Parcel 154(7) were grossly contaminated. That the wells were grossly contaminated with sediment is further supported by the identification of low levels of several organochlorine pesticides in groundwater (Table 9). As noted above, organochlorine pesticides have a high chemical affinity for soil, particularly for soil containing a high proportion of clay minerals such as surrounds the wells at Parcel 154(7). Since organochlorine pesticides are generally immobile in soil, their presence in groundwater suggests contamination with sediment.

In summary, it is concluded that exposure to surface soil or total soil at Parcel 154(7) is unlikely to yield unacceptable risks to human health. Thallium appears to be present in groundwater at levels of concern regarding human health, but further evaluation suggests that thallium concentrations are near background levels and that contamination of groundwater samples with sediment is the most likely explanation for the levels measured.

References

Agency for Toxic Substances and Disease Registry (ATSDR), 2000, ***Public Health Assessment Guidance Manual***, on line www.atsdr.cdc.gov.

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*

U.S. Environmental Protection Agency (EPA), 1989, ***Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A)***, Interim Final, Office of Emergency and Remedial Response, Washington, DC, EPA/540/1-89/002, December.

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

Surface Soil Samples Used in Streamlined Risk Assessment
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Alabama

Sample Location	Sample Number	Sample Date	Depth of sample (ft)	Chemical Analyses Performed
SI17-SS01	17-SS01A	21-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS02	17-SS02A	22-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS03	17-SS03A	21-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS04	17-SS04A	21-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS05	17-SS05	22-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS06	17-SS06	22-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS07	17-SS07	22-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS08	17-SS08	21-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-TP03	17-TP04	27-May-98	0 - 1	EXPL_HIST, HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES

Table 2

Selection of Site-Related Chemicals for Surface Soil[a]
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), Fort McClellan, Alabama

Chemical	Detection Frequency	Percent hits	Range of values (mg/kg) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limits Minimum	Reporting Limits Maximum	Statistical Distribution	Arithmetic Mean (mg/kg)	95% UCL (mg/kg)	Background Screening Criterion[b] (mg/kg)	95% UTL[c] (mg/kg)	Nutrient?	Site-Related?[d]
Metals													
Aluminum	9 / 9	100	4.10E+03	1.27E+04		NA	L	7.20E+03	1.86E+04	1.63E+04	2.14E+04		N (a)
Arsenic	9 / 9	100	1.45E+00	1.65E+01		NA	L	7.95E+00	3.21E+01	1.37E+01	2.54E+01		N (b)
Barium	9 / 9	100	5.97E+00	1.73E+02		NA	L	4.64E+01	2.43E+02	1.24E+02	1.94E+02		N (b)
Beryllium	9 / 9	100	1.07E-01	2.81E-01		NA	N	2.07E-01	2.41E-01	8.00E-01	8.68E-01		N (a)
Calcium	9 / 9	100	1.08E+02	3.46E+03		NA	NP	5.93E+02	4.93E+03	1.72E+03	3.54E+03	Y	N (c)
Chromium	9 / 9	100	4.51E+00	4.97E+01		NA	N	2.66E+01	3.78E+01	3.70E+01	6.44E+01		N (b)
Cobalt	9 / 9	100	1.08E+00	5.74E+00		NA	L	2.59E+00	9.34E+00	1.52E+01	3.25E+01		N (a)
Copper	9 / 9	100	2.00E+00	2.22E+01		NA	L	6.93E+00	3.62E+01	1.27E+01	2.25E+01		N (b)
Iron	9 / 9	100	4.40E+03	6.50E+04		NA	L	2.83E+04	1.17E+05	3.42E+04	5.54E+04		N (d)
Lead	9 / 9	100	6.46E+00	3.00E+02		NA	NP	4.50E+01	4.29E+02	4.01E+01	6.38E+01		Y
Magnesium	9 / 9	100	6.67E+01	4.49E+02		NA	L	2.29E+02	6.96E+02	1.03E+03	9.60E+03	Y	N (c)
Manganese	9 / 9	100	2.93E+01	1.61E+02		NA	L	7.30E+01	2.21E+02	1.58E+03	4.66E+03		N (a)
Mercury	8 / 9	89	4.74E-02	8.10E-01	2.40E-02	2.40E-02	L	1.50E-01	1.15E+00	8.00E-02	3.22E-01		Y
Nickel	9 / 9	100	2.03E+00	1.03E+01		NA	L	4.47E+00	1.65E+01	1.03E+01	2.00E+01		N (a)
Potassium	9 / 9	100	1.16E+02	3.00E+02		NA	L	1.90E+02	4.41E+02	8.00E+02	6.01E+03	Y	N (c)
Selenium	5 / 9	56	7.75E-01	2.27E+00	4.76E-01	1.00E+00	L	9.27E-01	4.01E+00	4.80E-01	1.28E+00		Y
Silver	1 / 9	11	5.65E-01	5.65E-01	1.90E-01	4.00E-01	NP	1.62E-01	7.82E-01	3.60E-01	1.13E+00		N (b)
Sodium	9 / 9	100	3.12E+02	6.27E+02		NA	NP	3.90E+02	7.62E+02	6.34E+02	5.63E+02	Y	N (c)
Thallium	3 / 9	33	7.57E-01	1.99E+00	4.80E-01	1.00E+00	NP	5.91E-01	2.90E+00	3.43E+00	4.53E-01		N (a)
Vanadium	9 / 9	100	8.59E+00	9.19E+01		NA	L	4.55E+01	1.72E+02	5.88E+01	9.94E+01		N (b)
Zinc	9 / 9	100	1.18E+01	1.27E+02		NA	NP	3.20E+01	1.77E+02	4.06E+01	7.37E+01		Y
Pesticides													
4,4'-DDD	1 / 9	11	2.02E-03	2.02E-03	6.70E-04	7.10E-04	NP	5.24E-04	2.77E-03				Y
4,4'-DDE	2 / 9	22	1.68E-03	3.57E-03	6.70E-04	7.10E-04	NP	8.46E-04	5.31E-03				Y
4,4'-DDT	2 / 9	22	1.96E-03	3.36E-03	6.70E-04	7.10E-04	NP	8.54E-04	5.19E-03				Y
Semivolatile Organics													
Alpha-Pinene	3 / 3	100	3.36E-01	1.15E+00		NA	NA	6.71E-01					N (e)
Benzoic Acid	4 / 9	44	2.80E-02	2.10E-01	1.40E+00	1.40E+00	NP	4.43E-01	1.68E+00				Y
bis(2-Ethylhexyl)phthalate	1 / 1	100	7.50E-01	7.50E-01		NA	NA	7.50E-01					Y
Di-n-butyl phthalate	2 / 9	22	2.10E-02	2.90E-02	7.00E-02	7.00E-02	NP	3.28E-02	5.22E-02				Y
Fluoranthene	1 / 9	11	2.50E-02	2.50E-02	7.00E-02	7.00E-02	NP	3.39E-02	4.72E-02				Y
Gamma-Sitosterol	1 / 1	100	1.15E+00	1.15E+00		NA	NA	1.15E+00					N (e)
Phenanthrene	1 / 9	11	4.50E-02	4.50E-02	7.00E-02	7.00E-02	NP	3.61E-02	4.95E-02				Y
Pyrene	1 / 9	11	2.60E-02	2.60E-02	7.00E-02	7.00E-02	NP	3.40E-02	4.60E-02				Y
Volatiles Organics													
1,1,1-Trichloroethane	9 / 9	100	3.30E-03	1.10E-01	5.00E-03	5.00E-03	L	3.58E-02	1.63E-01				Y
1,1-Dichloroethene	4 / 9	44	1.20E-03	3.90E-03	5.00E-03	5.40E-03	NP	2.29E-03	5.71E-03				Y
1,2-Dichloroethene	6 / 9	67	4.50E-04	9.30E-03	5.00E-03	5.40E-03	L	2.66E-03	1.38E-02				Y
1,2-Dichloropropane	9 / 9	100	1.90E-03	1.60E-02	5.00E-03	5.00E-03	L	6.81E-03	2.77E-02				Y
2-Butanone	5 / 9	56	1.50E-02	3.10E-02	2.70E-02	2.70E-02	NP	1.76E-02	4.41E-02				Y
4-Methyl-2-pentanone	1 / 9	11	3.40E-03	3.40E-03	2.50E-02	2.70E-02	NP	1.17E-02	2.41E-02				Y
Acetone	5 / 9	56	2.60E-02	6.20E-01	4.10E-02	5.10E-02	NP	2.15E-01	1.23E+00				Y
Benzene	7 / 9	78	5.60E-04	3.10E-03	5.00E-03	5.00E-03	L	1.60E-03	5.65E-03				Y
Ethylbenzene	9 / 9	100	2.90E-03	1.00E-02	5.00E-03	5.00E-03	L	5.64E-03	1.50E-02				Y
Methylene chloride	9 / 9	100	3.60E-03	1.90E-01	5.00E-03	5.00E-03	L	4.37E-02	2.72E-01				Y
Tetrachloroethene	9 / 9	100	2.00E-02	1.00E-01		NA	L	4.84E-02	1.64E-01				Y
Toluene	9 / 9	100	2.20E-03	1.50E-02	5.00E-03	5.00E-03	L	6.71E-03	2.20E-02				Y
Trichloroethene	9 / 9	100	5.20E-03	5.40E-02		NA	L	1.79E-02	7.61E-02				Y
Xylene, Total	9 / 9	100	1.20E-02	4.50E-02		NA	L	2.42E-02	6.40E-02				Y

N = Chemical is determined not to be site-related ; Y = Chemical is determined to be site-related.

[a] Surface soil is defined as 0 to 1 foot below ground surface.

[b] Background criterion for inorganic constituents is 2 times the mean background concentration
(Science Applications International Corporation, 1998, Background Metals Survey Report, Fort McClellan, Anniston, Alabama, July).

[c] 95% Upper Tolerance Limit based on statistical distribution of background metal data.

[d] Rationale for exclusion of a chemical as site-related:

N (a) = maximum detected concentration is less than or equal to background screening criterion.
N (b) = maximum detected concentration is less than or equal to the upper tolerance limit.
N (c) = essential nutrient.
N (d) = site data set and background data set are drawn from the same population as determined by statistical testing.
N (e) = Toxicologist determined chemical is unlikely to be site-related and has relatively low toxicity.

Table 3

Selection of Chemicals of Potential Concern for Surface Soil[a]
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), Fort McClellan, Alabama

Site-Related Chemical	Maximum Detected Concentration (mg/kg)	Applicable SSSL (mg/kg) Resident Noncancer	COPC?	Cancer	COPC?	Statistical Distribution [b]	95% UCL (mg/kg)	Source-Term Concentration [d] (mg/kg)
Metals								
Lead	3.00E+02	4.00E+02	N	NA	NA			
Mercury	8.10E-01	2.33E+00	N	NA	NA			
Selenium	2.27E+00	3.91E+01	N	NA	NA			
Zinc	1.27E+02	2.34E+03	N	NA	NA			
Pesticides								
4,4'-DDD	2.02E-03	NA	NA	2.54E+00	N			
4,4'-DDE	3.57E-03	NA	NA	1.79E+00	N			
4,4'-DDT	3.36E-03	3.83E+00	N	1.79E+00	N			
Semivolatile Organics								
Benzoic Acid	2.10E-01	3.11E+04	N	NA	NA			
bis(2-Ethylhexyl)phthalate	7.50E-01	1.56E+02	N	4.52E+01	N			
Di-n-butyl phthalate	2.90E-02	7.80E+02	N	NA	NA			
Fluoranthene	2.50E-02	3.09E+02	N	NA	NA			
Phenanthrene	4.50E-02	2.32E+03	N	NA	NA			
Pyrene	2.60E-02	2.33E+02	N	NA	NA			
Volatiles Organics								
1,1,1-Trichloroethane	1.10E-01	1.55E+03	N	NA	NA			
1,1-Dichloroethene	3.90E-03	7.00E+01	N	1.05E+00	N			
1,2-Dichloroethene	9.30E-03	7.00E+01	N	NA	NA			
1,2-Dichloropropane	1.60E-02	NA	NA	9.26E+00	N			
2-Butanone	3.10E-02	4.66E+03	N	NA	NA			
4-Methyl-2-pentanone	3.40E-03	6.21E+02	N	NA	NA			
Acetone	6.20E-01	7.76E+02	N	NA	NA			
Benzene	3.10E-03	2.33E+01	N	2.17E+01	N			
Ethylbenzene	1.00E-02	7.77E+02	N	NA	NA			
Methylene chloride	1.90E-01	4.66E+02	N	8.41E+01	N			
Tetrachloroethene	1.00E-01	7.77E+01	N	1.21E+01	N			
Toluene	1.50E-02	1.55E+03	N	NA	NA			
Trichloroethene	5.40E-02	4.66E+01	N	5.72E+01	N			
Xylene, Total	4.50E-02	1.55E+04	N	NA	NA			

SSSL = Site-specific screening level developed as described in the *Human Health & Ecological Screening Values & PAH Background Summary Report* (IT, August 2000).
COPC = Chemical of potential concern.
UCL = Upper confidence limit.
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC.
[a] Surface soil is defined as 0 to 1 foot below ground surface.
[b] Statistical distribution testing performed only for COPC:
N = Normal distribution.
L = Lognormal distribution.
NP = Nonparametric distribution (if data set fails normal and lognormal).
[c] 95% UCL calculated only for COPC with at least 5 samples.
[d] The 95% UCL or maximum concentration, whichever is lower, is selected as the source-term concentration.

Table 4

Total Soil Samples Used in Streamlined Risk Assessment
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Alabama

Sample Location	Sample Number	Sample Date	Depth of sample (ft)	Chemical Analyses Performed
SI17-SS01	17-SS01A	21-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS02	17-SS02A	22-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS03	17-SS03A	21-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS04	17-SS04A	21-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS05	17-SS05	22-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS06	17-SS06	22-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS07	17-SS07	22-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS08	17-SS08	21-May-98	0 - 1	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-TP03	17-TP04	27-May-98	0 - 1	EXPL_HIST, HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS01	17-SS01B	21-May-98	3 - 5	EXPL_HIST, HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS02	17-SS02B	22-May-98	3 - 5	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS03	17-SS03B	21-May-98	3 - 5	EXPL_HIST, HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-SS04	17-SS04B	21-May-98	3 - 5	HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-TP01	17-TP01	27-May-98	2 - 4	EXPL_HIST, HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES
SI17-TP01	17-TP02	27-May-98	1 - 3	EXPL_HIST, HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES
SI17-TP03	17-TP03	27-May-98	3 - 5	EXPL_HIST, HERBICIDES, METALS, PEST/PCB, SEMIVOLATILES, VOLATILES

Table 5

Selection of Site-Related Chemicals for Total Soil[a]
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), Fort McClellan, Alabama

Chemical	Detection Frequency	Percent hits	Range of values (mg/kg) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limits Minimum	Reporting Limits Maximum	Statistical Distribution	Arithmetic Mean (mg/kg)	95% UCL (mg/kg)	Background Screening Criterion[b] (mg/kg)	95% UTL[c] (mg/kg)	Nutrient?	Site-Related?[d]
Metals													
Aluminum	16 / 16	100	3.77E+03	2.58E+04		NA	L	9.50E+03	3.10E+04	1.50E+04	1.80E+04		Y
Antimony	1 / 16	6	9.90E-01	9.90E-01	9.10E-01	2.00E+00	NP	5.51E-01	1.23E+00	1.66E+00	2.64E+00		N (a)
Arsenic	16 / 16	100	1.45E+00	1.65E+01		NA	L	6.98E+00	2.56E+01	1.60E+01	3.24E+01		N (b)
Barium	16 / 16	100	5.97E+00	1.73E+02		NA	L	3.86E+01	1.85E+02	1.76E+02	2.42E+02		N (a)
Beryllium	16 / 16	100	1.07E-01	2.81E-01		NA	N	2.04E-01	2.23E-01	8.31E-01	1.50E+00		N (a)
Cadmium	1 / 16	6	9.90E-02	9.90E-02	9.10E-02	2.00E-01	NP	5.51E-02	1.23E-01	2.51E-01	6.83E-01		N (a)
Calcium	16 / 16	100	1.05E+02	3.46E+03		NA	NP	4.52E+02	3.64E+03	1.20E+03	2.41E+03	Y	N (c)
Chromium	16 / 16	100	4.51E+00	4.97E+01		NA	L	2.31E+01	8.14E+01	3.76E+01	5.63E+01		N (b)
Cobalt	16 / 16	100	1.08E+00	5.74E+00		NA	L	2.36E+00	7.31E+00	1.63E+01	3.63E+01		N (a)
Copper	16 / 16	100	2.00E+00	2.22E+01		NA	L	6.63E+00	2.84E+01	1.59E+01	2.59E+01		N (b)
Iron	16 / 16	100	4.31E+03	6.50E+04		NA	L	2.41E+04	9.24E+04	3.92E+04	5.63E+04		N (d)
Lead	16 / 16	100	6.39E+00	3.00E+02		NA	NP	2.87E+01	3.11E+02	3.93E+01	6.05E+01		Y
Magnesium	16 / 16	100	6.67E+01	5.27E+02		NA	N	2.80E+02	3.38E+02	9.06E+02	5.54E+03	Y	N (c)
Manganese	16 / 16	100	1.90E+01	1.83E+02		NA	L	6.26E+01	2.48E+02	1.47E+03	4.12E+03		N (a)
Mercury	15 / 16	94	3.25E-02	8.10E-01	2.40E-02	2.40E-02	NP	1.08E-01	8.44E-01	7.04E-02	1.71E-01		Y
Nickel	16 / 16	100	1.72E+00	1.03E+01		NA	L	4.45E+00	1.39E+01	1.16E+01	2.07E+01		N (a)
Potassium	16 / 16	100	1.01E+02	3.88E+02		NA	L	2.29E+02	5.89E+02	7.57E+02	5.78E+03	Y	N (c)
Selenium	9 / 16	56	7.63E-01	2.27E+00	4.55E-01	1.00E+00	NP	7.78E-01	3.21E+00	4.80E-01	5.57E-01		Y
Silver	3 / 16	19	2.00E-01	5.65E-01	1.90E-01	4.00E-01	NP	1.47E-01	6.09E-01	3.03E-01	8.51E-01		N (b)
Sodium	16 / 16	100	2.54E+02	6.27E+02		NA	NP	3.90E+02	7.46E+02	6.67E+02	6.23E+02	Y	N (c)
Thallium	6 / 16	38	5.71E-01	1.99E+00	4.50E-01	1.00E+00	NP	5.22E-01	2.29E+00	2.45E+00	6.62E+00		N (a)
Vanadium	16 / 16	100	8.51E+00	9.19E+01		NA	N	4.11E+01	5.21E+01	6.17E+01	9.05E+01		Y
Zinc	16 / 16	100	9.93E+00	1.27E+02		NA	NP	2.57E+01	1.34E+02	3.79E+01	7.13E+01		Y
Pesticides													
4,4'-DDD	1 / 16	6	2.02E-03	2.02E-03	6.70E-04	7.50E-04	NP	4.48E-04	2.08E-03				Y
4,4'-DDE	2 / 16	13	1.68E-03	3.57E-03	6.70E-04	7.50E-04	NP	6.29E-04	3.95E-03				Y
4,4'-DDT	2 / 16	13	1.96E-03	3.36E-03	6.70E-04	7.50E-04	NP	6.33E-04	3.87E-03				Y
Endrin aldehyde	1 / 16	6	2.27E-03	2.27E-03	6.70E-04	7.50E-04	NP	4.63E-04	2.34E-03				Y
Semivolatile Organics													
Alpha-Pinene	3 / 3	100	3.36E-01	1.15E+00		NA	NA	6.71E-01					N (e)
Benzo(a)pyrene	1 / 16	6	1.40E-01	1.40E-01	1.40E-01	1.40E-01	NP	7.44E-02	1.42E-01				Y
Benzoic Acid	4 / 16	25	2.80E-02	2.10E-01	1.40E+00	1.40E+00	NP	5.56E-01	1.57E+00				Y
bis(2-Ethylhexyl)phthalate	1 / 1	100	7.50E-01	7.50E-01		NA	NA	7.50E-01					Y
Di-n-butyl phthalate	4 / 16	25	2.10E-02	4.10E-02	7.00E-02	7.00E-02	NP	3.41E-02	5.01E-02				Y
Fluoranthene	1 / 16	6	2.50E-02	2.50E-02	7.00E-02	7.00E-02	NP	3.44E-02	4.41E-02				Y
Gamma-Sitosterol	1 / 1	100	1.15E+00	1.15E+00		NA	NA	1.15E+00					N (e)
Phenanthrene	1 / 16	6	4.50E-02	4.50E-02	7.00E-02	7.00E-02	NP	3.56E-02	4.54E-02				Y
Pyrene	1 / 16	6	2.60E-02	2.60E-02	7.00E-02	7.00E-02	NP	3.44E-02	4.32E-02				Y
Volatiles Organics													
1,1,1-Trichloroethane	15 / 15	100	3.30E-03	1.10E-01	5.00E-03	5.00E-03	L	3.28E-02	1.35E-01				Y
1,1-Dichloroethene	7 / 15	47	1.20E-03	3.90E-03	5.00E-03	5.40E-03	NP	2.29E-03	5.05E-03				Y
1,2-Dichloroethene	9 / 15	60	4.50E-04	9.30E-03	5.00E-03	5.40E-03	L	2.41E-03	1.09E-02				Y
1,2-Dichloropropane	13 / 15	87	1.60E-03	1.60E-02	5.00E-03	5.00E-03	L	5.88E-03	2.38E-02				Y
2-Butanone	8 / 15	53	3.90E-03	3.10E-02	2.20E-02	2.70E-02	NP	1.40E-02	4.23E-02				Y
4-Methyl-2-pentanone	1 / 15	7	3.40E-03	3.40E-03	2.10E-02	2.70E-02	NP	1.19E-02	2.13E-02				Y
Acetone	5 / 15	33	2.60E-02	6.20E-01	4.10E-02	5.10E-02	NP	1.38E-01	9.79E-01				Y
Benzene	12 / 15	80	5.20E-04	3.10E-03	5.00E-03	5.00E-03	L	1.42E-03	4.95E-03				Y
Ethylbenzene	14 / 15	93	2.40E-03	1.00E-02	5.00E-03	5.00E-03	L	4.65E-03	1.33E-02				Y
Methylene chloride	15 / 15	100	3.60E-03	1.90E-01	5.00E-03	5.00E-03	L	4.17E-02	2.29E-01				Y
Tetrachloroethene	15 / 15	100	1.60E-02	1.00E-01		NA	L	3.99E-02	1.37E-01				Y
Toluene	14 / 15	93	2.20E-03	1.50E-02	5.00E-03	5.00E-03	L	5.86E-03	1.88E-02				Y
Trichloroethene	15 / 15	100	5.20E-03	5.40E-02		NA	L	1.64E-02	6.32E-02				Y
Xylene, Total	15 / 15	100	9.80E-03	4.50E-02		NA	L	2.05E-02	5.70E-02				Y

N = Chemical is determined not to be site-related ; Y = Chemical is determined to be site-related.

[a] Total soil is surface and deep soil combined.

[b] Background criterion for inorganic constituents is 2 times the mean background concentration
(Science Applications International Corporation, 1998, Background Metals Survey Report, Fort McClellan, Anniston, Alabama, July).

[c] 95% Upper Tolerance Limit based on statistical distribution of background metal data.

[d] Rationale for exclusion of a chemical as site-related:
N (a) = maximum detected concentration does not exceed background screening criterion.
N (b) = maximum detected concentration does not exceed the upper tolerance limit.
N (c) = essential nutrient.
N (d) = site data set and background data set are drawn from the same population as determined by statistical testing.
N (e) = Toxicologist determined chemical is unlikely to be site-related and has relatively low toxicity.

Table 6

Selection of Chemicals of Potential Concern for Total Soil[a]
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), Fort McClellan, Alabama

Site-Related Chemical	Maximum Detected Concentration (mg/kg)	Applicable SSSL (mg/kg) Resident Noncancer	COPC?	Cancer	COPC?	Statistical Distribution[b]	95% UCL (mg/kg)	Source-Term Concentration[d] (mg/kg)
Metals								
Aluminum	2.58E+04	7.80E+03	Y	NA	NA	L	3.10E+04	2.58E+04
Lead	3.00E+02	4.00E+02	N	NA	NA			
Mercury	8.10E-01	2.33E+00	N	NA	NA			
Selenium	2.27E+00	3.91E+01	N	NA	NA			
Vanadium	9.19E+01	5.31E+01	Y	NA	NA	N	5.21E+01	5.21E+01
Zinc	1.27E+02	2.34E+03	N	NA	NA			
Pesticides								
4,4'-DDD	2.02E-03	NA	NA	2.54E+00	N			
4,4'-DDE	3.57E-03	NA	NA	1.79E+00	N			
4,4'-DDT	3.36E-03	3.83E+00	N	1.79E+00	N			
Endrin aldehyde	2.27E-03	2.32E-01	N	NA	NA			
Semivolatile Organics								
Benzo(a)pyrene	1.40E-01	NA	NA	8.51E-02	Y	NP	1.42E-01	1.40E-01
Benzoic Acid	2.10E-01	3.11E+04	N	NA	NA			
bis(2-Ethylhexyl)phthalate	7.50E-01	1.56E+02	N	4.52E+01	N			
Di-n-butyl phthalate	4.10E-02	7.80E+02	N	NA	NA			
Fluoranthene	2.50E-02	3.09E+02	N	NA	NA			
Phenanthrene	4.50E-02	2.32E+03	N	NA	NA			
Pyrene	2.60E-02	2.33E+02	N	NA	NA			
Volatiles Organics								
1,1,1-Trichloroethane	1.10E-01	1.55E+03	N	NA	NA			
1,1-Dichloroethene	3.90E-03	7.00E+01	N	1.05E+00	N			
1,2-Dichloroethene	9.30E-03	7.00E+01	N	NA	NA			
1,2-Dichloropropane	1.60E-02	NA	NA	9.26E+00	N			
2-Butanone	3.10E-02	4.66E+03	N	NA	NA			
4-Methyl-2-pentanone	3.40E-03	6.21E+02	N	NA	NA			
Acetone	6.20E-01	7.76E+02	N	NA	NA			
Benzene	3.10E-03	2.33E+01	N	2.17E+01	N			
Ethylbenzene	1.00E-02	7.77E+02	N	NA	NA			
Methylene chloride	1.90E-01	4.66E+02	N	8.41E+01	N			
Tetrachloroethene	1.00E-01	7.77E+01	N	1.21E+01	N			
Toluene	1.50E-02	1.55E+03	N	NA	NA			
Trichloroethene	5.40E-02	4.66E+01	N	5.72E+01	N			
Xylene, Total	4.50E-02	1.55E+04	N	NA	NA			

SSSL = Site-specific screening level developed as described in the *Human Health & Ecological Screening Values & PAH Background Summary Report* (IT, August 2000).
COPC = Chemical of potential concern.
UCL = Upper confidence limit.
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC.
[a] Total soil is surface and deep soil combined.
[b] Statistical distribution testing performed only for COPC:
N = Normal distribution.
L = Lognormal distribution.
NP = Nonparametric distribution (if data set fails normal and lognormal).
[c] 95% UCL calculated only for COPC with at least 5 samples.
[d] The 95% UCL or maximum concentration, whichever is lower, is selected as the source-term concentration.

Table 7

Cancer Risk and Noncancer Hazard Estimates for the Resident Exposed to Total Soil[a]
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Alabama

COPC	Source-Term Concentration (mg/kg)	Total Noncancer Hazard / Cancer Risk Resident HI	Total Noncancer Hazard / Cancer Risk Resident ILCR
Metals			
Aluminum	2.58E+04	3.31E-01	NA
Vanadium	5.21E+01	9.81E-02	NA
Semivolatile Organics			
Benzo(a)pyrene	1.40E-01	NA	1.65E-06
Total HI / ILCR		**4.29E-01**	**1.65E-06**

[a] Total soil is surface and deep soil combined.
COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable

Table 8

Groundwater Samples Used in Streamlined Risk Assessment
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Alabama

Sample Location	Sample Number	Sample Date	Chemical Analyses Performed
GSBP-154-MW01	BQ3048	9-Dec-99	CL Herb, CL Pest, Metals-W, Nitro, PCBs, SVOCs, VOCs
GSBP-154-MW02	BQ3049	10-Dec-99	CL Herb, CL Pest, Metals-W, Nitro, PCBs, SVOCs, VOCs
GSBP-154-MW03	BQ3050	8-Dec-99	CL Herb, CL Pest, Metals-W, Nitro, PCBs, SVOCs, VOCs
GSBP-154-MW04	BQ3052	8-Dec-99	CL Herb, CL Pest, Metals-W, Nitro, PCBs, SVOCs, VOCs

CL Herb - Chlorinated herbicides
CL Pest - Chlorinated pesticides
Nitro - Nitroaromatics
PCBs - Polychlorinated biphenyls
SVOCs - Semivolatile organic compounds
VOCs - Volatile organic compounds

Table 9

Selection of Site-Related Chemicals for Groundwater
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), Fort McClellan, Alabama

Chemical	Detection Frequency	Percent hits	Range of values (mg/L) Detected Concentration Minimum	Detected Concentration Maximum	Reporting Limits Minimum	Reporting Limits Maximum	Arithmetic Mean (mg/L)	Background Screening Criterion [a] (mg/L)	95% UTL [b] (mg/L)	Nutrient?	Site-Related? [c]
Metals											
Aluminum	4 / 4	100	2.86E+00	1.06E+01	2.00E-01	2.00E-01	7.18E+00	2.34E+00	9.60E+00		Y
Arsenic	4 / 4	100	4.00E-03	1.04E-02	1.00E-02	1.00E-02	7.48E-03	1.78E-02	2.22E-01		N (a)
Barium	4 / 4	100	8.27E-02	1.70E-01	2.00E-01	2.00E-01	1.17E-01	1.27E-01	4.72E-01		N (b)
Calcium	4 / 4	100	9.74E-01	3.30E+00	5.00E+00	5.00E+00	2.27E+00	5.65E+01	4.52E+02	Y	N (d)
Chromium	4 / 4	100	1.08E-02	6.20E-02	1.00E-02	1.00E-02	3.46E-02				Y
Cobalt	4 / 4	100	2.20E-02	7.04E-02	5.00E-02	5.00E-02	3.70E-02	2.34E-02	2.52E-02		Y
Copper	2 / 2	100	2.92E-02	3.32E-02	2.50E-02	2.50E-02	3.12E-02	2.55E-02	2.35E-01		N (b)
Iron	4 / 4	100	9.58E+00	1.88E+01	1.00E-01	1.00E-01	1.40E+01	7.04E+00	2.58E+01		N (b)
Lead	4 / 4	100	7.10E-03	1.40E-02	3.00E-03	3.00E-03	1.12E-02	8.00E-03	2.58E-02		N (b)
Magnesium	4 / 4	100	1.03E+00	2.46E+00	5.00E+00	5.00E+00	1.60E+00	2.13E+01	1.49E+02	Y	N (d)
Manganese	4 / 4	100	1.02E+00	4.00E+00	1.50E-02	1.50E-02	2.61E+00	5.81E-01	4.13E+00		N (b)
Nickel	4 / 4	100	4.12E-02	5.42E-02	4.00E-02	4.00E-02	5.04E-02				Y
Potassium	4 / 4	100	2.39E+00	6.30E+00	5.00E+00	5.00E+00	4.60E+00	7.20E+00	6.85E+01	Y	N (d)
Sodium	3 / 3	100	8.32E-01	2.25E+00	5.00E+00	5.00E+00	1.54E+00	1.48E+01	4.90E+01	Y	N (d)
Thallium	2 / 2	100	5.90E-03	6.00E-03	1.00E-02	1.00E-02	5.95E-03	1.46E-03	4.16E-03		Y
Vanadium	4 / 4	100	1.21E-02	2.77E-02	5.00E-02	5.00E-02	2.17E-02	1.70E-02	1.14E-02		Y
Zinc	4 / 4	100	3.42E-02	7.08E-02	2.00E-02	2.00E-02	5.38E-02	2.20E-01	1.52E+00		N (a)
Chlorinated Pesticides											
4,4'-DDD	1 / 4	25	5.40E-05	5.40E-05	5.00E-05	5.00E-05	3.23E-05				Y
Aldrin	1 / 4	25	2.40E-05	2.40E-05	5.00E-05	5.00E-05	2.48E-05				Y
alpha-BHC	2 / 4	50	2.30E-05	4.90E-05	5.00E-05	5.00E-05	3.05E-05				Y
delta-BHC	1 / 4	25	8.10E-05	8.10E-05	5.00E-05	5.00E-05	3.90E-05				Y
Dieldrin	1 / 4	25	6.00E-05	6.00E-05	5.00E-05	5.00E-05	3.38E-05				Y
Endosulfan II	1 / 4	25	2.80E-05	2.80E-05	5.00E-05	5.00E-05	2.58E-05				Y
Endosulfan sulfate	3 / 4	75	3.20E-05	1.10E-04	5.00E-05	5.00E-05	5.23E-05				Y
Endrin	2 / 4	50	4.00E-05	5.50E-05	5.00E-05	5.00E-05	3.63E-05				Y
Endrin aldehyde	2 / 4	50	7.90E-05	2.40E-04	5.00E-05	5.00E-05	9.23E-05				Y
Endrin ketone	2 / 4	50	1.40E-05	2.20E-05	5.00E-05	5.00E-05	2.15E-05				Y
Heptachlor	2 / 4	50	3.60E-05	3.90E-05	5.00E-05	5.00E-05	3.13E-05				Y
Nitroaromatics											
2-Amino-4,6-dinitrotoluene	1 / 4	25	2.80E-04	2.80E-04	2.00E-04	1.60E-03	3.71E-04				Y
2-Nitrotoluene	1 / 4	25	3.70E-04	3.70E-04	2.00E-04	1.00E-03	2.68E-04				Y
Semivolatile Organics											
Di-n-butyl phthalate	3 / 4	75	1.00E-03	7.60E-03	1.00E-02	1.00E-02	4.00E-03				Y
Volatile Organics											
Acetone	1 / 1	100	1.40E-03	1.40E-03	1.00E-02	1.00E-02	1.40E-03				Y
Benzene	1 / 4	25	2.50E-04	2.50E-04	1.00E-03	1.00E-03	4.38E-04				Y
Chloroform	1 / 4	25	4.40E-04	4.40E-04	1.00E-03	1.00E-03	4.85E-04				Y
Chloromethane	2 / 2	100	1.40E-04	2.80E-04	2.00E-03	2.00E-03	2.10E-04				Y

N = Chemical is determined not to be site-related ; Y = Chemical is determined to be site-related.

[a] Background criterion for inorganic constituents is 2 times the mean background concentration
(Science Applications International Corporation, 1998, Background Metals Survey Report, Fort McClellan, Anniston, Alabama, July).

[b] 95% Upper Tolerance Limit based on statistical distribution of background metal data.

[c] Rationale for exclusion of a chemical as site-related:
N (a) = maximum detected concentration does not exceed background screening criterion.
N (b) = maximum detected concentration does not exceed the upper tolerance limit.
N (c) = detection frequency is less than 5 percent, detected only at low concentrations, and not expected to be site-related based on historical information.
N (d) = essential nutrient.
N (e) = site data set and background data set are drawn from the same population as determined by statistical testing.

Table 10

Selection of Chemicals of Potential Concern for Groundwater
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7), Fort McClellan, Alabama

Site-Related Chemical	Maximum Detected Concentration (mg/L)	Applicable SSSL (mg/L) Resident Noncancer	COPC?	Cancer	COPC?	Statistical Distribution [a]	95% UCL (mg/L)	Source-Term Concentration [c] (mg/L)
Metals								
Aluminum	1.06E+01	1.56E+00	Y	NA	NA	NA	NA	1.06E+01
Chromium	6.20E-02	4.69E-03	Y	NA	NA	NA	NA	6.20E-02
Cobalt	7.04E-02	9.39E-02	N	NA	NA			
Nickel	5.42E-02	3.13E-02	Y	NA	NA	NA	NA	5.42E-02
Thallium	6.00E-03	1.02E-04	Y	NA	NA	NA	NA	6.00E-03
Vanadium	2.77E-02	1.10E-02	Y	NA	NA	NA	NA	2.77E-02
Chlorinated Pesticides								
4,4'-DDD	5.40E-05	NA	NA	1.83E-04	N			
Aldrin	2.40E-05	4.67E-05	N	3.92E-06	Y	NA	NA	2.40E-05
alpha-BHC	4.90E-05	NA	NA	1.03E-05	Y	NA	NA	4.90E-05
delta-BHC	8.10E-05	4.49E-04	N	NA	NA			
Dieldrin	6.00E-05	7.47E-05	N	3.97E-06	Y	NA	NA	6.00E-05
Endosulfan II	2.80E-05	9.35E-03	N	NA	NA			
Endosulfan sulfate	1.10E-04	9.35E-03	N	NA	NA			
Endrin	5.50E-05	4.48E-04	N	NA	NA			
Endrin aldehyde	2.40E-04	3.75E-05	Y	NA	NA	NA	NA	2.40E-04
Endrin ketone	2.20E-05	4.69E-05	N	NA	NA			
Heptachlor	3.90E-05	7.67E-04	N	1.46E-05	Y	NA	NA	3.90E-05
Nitroaromatics								
2-Amino-4,6-dinitrotoluene	2.80E-04	9.36E-05	Y	NA	NA	NA	NA	2.80E-04
2-Nitrotoluene	3.70E-04	1.53E-02	N	NA	NA			
Semivolatile Organics								
Di-n-butyl phthalate	7.60E-03	1.48E-01	N	NA	NA			
Volatile Organics								
Acetone	1.40E-03	1.56E-01	N	NA	NA			
Benzene	2.50E-04	3.96E-03	N	1.41E-03	N			
Chloroform	4.40E-04	3.11E-04	Y	1.15E-03	N	NA	NA	4.40E-04
Chloromethane	2.80E-04	6.22E-03	N	3.93E-03	N			

SSSL = Site-specific screening level developed as described in the *Human Health & Ecological Screening Values & PAH Background Summary Report* (IT, August 2000).
COPC = Chemical of potential concern.
UCL = Upper confidence limit.
N = Chemical is determined not to be a COPC ; Y = Chemical is determined to be COPC.
NA = Not applicable
[a] Statistical distribution testing not performed on sample sets of than 5 data points.
[b] 95% UCL calculated only for COPC with at least 5 samples.
[c] The maximum concentration is selected as the source-term concentration.

Table 11

Cancer Risk and Noncancer Hazard Estimates for Resident Exposed to Groundwater
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Alabama

COPC	Source-Term Concentration (mg/L)	Total Noncancer Hazard / Cancer Risk Resident HI	Total Noncancer Hazard / Cancer Risk Resident ILCR
Metals			
Aluminum	1.06E+01	6.78E-01	NA
Chromium	6.20E-02	1.32E+00	NA
Nickel	5.42E-02	1.73E-01	NA
Thallium	6.00E-03	5.90E+00	NA
Vanadium	2.77E-02	2.53E-01	NA
Chlorinated Pesticides			
Aldrin	2.40E-05	NA	6.12E-06
alpha-BHC	4.90E-05	NA	4.74E-06
Dieldrin	6.00E-05	NA	1.51E-05
Endrin aldehyde	2.40E-04	6.39E-01	NA
Heptachlor	3.90E-05	NA	2.68E-06
Nitroaromatics			
2-Amino-4,6-dinitrotoluene	2.80E-04	2.99E-01	NA
Volatile Organics			
Chloroform	4.40E-04	1.41E-01	NA
Total HI / ILCR		**9.41E+00**	**2.86E-05**

COPC = Chemical of potential concern
HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable

Table 12

Cancer Risk and Noncancer Hazard Estimates Across All Media
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Alabama

Medium	Resident	
	HI	ILCR
Surface Soil	NA	NA
Total Soil	4.29E-01	1.65E-06
Groundwater	9.41E+00	2.86E-05
Total HI / ILCR	**9.83E+00**	**3.03E-05**

HI = Hazard index
ILCR = Incremental lifetime cancer risk
NA = Not applicable

Table 13

Separation of Noncancer Hazard by Target Organ
for Resident
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Alabama

COPC	Nervous System	Reduced Body & Organ Wt.	Skin	Respiratory Track	Nasal Epithelium	CNS	Liver	Not Determined	Kidney
For Total Soil:									
Metals									
Aluminum	3.31E-01								
For Groundwater:									
Metals									
Aluminum	6.78E-01								
Chromium								1.32E+00	
Nickel		1.73E-01							
Thallium			5.90E+00				5.90E+00		
Vanadium				2.53E-01					
Chlorinated Pesticides									
Endrin aldehyde						6.39E-01	6.39E-01		
Nitroaromatics									
2-Amino-4,6-dinitrotoluene							2.99E-01		
Volatile Organics									
Chloroform					1.41E-01		1.41E-01		1.41E-01
Resident HI by Target Organ:	**1.01E+00**	**1.73E-01**	**5.90E+00**	**2.53E-01**	**1.41E-01**	**6.39E-01**	**6.98E+00**	**1.32E+00**	**1.41E-01**

COPC = Chemical of potential concern
CNS = Central Nervous System
* See Toxicological Profiles for data regarding selection of target organs.

Table 14

Remedial Goal Options Based on Noncancer for the Resident Groundwater
Ground Scar with Trenches at Littlebrant Drive, Parcel 154(7)
Fort McClellan, Alabama

COC	Source-Term Concentration (mg/L)	MCL[a] (mg/L)	HI (all pathways) for COC	Noncancer Remedial Goal Options (mg/L) Based on an HI of: 0.1	1	3
Metals						
Thallium	6.00E-03	2.00E-03	5.90E+00	1.02E-04	1.02E-03	3.05E-03
Chlorinated Pesticides						
Endrin aldehyde	2.40E-04	2.00E-3[b]	6.39E-01	3.75E-05	3.75E-04	1.13E-03
Nitroaromatics						
2-Amino-4,6-dinitrotoluene	2.80E-04	ND	2.99E-01	9.36E-05	9.36E-04	2.81E-03
Volatile Organics						
Chloroform	4.40E-04	8.00E-2[c]	1.41E-01	3.11E-04	3.11E-03	9.34E-03

a = US Environmental Protection Agency, *Drinking Water Standards and Health Advisories*, Summer 2000.
b = MCL for endrin, the parent compound for endrin aldehyde.
c = MCL for total trihalogenated methanes.
COC = Chemical of concern.
HI = Hazard index
MCL = Maximum contaminant level.
ND = No data