/ls (PCBs)

80B	80B
0.5	1
<20	9200
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	0.05
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
BDL	BDL
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

Environmental Assessment, Stronghold Freedom
(U) ~~(C//REL)~~ Table C-7, Soil Results, Munitions

Boring/Area Identification					B	4A	4B	4C	10A	10B	10C	20E	30A	30A	30B	30B	30C
Depth Below Ground Surface (Meters)					0	0	0	0	0	0	0	2.5	0.5	1.5	0.5	1.5	0.5
Analyte	Units	MDL[1]	MSG-L[2]	PRG													
Explosives:																	
1,3,5-Trinitrobenzene	mg/kg dw	Not Reported	N/A	26000	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
1,3-Dinitrobenzene	mg/kg dw	Not Reported	450		<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
2,4,6-Trinitrotoluene	mg/kg dw	Not Reported	N/A	82	<0.047	<0.046	<0.045	<0.047	<0.045	0.087	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
2,4-Dinitrotoluene	mg/kg dw	Not Reported	N/A	1800	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
2,6-Dinitrotoluene	mg/kg dw	Not Reported	N/A	880	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
2-Amino-4,6-dinitrotoluene	mg/kg dw	Not Reported	N/A	3.6	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
2-Nitrotoluene	mg/kg dw	Not Reported	N/A	1000	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
3-Nitrotoluene	mg/kg dw	Not Reported	N/A	1000	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
4-Amino-2,6-dinitrotoluene	mg/kg dw	Not Reported	N/A	3.6	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
4-Nitrotoluene	mg/kg dw	Not Reported	N/A	1000	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
HMX	mg/kg dw	Not Reported	N/A	44000	<0.047	<0.046	<0.045	<0.047	<0.045	0.37	0.12	<0.094	<0.081	<0.092	<0.087	<0.094	<0.084
Nitrobenzene	mg/kg dw	Not Reported	N/A	110	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
Nitroglycerin	mg/kg dw	Not Reported	N/A	180	<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
RDX	mg/kg dw	Not Reported	N/A	22	<0.047	<0.046	<0.045	<0.047	<0.045	0.19	0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041
Tetryl	mg/kg dw	Not Reported	N/A		<0.047	<0.046	<0.045	<0.047	<0.045	<0.046	<0.044	<0.047	<0.04	<0.046	<0.043	<0.046	<0.041

Boring/Area Identification					30E	30E	30F	30F	30G	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8
Depth Below Ground Surface (Meters)					0.5	1.5	0.5	1.5	1.5	0	0	0	0	0	0	0	0
Analyte	Units	MDL[1]	MSG-L[2]														
Explosives:																	
1,3,5-Trinitrobenzene	mg/kg dw	Not Reported	N/A	26000	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
1,3-Dinitrobenzene	mg/kg dw	Not Reported	450		<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
2,4,6-Trinitrotoluene	mg/kg dw	Not Reported	N/A	82	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	0.055	<0.046	<0.047
2,4-Dinitrotoluene	mg/kg dw	Not Reported	N/A	1800	<0.04	<0.041	<0.4	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
2,6-Dinitrotoluene	mg/kg dw	Not Reported	N/A	880	<0.04	<0.041	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
2-Amino-4,6-dinitrotoluene	mg/kg dw	Not Reported	N/A	3.6	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
2-Nitrotoluene	mg/kg dw	Not Reported	N/A	1000	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
3-Nitrotoluene	mg/kg dw	Not Reported	N/A	1000	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
4-Amino-2,6-dinitrotoluene	mg/kg dw	Not Reported	N/A	3.6	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
4-Nitrotoluene	mg/kg dw	Not Reported	N/A	1000	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
HMX	mg/kg dw	Not Reported	N/A	44000	<0.079	<0.11	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
Nitrobenzene	mg/kg dw	Not Reported	N/A	110	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
Nitroglycerin	mg/kg dw	Not Reported	N/A	180	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047
RDX	mg/kg dw	Not Reported	N/A	22	<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	0.71	<0.044	<0.047	0.06	0.66	0.16
Tetryl	mg/kg dw	Not Reported	N/A		<0.04	<0.053	<0.043	<0.04	<0.049	<0.048	<0.048	<0.045	<0.044	<0.047	<0.047	<0.046	<0.047

Notes:
1. MDL: Method Detection Limit; BDL: Below Detection Limit

2. MSG-L: Military Soil Guidelines-Long Term, TG 230 **DECLASSIFIED** ~~CONFIDENTIAL//REL TO USA, AUS, CAN and GBR//MR~~
3. N/A: Not Applicable or Not Analyzed

(U) ~~(C//REL)~~ Table C-7, Soil Results, Munitions

Boring/Area Identification					Area 19	Area 20	Area 30	Area 32	Area 33
Depth Below Ground Surface (Meters)					0	0	0	0	0
Analyte	Units	MDL[1]	MSG-L[2]						
Explosives:									
1,3,5-Trinitrobenzene	mg/kg dw	Not Reported	N/A	26000	<0.046	<0.042	<0.041	<0.043	<0.044
1,3-Dinitrobenzene	mg/kg dw	Not Reported	450		<0.046	<0.042	<0.041	<0.043	<0.044
2,4,6-Trinitrotoluene	mg/kg dw	Not Reported	N/A	82	0.12	<0.042	<0.041	<0.043	<0.044
2,4-Dinitrotoluene	mg/kg dw	Not Reported	N/A	1800	0.065	<0.042	<0.041	<0.043	<0.044
2,6-Dinitrotoluene	mg/kg dw	Not Reported	N/A	880	<0.046	<0.042	<0.041	<0.043	<0.044
2-Amino-4,6-dinitrotoluene	mg/kg dw	Not Reported	N/A	3.6	<0.046	<0.042	<0.041	<0.043	<0.044
2-Nitrotoluene	mg/kg dw	Not Reported	N/A	1000	<0.046	<0.042	<0.041	<0.043	<0.044
3-Nitrotoluene	mg/kg dw	Not Reported	N/A	1000	<0.046	<0.042	<0.041	<0.043	<0.044
4-Amino-2,6-dinitrotoluene	mg/kg dw	Not Reported	N/A	3.6	<0.046	<0.042	<0.041	<0.043	<0.044
4-Nitrotoluene	mg/kg dw	Not Reported	N/A	1000	<0.046	<0.042	<0.041	<0.043	<0.044
HMX	mg/kg dw	Not Reported	N/A	44000	<0.046	<0.042	<0.041	<0.043	<0.044
Nitrobenzene	mg/kg dw	Not Reported	N/A	110	<0.046	<0.042	<0.041	<0.043	<0.044
Nitroglycerin	mg/kg dw	Not Reported	N/A	180	0.062	<0.042	<0.041	<0.043	<0.044
RDX	mg/kg dw	Not Reported	N/A	22	<0.046	<0.042	<0.041	<0.043	<0.044
Tetryl	mg/kg dw	Not Reported	N/A		<0.046	<0.042	<0.041	<0.043	<0.044

Notes:
1. MDL: Method Detection Limit; BDL: Below Detection Limit
2. MSG-L: Military Soil Guidelines-Long Term, TG 230
3. N/A: Not Applicable or Not Analyzed

30C	30D	30D
1.5	0.5	1.5
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.082	<0.095	<0.081
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041
<0.041	<0.047	<0.041

Area 16	Area 17	Area 18
0	0	0
<0.042	<0.043	<0.045
<0.042	<0.043	<0.045
0.049	<0.043	0.11
<0.042	<0.043	<0.045
<0.042	<0.043	<0.045
0.21	0.047	<0.045
<0.042	<0.043	<0.045
<0.042	<0.043	<0.045
0.23	0.053	<0.045
<0.042	<0.043	<0.045
<0.042	0.18	<0.045
<0.042	<0.043	<0.045
<0.042	<0.043	<0.045
0.11	0.58	6.4
<0.042	<0.043	<0.045

Boring/Area Identification					B	Berm 1	Berm 2	Berm 3	Berm 4	Berm 5	Berm 7	Area 1	Area 2	Area 3
Depth Below Ground Surface (Meters)					0	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0
Analyte	Units	MDL[1]	MSG-L[2]	PRG										
Herbicides:														
Pentachlorophenol (PCP)	mg/kg dw	0.02	N/A	11	<0.055	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4-D	mg/kg dw	0.01	1000		<0.055	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2,4,5-TP	mg/kg dw	0.01	N/A	8800	<0.055	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Pesticides:														
Azinphosethyl	mg/kg dw	0.01	N/A		N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chlorfenvinphos	mg/kg dw	0.01	N/A		N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dimethoat	mg/kg dw	0.01	N/A	180	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Prathionethyl	mg/kg dw	0.01	N/A		N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Prathionmethyl	mg/kg dw	0.01	310		N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DDD-o,p'	mg/kg dw	0.01	N/A	17	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DDD-p,p'	mg/kg dw	0.01	N/A	17	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DDE-o,p'	mg/kg dw	0.01	N/A	12	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DDE-p,p'	mg/kg dw	0.01	N/A	12	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DDT-o,p'	mg/kg dw	0.01	N/A	12	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DDT-p,p'	mg/kg dw	0.01	52		N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Hexachlorocyclohexane (HCH) -alpha	mg/kg dw	0.01	N/A	0.59	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HCH-beta	mg/kg dw	0.01	N/A	2.1	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HCH-gamma	mg/kg dw	0.01	N/A	2.9	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HCH-delta	mg/kg dw	0.01	N/A	2.1	N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
HCB	mg/kg dw	0.01	N/A		N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Dieldrin	mg/kg dw	0.01	5.2		N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Heptachlor	mg/kg dw	0.01	2		N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Heptachloroepoxide (A)	mg/kg dw	0.01	1.5		N/A	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Picloram	mg/kg dw	N/A	N/A	62000	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MCPP	mg/kg dw	N/A	N/A	880	<5.45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MCPA	mg/kg dw	N/A	N/A	880	<5.45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dichloroprop	mg/kg dw	N/A	N/A		<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dicamba	mg/kg dw	N/A	N/A	26000	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bentazon	mg/kg dw	N/A	N/A	26000	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acifluorfen	mg/kg dw	N/A	N/A	22	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3,5-Dichlorobenzoic acid	mg/kg dw	N/A	N/A		<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4-DB	mg/kg dw	N/A	N/A	7000	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4,5-TP (ABOVE??)	mg/kg dw	N/A	N/A	8800	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
1. MDL: Method Detection Limit; BDL: Below Detection Limit
2. MSG-L: Military Soil Guidelines-Long Term, TG 230
3. N/A: Not Applicable or Not Analyzed

(U) ~~(C//REL)~~ Table C-8, Soil Results, Herbicides & Pesticides

Boring/Area Identification					Area 7	Area 8	Area 11	Area 12	Area 13	Area 14	Area 15	Area 16[4]	Area 17[4]	Area 18[4]
Depth Below Ground Surface (Meters)					0	0	0	0	0	0	0	0	0	0
Analyte	Units	MDL[1]	MSG-L[2]	PRG										
Herbicides:														
Pentachlorophenol (PCP)	mg/kg dw	0.02	N/A	11	BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
2,4-D	mg/kg dw	0.01	1000		BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
2,4,5-TP	mg/kg dw	0.01	N/A	8800	BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
Pesticides:														
Azinphosethyl	mg/kg dw	0.01	N/A		BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.2	<0.2	<0.2
Chlorfenvinphos	mg/kg dw	0.01	N/A		BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.1	<0.1	<0.1
Dimethoat	mg/kg dw	0.01	N/A	180	BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
Prathionethyl	mg/kg dw	0.01	N/A		BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
Prathionmethyl	mg/kg dw	0.01	310		BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
DDD-o,p'	mg/kg dw	0.01	N/A	17	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.02	<0.02	<0.02
DDD-p,p'	mg/kg dw	0.01	N/A	17	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.02	<0.02	<0.02
DDE-o,p'	mg/kg dw	0.01	N/A	12	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.01	<0.01	<0.01
DDE-p,p'	mg/kg dw	0.01	N/A	12	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.01	<0.01	<0.01
DDT-o,p'	mg/kg dw	0.01	N/A	12	BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.02	<0.02	<0.02
DDT-p,p'	mg/kg dw	0.01	52		BDL	0.03	BDL	BDL	BDL	BDL	BDL	<0.02	<0.02	<0.02
Hexachlorocyclohexane (HCH) -alpha	mg/kg dw	0.01	N/A	0.59	BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
HCH-beta	mg/kg dw	0.01	N/A	2.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
HCH-gamma	mg/kg dw	0.01	N/A	2.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
HCH-delta	mg/kg dw	0.01	N/A	2.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
HCB	mg/kg dw	0.01	N/A		BDL	BDL	BDL	BDL	BDL	BDL	BDL	N/A	N/A	N/A
Dieldrin	mg/kg dw	0.01	5.2		BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.01	<0.01	<0.01
Heptachlor	mg/kg dw	0.01	2		BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.01	<0.01	<0.01
Heptachloroepoxide (A)	mg/kg dw	0.01	1.5		BDL	BDL	BDL	BDL	BDL	BDL	BDL	<0.01	<0.01	<0.01
Picloram	mg/kg dw	N/A	N/A	62000	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MCPP	mg/kg dw	N/A	N/A	880	<0.005	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MCPA	mg/kg dw	N/A	N/A	880	<0.005	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dichloroprop	mg/kg dw	N/A	N/A		<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dicamba	mg/kg dw	N/A	N/A	26000	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bentazon	mg/kg dw	N/A	N/A	26000	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acifluorfen	mg/kg dw	N/A	N/A	22	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3,5-Dichlorobenzoic acid	mg/kg dw	N/A	N/A		<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4-DB	mg/kg dw	N/A	N/A	7000	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,4,5-TP	mg/kg dw	N/A	N/A	8800	<0.055	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1. MDL: Method Detection Limit; BDL: Below Detection Limit
2. MSG-L: Military Soil Guidelines-Long Term, TG 230
3. N/A: Not Applicable or Not Analyzed
4. Areas 16-20 were analyzed for an additional 80 plus pesticides and herbicides that are not reported in this table due to space constraints. These additional pesticides and herbicides were not reported above the method reporting limit by the laboratory.

(U) ~~(C//REL)~~ Table C-8, Soil Results, Herbicides & Pesticides

Boring/Area Identification					Area 81	Area 82	Area 83	Area 84
Depth Below Ground Surface (Meters)					0	0	0	0
Analyte	Units	MDL[1]	MSG-L[2]	PRG				
Herbicides:								
Pentachlorophenol (PCP)	mg/kg dw	0.02	N/A	11	BDL	BDL	BDL	BDL
2,4-D	mg/kg dw	0.01	1000		BDL	BDL	BDL	BDL
2,4,5-TP	mg/kg dw	0.01	N/A	8800	0.02	BDL	BDL	BDL
Pesticides:								
Azinphosethyl	mg/kg dw	0.01	N/A		BDL	BDL	BDL	BDL
Chlorfenvinphos	mg/kg dw	0.01	N/A		BDL	BDL	BDL	BDL
Dimethoat	mg/kg dw	0.01	N/A	180	BDL	BDL	BDL	BDL
Prathionethyl	mg/kg dw	0.01	N/A		BDL	BDL	BDL	BDL
Prathionmethyl	mg/kg dw	0.01	310		BDL	BDL	BDL	BDL
DDD-o,p'	mg/kg dw	0.01	N/A	17	BDL	BDL	BDL	BDL
DDD-p,p'	mg/kg dw	0.01	N/A	17	BDL	BDL	BDL	BDL
DDE-o,p'	mg/kg dw	0.01	N/A	12	BDL	BDL	BDL	BDL
DDE-p,p'	mg/kg dw	0.01	N/A	12	BDL	0.02	0.05	BDL
DDT-o,p'	mg/kg dw	0.01	N/A	12	BDL	BDL	BDL	BDL
DDT-p,p'	mg/kg dw	0.01	52		BDL	BDL	BDL	BDL
Hexachlorocyclohexane (HCH) -alpha	mg/kg dw	0.01	N/A	0.59	BDL	BDL	BDL	BDL
HCH-beta	mg/kg dw	0.01	N/A	2.1	BDL	BDL	BDL	BDL
HCH-gamma	mg/kg dw	0.01	N/A	2.9	BDL	BDL	BDL	BDL
HCH-delta	mg/kg dw	0.01	N/A	2.1	BDL	BDL	BDL	BDL
HCB	mg/kg dw	0.01	N/A		BDL	BDL	BDL	BDL
Dieldrin	mg/kg dw	0.01	5.2		BDL	BDL	BDL	BDL
Heptachlor	mg/kg dw	0.01	2		BDL	BDL	BDL	BDL
Heptachloroepoxide (A)	mg/kg dw	0.01	1.5		BDL	BDL	BDL	BDL
Picloram	mg/kg dw	N/A	N/A	62000	N/A	N/A	N/A	N/A
MCPP	mg/kg dw	N/A	N/A	880	N/A	N/A	N/A	N/A
MCPA	mg/kg dw	N/A	N/A	880	N/A	N/A	N/A	N/A
Dichloroprop	mg/kg dw	N/A	N/A		N/A	N/A	N/A	N/A
Dicamba	mg/kg dw	N/A	N/A	26000	N/A	N/A	N/A	N/A
Bentazon	mg/kg dw	N/A	N/A	26000	N/A	N/A	N/A	N/A
Acifluorfen	mg/kg dw	N/A	N/A	22	N/A	N/A	N/A	N/A
3,5-Dichlorobenzoic acid	mg/kg dw	N/A	N/A		N/A	N/A	N/A	N/A
2,4-DB	mg/kg dw	N/A	N/A	7000	N/A	N/A	N/A	N/A
2,4,5-TP	mg/kg dw	N/A	N/A	8800	N/A	N/A	N/A	N/A

Notes:
1. MDL: Method Detection Limit; BDL: Below Detection Limit
2. MSG-L: Military Soil Guidelines-Long Term, TG 230
3. N/A: Not Applicable or Not Analyzed

Area 4	Area 5	Area 6
0	0	0
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
BDL	BDL	BDL
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

Area 19[4]	Area 20[4]
0	0
N/A	<0.055
N/A	<0.055
N/A	<0.055
<0.2	<0.2
<0.1	<0.1
N/A	N/A
N/A	N/A
N/A	N/A
<0.02	<0.02
<0.02	<0.02
<0.01	<0.01
<0.01	<0.01
<0.02	<0.02
<0.02	<0.02
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
<0.01	<0.01
<0.01	<0.01
<0.01	<0.01
N/A	<0.055
N/A	<5.45
N/A	<5.45
N/A	<0.055
N/A	<0.055
N/A	<0.055
N/A	<0.055
N/A	<0.055
N/A	<0.055
N/A	<0.055

analyzed

(U) ~~(C//REL)~~ Table C-9, Air Sample Locations

Sample Number	Sampling Location	Date	Duration (minutes)	Flowrate (liters/minute)
A-1	Observation Post on Berm (collocated with A-2)	28-Oct-01	250	0.411
A-2	Observation Post on Berm (collocated with A-1)	28-Oct-01	50	0.215
A-3	Manhole near Waste Pit (collocated with A-4)	28-Oct-01	51	0.205
A-4	Manhole near Waste Pit (collocated with A-3)	28-Oct-01	225	0.401
A-5	Waste Pit (near Soil Sample 1E)	28-Oct-01	5	0.21
A-6	Waste Pit (near Soil Sample 1F)	28-Oct-01	10	0.305
A-7	Waste Pit (near Soil Sample 1A)	28-Oct-01	25	0.403
A-8	Waste Pit (near Soil Sample 1C)	28-Oct-01	25	0.21
A-9	Field Blank	28-Oct-01	0	0
A-10	Tent City, Corner Tent 2 (same as A-33)	29-Oct-01	333	0.314
A-11	Inside Tent 2	29-Oct-01	285	0.217
A-12	Same as A-1, A-2	29-Oct-01	288	0.409
A-13	Collocated with A-13	29-Oct-01	284	0.209
A-14	Corner Tent 29	29-Oct-01	274	0.219
A-15	Field Blank	29-Oct-01	0	0
A-16	Unmanned Fighting Position in Berm	31-Oct-01	50	0.22
A-17	Collocated with A-16	31-Oct-01	25	0.401
A-18	Field Blank	31-Oct-01	0	0

Environmental Assessment, Stronghold Freedom
(U) ~~(C//REL)~~ Table C-9, Air Sample Locations

Sample Number	Sampling Location	Date	Duration (minutes)	Flowrate (liters/minute)
A-19	Utility Pole in West end of Tent City	03-Nov-01	263	0.216
A-20	Fighting Position on Western Berm	3-Nov-01	266	0.214
A-21	Fighting Position on Northwestern Berm	3-Nov-01	262	0.207
A-22	Fighting Position - Northern Berm (parallel to western edge of visible contamination in trench below)	3-Nov-01	254	0.405
A-23	Fighting position - Northeast berm (overlooking northern edge of waste pit and eastern end of adjoining trench)	3-Nov-01	243	0.303
A-24	Utility Pole in East end of Tent City	3-Nov-01	248	0.399
A-25	Field Blank	3-Nov-01	0	0
A-26	Fighting Position - Northeast berm replacing OP on top of berm (A-1, A-2 location)	12-Nov-01	250	0.406
A-27	Collocated with A-26	12-Nov-01	250	0.212
A-28	Same location as A-23	12-Nov-01	248	0.212
A-29	Collocated with A-28	12-Nov-01	246	0.411
A-30	Same location as A-22	12-Nov-01	244	0.22
A-31	Corner "LA" Tent just west of Pentagon Road	12-Nov-01	240	0.329
A-32	Corner Tent 59 Tent City	12-Nov-01	250	0.205
A-33	Corner Tent 2 (same as A-10)	12-Nov-01	242	0.213
A-34	Top of Tent City Bunker 1 Fighting Position	12-Nov-01	239	0.407
A-35	Field Blank	12-Nov-01	0	0

Volume of Sample (liters)
102.75
10.75
10.46
90.23
1.05
3.05
10.08
5.25
0.00
104.56
61.85
117.79
59.36
60.01
0.00
11.00
10.03
0.00

Volume of Sample (liters)
56.81
56.92
54.23
102.87
73.63
98.95
0.00
101.50
53.00
52.58
101.11
53.68
78.96
51.25
51.55
97.27
0

Environmental Assessment, Stronghold Freedom
(U) ~~(C)~~ Table C-10, Air Sampling Results

Sample Identification				A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9 FIELD BLANK	A-10	A-11	A-12
Analyte	Units	MAG-L	MAG-14day												
Volatilic halogenated hydrocarbons (CHC):															
Vinylchloride (VC)	mg/m³	0.057		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
Dichloromethane	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
1,1,1-Trichloroethane	mg/m³	0.3		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
Trichloroethylene	mg/m³		6.6	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
Tetrachloroethylene	mg/m³		4.2	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
1,1-Dichloroethane	mg/m³	3.42		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
1,2-Dichloroethane	mg/m³	0.18		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
1,1-Dichlorethylene	mg/m³	0.096		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
cis-1,2-Dichloroethylene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
trans-1,2-Dichloroethylene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
Trichloromethane	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
Tetrachloromethane	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
Trichlorofluoromethane	mg/m³	4.8		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
1,1,2-Trichlorotrifluoroethane	mg/m³	21		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
1,1,2-Trichlorethane	mg/m³	0.3		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
1,1,1,2-Tetrachlorethane	mg/m³	0.65		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
2-Butanone (MEK)	mg/m³	14.4		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
TIC Total-Ion-Chromatogramme C6-C10 reported as n-Hexane equivalents (semiquantitative):															
Kerosene Fraction	mg/m³	3		0.34	0.48	0.75	0.95	14.63	63.55	3.69	33.01	< 0.001 µg abs./tube	< 0.1	0.36	< 0.1
Highly volatile aromatic carbons BTEX:															
Benzene	mg/m³	0.039		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Toluene	mg/m³	4.6		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Ethylbenzene	mg/m³	2.95		< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
o,m,p-Xylenes	mg/m³	10.6		< 1.	< 1.	< 1.	< 1.	< 1.	4.0	< 1.	3.4	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Further (Testbenzin-) aromates up to Naphthalene AKW:															
Propylbenzene	mg/m³	0.025		< 1.	< 1.	< 1.	< 1.	< 1.	1.1	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Isopropylbenzene (Cumol)	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	0.54	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Isoamylbenzene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
2-Ethyltoluene	mg/m³			< 0.1	< 0.1	< 0.1	< 0.1	< 1.	1.4	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
3-/4-Ethyltoluene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	2.4	< 1.	1.6	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,2-Diethylbenzene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,3-Diethylbenzene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,4-Diethylbenzene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	2.0	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,3-Diisopropylbenzene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,4-Diisopropylbenzene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,2,3-Trimethylbenzene (Hemellitol)	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	2.5	< 1.	1.4	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,2,4-Trimethylbenzene (Pseudocumol)	mg/m³	3.06		< 0.1	< 0.1	< 0.1	< 0.1	1.0	4.3	< 1.	2.6	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,3,5-Trimethylbenzene (Mesitylen)	mg/m³	3.06		< 0.1	< 0.1	< 0.1	< 0.1	< 1.	1.6	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,3,5-Triethylbenzene	mg/m³			< 0.1	< 0.1	< 0.1	< 0.1	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1

1,2,3,4-Tetramethylbenzene	mg/m³		~~ONFIDENTIAL//REL TO USA, AUS, CAN and GBR//MR~~	< 1.	< 1.	< 1.	< 1.	< 1.	1.3	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,2,3,5-Tetramethylbenzene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
1,2,4,5-Tetramethylbenzene (Durol)	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Benzofuran	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Indane	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Indene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Tetrahydronaphthylene (Tetralin)	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
Naphthylene	mg/m³			< 1.	< 1.	< 1.	< 1.	< 1.	1.2	< 1.	< 1.	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1

(U) (C//REL) Table C-10, Air Sampling Results

A-13	A-14	A-15 FIELD BLANK	Sample Identification				A-16	A-17	A-18 FIELD BLANK	A-19	A-20	A-21
			Analyte	Units	MAG-L	MAG-14day						
			Volatilic halogenated hydrocarbons (CHC):									
< 1.	< 1.	< 0.002 µg abs./tube	Vinylchloride (VC)	mg/m³	0.057		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	Dichloromethane	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	1,1,1-Trichloroethane	mg/m³	0.3		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	Trichloroethylene	mg/m³		6.6	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	Tetrachloroethylene	mg/m³		4.2	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	1,1-Dichloroethane	mg/m³	3.42		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	1,2-Dichloroethane	mg/m³	0.18		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	1,1-Dichloroethylene	mg/m³	0.096		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	cis-1,2-Dichloroethylene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	trans-1,2-Dichloroethylene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	Trichloromethane	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	Tetrachloromethane	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	Trichlorofluoromethane	mg/m³	4.8		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	1,1,2-Trichlorotrifluoroethane	mg/m³	21		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	1,1,2-Trichloroethane	mg/m³	0.3		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	1,1,1,2-Tetrachloroethane	mg/m³	0.55		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 1.	< 1.	< 0.002 µg abs./tube	2-Butanone (MEK)	mg/m³	14.4		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
			TIC Total-Ion-Chromatogramme C6-C10 reported as n-Hexane equivalents (semiquantitative):									
< 0.1	< 0.1	< 0.002 µg abs./tube	Kerosene Fraction	mg/m³	3*		11	11	< 0.002 µg abs./tube	< 0.1	< 0.1	< 0.1
			Highly volatile aromatic carbons BTEX:									
< 0.1	< 0.1	< 0.002 µg abs./tube	Benzene	mg/m³	0.039		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	Toluene	mg/m³	4.6		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	Ethylbenzene	mg/m³	2.95		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	o,m,p-Xylenes	mg/m³	10.6		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
			Further (Testbenzin-) aromates up to Naphthalene AKW:									
< 0.1	< 0.1	< 0.002 µg abs./tube	Propylbenzene	mg/m³	0.025		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	Isopropylbenzene (Cumol)	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	Isoamylbenzene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	2-Ethyltoluene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	3-/4-Ethyltoluene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,2-Diethylbenzene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,3-Diethylbenzene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,4-Diethylbenzene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,3-Diisopropylbenzene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,4-Diisopropylbenzene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,2,3-Trimethylbenzene (Hemellitol)	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,2,4-Trimethylbenzene (Pseudocumol)	mg/m³	3.06		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,3,5-Trimethylbenzene (Mesitylen)	mg/m³	3.06		< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,3,5-Triethylbenzene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.

< 0.1	< 0.1	< 0.002 µg abs./tube	1,2,3,4-Tetramethylbenzene	mg/m³		~~CAN and GBR//MR~~	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,2,3,5-Tetramethylbenzene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	1,2,4,5-Tetramethylbenzene (Durol)	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	Benzofuran	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	Indane	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	Indene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	Tetrahydronaphthylene (Tetralin)	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.
< 0.1	< 0.1	< 0.002 µg abs./tube	Naphthylene	mg/m³			< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.

(U) (C//REL) Table C-10, Air Sampling Results

Assuming DL is 1 mg/m

A-22	A-23	A-24	A-25 FIELD BLANK	A-26	A-27	A-28	Sample Identification				A-29	A-30	A-31
							Analyte	Units	MAG-L	MAG-14day			
							Volatilic halogenated hydrocarbons (CHC):						
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Vinylchloride (VC)	mg/m³	0.057		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Dichloromethane	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,1,1-Trichloroethane	mg/m³	0.3		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Trichloroethylene	mg/m³		6.6	< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Tetrachloroethylene	mg/m³		4.2	< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,1-Dichloroethane	mg/m³	3.42		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,2-Dichloroethane	mg/m³	0.48		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,1-Dichloroethylene	mg/m³	0.096		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	cis-1,2-Dichloroethylene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	trans-1,2-Dichloroethylene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Trichloromethane	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Tetrachloromethane	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Trichlorofluoromethane	mg/m³	4.8		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,1,2-Trichlorotrifluoroethane	mg/m³	21		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,1,2-Trichloroethane	mg/m³	0.3		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,1,1,2-Tetrachloroethane	mg/m³	0.65		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	2-Butanone (MEK)	mg/m³	14.4		< 1.	< 1.	< 1.
							TIC Total-Ion-Chromatogramme C6-C10 reported as n-Hexane equivalents (semiquantitative):						
< 0.1	0.55	< 0.1	< 0.002 µg abs./tube	0.15	0.16	0.11	Kerosene Fraction	mg/m³	3*		< 0.1	< 0.1	< 0.1
							Highly volatile aromatic carbons BTEX:						
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Benzene	mg/m³	0.039		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Toluene	mg/m³	4.6		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Ethylbenzene	mg/m³	2.95		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	o,m,p-Xylenes	mg/m³	10.6		< 1.	< 1.	< 1.
							Further (Testbenzin-) aromates up to Naphthalene AKW:						
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Propylbenzene	mg/m³	0.025		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Isopropylbenzene (Cumol)	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Isoamylbenzene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	2-Ethyltoluene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	3-/4-Ethyltoluene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,2-Diethylbenzene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,3-Diethylbenzene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,4-Diethylbenzene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,3-Diisopropylbenzene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,4-Diisopropylbenzene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,2,3-Trimethylbenzene (Hemellitol)	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,2,4-Trimethylbenzene (Pseudocumol)	mg/m³	3.06		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,3,5-Trimethylbenzene (Mesitylen)	mg/m³	3.06		< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,3,5-Triethylbenzene	mg/m³			< 1.	< 1.	< 1.

< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	DECLASSIFIED		1,2,3,4-Tetramethylbenzene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,2,3,5-Tetramethylbenzene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	1,2,4,5-Tetramethylbenzene (Durol)	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Benzofuran	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Indane	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Indene	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Tetrahydronaphthylene (Tetralin)	mg/m³			< 1.	< 1.	< 1.
< 1.	< 1.	< 1.	< 0.002 µg abs./tube	< 1.	< 1.	< 1.	Naphthylene	mg/m³			< 1.	< 1.	< 1.

A-32	A-33	A-34	A-35 FIELD BLANK
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 0.1	0.24	0.11	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube

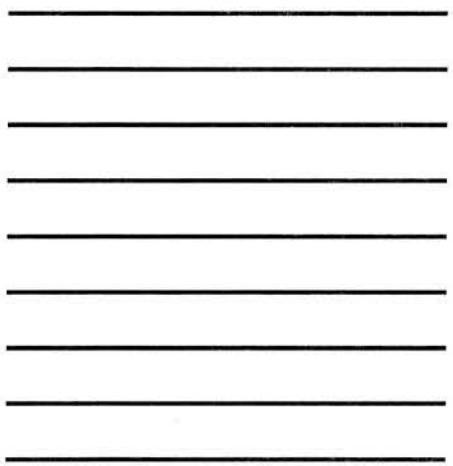
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube
< 1.	< 1.	< 1.	< 0.002 µg abs./tube

(U) ~~(C//REL)~~ Table C-11, Air Sampling Results, Respirable Particulate Matter MAG-L 74µg/m³

Location	Filter Number	Sample ID	Date Start	Date End	Concentration (ambient) [ug/m³]	Sample Notes
Minivol Location 1	47-01-301	FREPM101304P	01-Nov-01	02-Nov-01	25.33	
Minivol Location 2	47-01-302	FREPM101304P	01-Nov-01	02-Nov-01	10.29	
Minivol Location 1	47-01-303	FREPM101305P	02-Nov-01	03-Nov-01	4.67	Filter Torn
Minivol Location 2	47-01-304	FREPM101305P	02-Nov-01	03-Nov-01	13.48	
Minivol Location 1	47-01-305	FREPM101306P	03-Nov-01	04-Nov-01	19.57	
Minivol Location 2	47-01-306	FREPM101306P	03-Nov-01	04-Nov-01	2.80	Filter Torn
Minivol Location 1	47-01-307	FREPM101307P	04-Nov-01	05-Nov-01	34.17	
Minivol Location 2	47-01-308	FREPM101307P	04-Nov-01	05-Nov-01	64.72	
Minivol Location 1	47-01-309	FREPM101308P	05-Nov-01	06-Nov-01	69.96	
Minivol Location 2	47-01-310	FREPM101308P	05-Nov-01	06-Nov-01	1.66	Filter Torn
Minivol Location 1	47-01-311	FREPM101309P	06-Nov-01	07-Nov-01	75.54	
Minivol Location 2	47-01-312	FREPM101309P	06-Nov-01	07-Nov-01	54.86	
Minivol Location 1	47-01-313	FREPM101310P	07-Nov-01	08-Nov-01	135.27	
Minivol Location 2	47-01-314	FREPM101310P	07-Nov-01	08-Nov-01	-1.34	Filter Torn
Minivol Location 1	47-01-315	FREPM101311P	08-Nov-01	09-Nov-01	347.62	
Minivol Location 2	47-01-316	FREPM101311P	08-Nov-01	09-Nov-01	394.35	
Minivol Location 1	47-01-317	FREPM101313P	09-Nov-01	10-Nov-01	69.27	
Minivol Location 2	47-01-318	FREPM101313P	09-Nov-01	10-Nov-01	38.97	
				18-day average=	75.78	

Note: Minivol Location 1 is utility pole located at eastern end of tent city; Location 2 is utility pole located at western end of tent city.

14-day average= 96.88
w/out torn filter samples



(U) ~~(C//REL)~~ Table C-12, Drinking Water Results, ROWPU Source Water

Analyte	Units	MWG-L(5/15)	Result
General Parameters:			
Cyanide, Free	mg/L	6/2	<0.01
Ammonia	mg/L		<0.05
Total Nitrate-Nitrite	mg/L		10.5
Alkalinity	mg/L		273
Chloride	mg/L	600/600	9.9
Color	CU		<5
Conductivity	umhos/cm		750
Fluoride	mg/L		0.12
Sulfate	mg/L	300/100	80
Total Dissolved Solids	mg/L		
Turbidity	N.T.U.		0.45
pH	none		7.4
PAHs:			
Acenaphthene	mg/L	8.4/2.8	<0.0004
Acenaphthylene	mg/L	4.2/1.4	<0.0004
Anthracine	mg/L		<0.0002
Benzo(a)anthracene	mg/L	0.14/0.05	<0.0002
Benzo(a)pyrene	mg/L	0.014/0.005	<0.0002
Benzo(b)fluoranthene	mg/L	0.14/0.05	<0.0002
Benzo(g,h,i)perylene	mg/L		<0.0002
Benzo(k)fluoranthene	mg/L	1.4/0.5	<0.0002
Chrysene	mg/L	4.2/1.4	<0.0002
Dibenzo(a,h)anthracene	mg/L		<0.0002
Fluoranthene	mg/L	5.6/1.9	<0.0002
Fluorene	mg/L	5.6/1.9	<0.0002
Indeno(1,2,3-cd)pyrene	mg/L		<0.0002
Naphthalene	mg/L	0.5/1.7	<0.0004
Phenanthrene	mg/L	4.2/1.4	<0.0002
Pyrene	mg/L	4.2/1.4	<0.0002
Metals:			
Aluminum	mg/L		0.301
Antimony	mg/L		<0.001
Arsenic	mg/L	0.06/0.02	<0.001
Barium	mg/L		0.276
Beryllium	mg/L	0.02/0.007	<0.0002
Boron	mg/L	1.7/0.4	0.3
Cadmium	mg/L	0.007/0.002	<0.0003
Calcium	mg/L		110
Chromium	mg/L	0.3/0.1	0.006
Cobalt	mg/L		<0.025
Copper	mg/L	1.0/1.0	<0.01
Hardness	mg/L		380

Analyte	Units	MWG-L(5/15)	PRG	Result
VOCs:				
1,1,1-Trichloroethane	mg/l		0.54	<0.0005
1,1,2-Trichloroethane	mg/l		0.0002	<0.0005
1,1-Dichloroethene	mg/l			<0.0005
1,2,4-Trichlorobenzene	mg/l		0.19	<0.0005
1,2-Dibromo-3-chloropropane	mg/l	0.03/0.009		<0.0002
1,2-Dibromoethane	mg/l		0.00000076	<0.00005
1,2-Dichlorobenzene	mg/l		0.37	<0.0005
1,2-Dichloroethane	mg/l		0.00012	<0.0005
1,2-Dichloropropane	mg/l		0.00016	<0.0005
1,4-Dichlorobenzene	mg/l		0.00055	<0.0005
2-methoxy-2-methylpropane	mg/l			<0.0005
Benzene	mg/l	0.042/0.014		<0.0005
Bromodichloromethane	mg/l	0.3/0.1		<0.0005
Bromoform	mg/l		0.0085	<0.0005
Carbon tetrachloride	mg/l		0.00017	<0.0005
Chlorobenzene	mg/l		0.11	<0.0005
Chloroform	mg/l	1.4/0.5		<0.0005
Dibromochloromethane	mg/l	2.8/0.9		<0.0005
Ethylbenzene	mg/l	1.4/0.5		<0.0005
Methylene chloride	mg/l		0.0043	<0.0005
Styrene	mg/l		1.6	<0.0005
Tetrachloroethene (PCE)	mg/l		0.0011	<0.0005
Toluene	mg/l	3/1		<0.0005
Trichloroethene (TCE)	mg/l		0.0016	<0.0005
Trihalomethanes, total	mg/l			<0.0005
Vinyl chloride	mg/l		0.000042	<0.0005
cis-1,2-Dichloroethene	mg/l			<0.0005
trans-1,2-Dichloroethene	mg/l			<0.0005
Pesticides:				
Alachlor	mg/L		0.00084	<0.001
Aldrin	mg/L		0.000004	<0.0002
Atrazine	mg/L		0.0003	<0.002
Chlordane	mg/L		0.00019	<0.002
Dieldrin	mg/L		0.000004	<0.0002
Endrin	mg/L		0.01	<0.001
Heptachlor	mg/L		0.000015	<0.0002
Heptachlor Epoxide	mg/L		0.0000074	<0.0002
Hexachlorobenzene	mg/L		0.000042	<0.0002
Hexachlorocyclopentadiene	mg/L		0.26	<0.001
Lindane	mg/L			<0.0002
Methoxychlor	mg/L		0.18	<0.001
Simazine	mg/L		0.00056	<0.001
Toxaphene	mg/L		0.000061	<0.002

Iron	mg/L		LASSIFIED CONFID
Lead	mg/L	0.015/0.015	0.005
Magnesium	mg/L	100/30	28
Manganese	mg/L		<0.002
Mercury	mg/L	0.002/0.0007	<0.0002
Molybdenum	mg/L	0.07/0.02	<0.005
Nickel	mg/L		<0.002
Potassium	mg/L		2.4
Selenium	mg/L		0.002
Silver	mg/L		<0.005
Sodium	mg/L		15
Thallium	mg/L		<0.0002
Total Phosphorus	mg/L		<0.05
Zinc	mg/L	4/1.3	<0.01

Carbamate Pesticides:				
3-Hydroxycarbofuran	mg/l			<0.0001
Aldicarb	mg/l		0.036	<0.0001
Aldicarb Sulfone	mg/l		0.036	<0.0001
Aldicarb Sulfoxide	mg/l			<0.0001
Baygon	mg/l		0.15	<0.0001
Carbaryl	mg/l		3.6	<0.0001
Carbofuran	mg/l		0.18	<0.0001
Methiocarb	mg/l			<0.0001
Methomyl	mg/l		0.15	<0.0001
Oxamyl	mg/l		0.91	<0.0001
Herbicides:				
2,4,5-TP (Silvex)	mg/L			<0.012
2,4-Dichlorophenoxy Acetic Acid	mg/L		0.36	<0.012
Dinoseb	mg/L		0.036	<0.0075
Pentachlorophenol	mg/L		0.00056	<0.001
Picloram	mg/L		2.6	<0.012

(U) ~~(C//REL)~~ Table C-13, Drinking Water Metals Results, ROWPU at Temporary Mess Hall

Sample Identification				DW1A-E	DW1B-E	DW1C-E	DW1D-E	DW1E-E
Sample Location				Untreated Water at Storage Bladder	Brine Water	Treated Water at Storage Bladder	Treated Water at Mess Hall	Blank-Sterile Water
Analyte	Units	MWG-5-day	MWG-L					
Aluminum	mg/L			0.265	0.356	0.323	0.155	0.28
Antimony	mg/L	0.006/0.002		0.002	0.001	0.001	BDL	-999
Arsenic	mg/L	0.3/0.1	0.006/0.02	BDL	0.002	BDL	BDL	-999
Barium	mg/L			0.212	0.411	0.266	0.139	0.256
Beryllium	mg/L	36/12	0.02/0.007	BDL	BDL	BDL	BDL	-999
Boron	mg/L	5/1.7	1.7/0.4	0.26	0.56	0.47	0.26	0.17
Cadmium	mg/L	0.06/0.02	0.007/0.002	BDL	BDL	BDL	BDL	BDL
Calcium	mg/L			110	290	2.7	2	BDL
Chromium	mg/L	2/0.7	0.3/0.1	0.005	0.011	BDL	BDL	BDL
Cobalt	mg/L			BDL	BDL	BDL	BDL	BDL
Copper	mg/L		1.0/1.0	BDL	0.29	0.129	0.21	BDL
Hardness	mg/L			380	1000	8.3	6.2	BDL
Iron	mg/L			0.13	BDL	0.1	0.11	BDL
Lead	mg/L	0.05/0.05	0.015/0.015	0.001	0.007	0.005	0.013	BDL
Magnesium	mg/L	100/30	100/30	27	71	0.38	0.3	BDL
Manganese	mg/L			0.003	0.007	BDL	BDL	BDL
Mercury	mg/L		0.002/0.0007	BDL	BDL	BDL	BDL	BDL
Molybdenum	mg/L		0.07/0.02	BDL	BDL	BDL	BDL	BDL
Nickel	mg/L	1/0.5		0.005	0.051	0.006	0.006	BDL
Potassium	mg/L			2.3	5.4	0.7	BDL	BDL
Selenium	mg/L			0.002	0.006	BDL	BDL	BDL
Silver	mg/L	0.07/0.023		BDL	BDL	0.007	BDL	BDL
Sodium	mg/L			15	34	2.2	2.6	BDL
Thallium	mg/L	0.01/0.003		BDL	BDL	BDL	BDL	BDL
Total Phosphorus	mg/L			BDL	0.06	BDL	BDL	BDL
Zinc	mg/L	8/3	4/1.3	0.018	0.873	0.121	0.193	BDL

(U) ~~(C//REL)~~ Table C-14, Radiological Results - Base Camp Baseline Survey

Sample ID	Elevation (Meters)	Depth Below Ground Surface (cm)	SH 330 Probe Surface Exposure (kdpm/100cm^2)	Date	Notes	Laboratory Results	Units
Background 1	390	10	1.15	29-Oct-01	Eastern Section of Camp	0.049	Bq/g
Background 2	385	10	1.29	16-Nov-01	SW Section of Camp	0.032	Bq/g
1	385	10	≤ BKG	29-Oct-01	Baseline KK, Cs-137	0.00305	Bq/g
2	383	10	≤ BKG	29-Oct-01	Baseline KK, Cs-137	0.00292	Bq/g
3	371	10	≤ BKG	29-Oct-01	Baseline KK, Cs-137	0.0082	Bq/g
4	394	10	≤ BKG	29-Oct-01	Baseline KK, Cs-137	0.00717	Bq/g
5	387	10	≤ BKG	29-Oct-01	Baseline KK, Cs-137	0.000513	Bq/g
6	387	10	≤ BKG	29-Oct-01	Baseline KK, Cs-137	0.00181	Bq/g
7	390	10	≤ BKG	10-Nov-01	Baseline KK	1.99	ug/g
8	385	10	≤ BKG	10-Nov-01	Baseline KK	5.29	ug/g
9	393	10	≤ BKG	10-Nov-01	Baseline KK	209	ug/g
10	385	10	≤ BKG	10-Nov-01	Baseline KK	2.65	ug/g
12a	390	5	Unknown	10-Nov-01	Radioactive	0.7	Bq/g
12b	390	5	Unknown	10-Nov-01	Radioactive	0.6	Bq/g
12c	390	5	Unknown	10-Nov-01	Radioactive	0.2	Bq/g
13	377	10	43.60	11-Nov-01	Radioactive	4850	ug/g
14a	378	5	122.70	11-Nov-01	Radioactive	10900	ug/g
14b	378	5	758.00	11-Nov-01	Radioactive	64700	ug/g
15a	376	5	3.51	11-Nov-01	Radioactive	62.1	ug/g
15b	376	5	229.00	11-Nov-01	Radioactive	15200	ug/g
16a	380	10	140.30	11-Nov-01	Radioactive	3460	ug/g
16b	380	10	199.30	11-Nov-01	Radioactive	312	ug/g
17	380	10	71.50	11-Nov-01	Radioactive	2950	ug/g
18a	388	10	34.50	12-Nov-01	Radioactive	1710	ug/g
18b	388	10	162.20	12-Nov-01	Radioactive	15900	ug/g
19	388	10	161.00	12-Nov-01	Radioactive	6360	ug/g
20	388	10	226.00	12-Nov-01	Radioactive	5250	ug/g
21	380	10	≤ BKG	12-Nov-01	NW corner of Berm	2.23	ug/g
22	380	10	≤ BKG	14-Nov-01	Proposed CSH Site	0.037	Bq/g
23	380	10	≤ BKG	14-Nov-01	Proposed CSH Site	0.039	Bq/g

Notes:
1. BKG: Background
2. kdpm: kilo (1,000) disintigrations per minute

(U) ~~(C//REL)~~ Table C-15, Radiological Results, Bunkers

Location	Date	SPA-9 (kcpm)	Wipe Test	Gross Alpha dpm	Gross Beta dpm	SHP-330 Probe (kdpm/100 cm^2)	Background (kdpm/100 cm^2)
Bunker 19	29-Oct-01	7.60	Swipe A	1.44	3.78	1.072	0.746
Bunker 22	29-Oct-01	6.60	Swipe B	0.287	2.95	0.714	0.746
Bunker 23	29-Oct-01	7.27	Swipe C	BKG	2.74	0.804	0.746
Bunker 24	29-Oct-01	6.76	Swipe D	BKG	5.48	0.804	0.746
Bunker 25	29-Oct-01	6.63	Swipe E	BKG	2.74	1.295	0.746
Bunker 20	29-Oct-01	8.59	Swipe F	BKG	1.6	1.340	0.746
Bunker 18	29-Oct-01	7.73	Swipe G	0.862	8.39	1.251	0.746
Bunker 17	29-Oct-01	7.39	Swipe H	BKG	1.14	0.938	0.746
Bunker 14	29-Oct-01	8.36	Swipe I	BKG	0.137	1.537	0.746
Building 27	29-Oct-01	7.95	Swipe J	0.575	6.35	1.340	0.746
Bunker 15	29-Oct-01	7.85	Swipe K	BKG	0.685	0.970	0.746
Bunker 16	29-Oct-01	8.16	Swipe L	0.287	5.23	1.251	0.746
Bunker 21	29-Oct-01	8.75	Swipe M	0.287	1.81	1.027	0.746

Notes:
1. kdpm: kilo (1,000) disintigrations per minute
2. SPA-9: Sodium Iodide Probe & SHP-330 Gross Alpha/Gross Beta Probe

(U) ~~(C//REL)~~ Table C-16 - Radiological Results, Soil - Site 1

Quadrant A

Sample ID	Elevation (Meters)	Depth (cm)	SH 330 Probe Surface Exposure (kdpm/100cm^2)	Date	Notes	Laboratory Results	Units
1A	390	10	≤ BKG	12-Nov-01	MARSSIM Characterization	2.59	ug/g
1B	390	10	≤ BKG	12-Nov-01	MARSSIM Characterization	2.25	ug/g
1C	390	15	≤ BKG	12-Nov-01	MARSSIM Characterization	2.13	ug/g
1D	390	20	≤ BKG	12-Nov-01	MARSSIM Characterization	1.98	ug/g
1E	390	20	≤ BKG	12-Nov-01	MARSSIM Characterization	2.42	ug/g
1F	390	20	≤ BKG	12-Nov-01	MARSSIM Characterization	2.15	ug/g
1G	385	20	≤ BKG	12-Nov-01	MARSSIM Characterization	2.03	ug/g
1H	383	20	≤ BKG	12-Nov-01	MARSSIM Characterization	1.81	ug/g
1I	380	20	≤ BKG	12-Nov-01	MARSSIM Characterization	2.05	ug/g
1J	378	20	≤ BKG	12-Nov-01	MARSSIM Characterization	2.1	ug/g

Quadrant B

Sample ID	Elevation (Meters)	Depth (cm)	Surface Exposure (kdpm/100cm^2)	Date	Notes	Laboratory Results	Units
2A	389	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.048	Bq/g
2B	389	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.033	Bq/g
2C	385	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.042	Bq/g
2D	383	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.042	Bq/g
2E	383	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.034	Bq/g
2F	380	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.038	Bq/g
2G	380	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.04	Bq/g
2H	383	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.048	Bq/g
2I	380	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.042	Bq/g

Quadrant GZ

Sample ID	Elevation (Meters)	Depth (cm)	Surface Exposure (kdpm/100cm^2)	Date	Notes	Laboratory Results	Units
GZ1	386	5	134.80	13-Nov-01	Radioactive	12100	ug/g
GZ2	386	5	233.00	13-Nov-01	Radioactive	8630	ug/g
GZ3	386	5	136.30	13-Nov-01	Radioactive	25100	ug/g

Notes:
1. BKG: Background
2. kdpm: kilo (1,000) disintigrations per minute

(U) ~~(C//REL)~~ Table C-16, Radiological, Site 1 Results

Quadrant C

Sample ID	Elevation (Meters)	Depth (cm)	Surface Exposure (kdpm/100cm^2)	Date	Notes	Laboratory Results	Units
3A	381	10	≤ BKG	13-Nov-01	MARSSIM Characterization	2.11	ug/g
3B	381	10	≤ BKG	13-Nov-01	MARSSIM Characterization	4.67	ug/g
3C	386	10	≤ BKG	13-Nov-01	MARSSIM Characterization	1.97	ug/g
3D	379	10	≤ BKG	13-Nov-01	MARSSIM Characterization	2.77	ug/g
3E	378	10	≤ BKG	13-Nov-01	MARSSIM Characterization	1.82	ug/g
3F	376	10	≤ BKG	13-Nov-01	MARSSIM Characterization	2.34	ug/g
3G	380	10	≤ BKG	13-Nov-01	MARSSIM Characterization	1.92	ug/g
3H	383	10	≤ BKG	13-Nov-01	MARSSIM Characterization	1.65	ug/g
C1	381	15	425.00	13-Nov-01	Radioactive	3250	ug/g
C2	380	10	190.50	13-Nov-01	Radioactive	706	ug/g
C3	380	10	235.00	13-Nov-01	Radioactive	9890	ug/g
C4	380	10	35.20	13-Nov-01	Radioactive	514	ug/g

Quadrant D

Sample ID	Elevation (Meters)	Depth (cm)	Surface Exposure (kdpm/100cm^2)	Date	Notes	Laboratory Results	Units
4A	390	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.044	Bq/g
4B	388	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.034	Bq/g
4C	383	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.054	Bq/g
4D	383	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.045	Bq/g
4E	378	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.032	Bq/g
4F	380	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.037	Bq/g
4G	379	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.045	Bq/g
4H	383	10	≤ BKG	15-Nov-01	MARSSIM Characterization	0.05	Bq/g
D1	383	5	98.70	13-Nov-01	Radioactive	3040	ug/g
D2	383	5	187.20	13-Nov-01	Radioactive	15900	ug/g
D3	381	5	3.43	13-Nov-01	Radioactive	132	ug/g
D4	380	Surface	22.80	13-Nov-01	Radioactive	1090	ug/g
D5	380	Surface	30.70	13-Nov-01	Radioactive	4050	ug/g
D6	380	Surface	9.73	13-Nov-01	Radioactive	542	ug/g
D7	380	Surface	14.21	13-Nov-01	Radioactive	618	ug/g
D8	380	Surface	67.80	13-Nov-01	Radioactive	2900	ug/g

Notes:
1. BKG: Background
2. kdpm: kilo (1,000) disintigrations per minute

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(U) ~~(C//REL)~~ Table C-17, Radiological Results, Air

Sample ID	Elevation (Meters)	Start Time	Stop Time	Flow Rate (m^3/hr)	Wind Direction	SH-330 Probe Surface Exposure (kdpm/100cm^2)	Date	Notes	Uranium ug/filter
Background 1	390	1455hr	1700hr	47.35	SW to NE	2.07	17-Nov-01	Outside perimeter	0.46
Background 2	385	1430hr	1630hr	46.3	E to W	1.511	16-Nov-01	Outside perimeter	0.34
GZ	386	1213hr	1513hr	42.5	SW to NE	2.88	14-Nov-01	Outer Berm Perimeter	0.39
A	400	1345hr	1545hr	56.85	N to S	≤ BKG	14-Nov-01	Outer Berm Perimeter	0.99
B	400	1605hr	1805hr	55.3	N to S	≤ BKG	14-Nov-01	Outer Berm Perimeter	0.32
C	403	1214hr	1415hr	51.7	W to E	≤ BKG	16-Nov-01	Outer Berm Perimeter	0.28
D	402	0745hr	0950hr	49.65	S to N	2.62	17-Nov-01	Outer Berm Perimeter	0.28
E	400	1005hr	1205hr	44.2	S to N	≤ BKG	17-Nov-01	Outer Berm Perimeter	0.35
F	395	1227hr	1435hr	46.3	SW to NE	≤ BKG	17-Nov-01	Outer Berm Perimeter	0.25
G	398	1720hr	1940hr	53.6	SW to NE	4.46	17-Nov-01	Outer Berm Perimeter	0.34
H	390	1956hr	2200hr	41.7	S to N	6.94	17-Nov-01	Center of Tent City	0.22
I	396	0917hr	1125hr	48.05	S to N	≤ BKG	19-Nov-01	Inside Berm Fighting Pos.	0.48

Notes:
1. BKG: Background
2. kdpm: kilo (1,000) disintigrations per minute

(U) ~~(C//REL)~~ Table C-18, Asbestos Results, Bulk Samples

Field Identification		Hanger	Roof Tile	Missile Debris
Location		Hanger 19 Blackblast Area	Gazebo in Orchard	Former Missile Storage Site
Analysis	Units			
Asbestos	Percentage	0%	10%	5% (Chrysotile)

(U) ~~(C//REL)~~ Table C-19, Asbestos Results, Air - NIOSH 7402 Airborne Asbestos Analysis by Transmission Electron Microscopy (TEM)

Field Identification		FREABS1318-1C	FREABS1318-2C	FREABS1318-3C	FREABS1318-3C (Duplicate)	Lab Blank
Location		Vicinity Hanger 19	Vicinity Temporary PX	Berm Adjacent to Former Missile Storage Site	Berm adjacent to Former Missile Storage Site	N/A
Volume of Air (Liters)		2125	2188	7200	7200	N/A
Analysis	Units					
Total Asbestos Fibers in Relation to Area Analyzed.	Fibers/mm^2	<15.4 (Below Detection Limit)	<15.4 (Below Detection Limit)	<25.6 (Below Detection Limit)	<25.6 (Below Detection Limit)	<7.7 (Below Detection Limit)
Total Asbestos Fibers of all Sizes as a Function of the Volume of Air Sampled	Fibers/cm^3	<0.0028 (Below Detection Limit)	<0.0027 (Below Detection Limit)	<0.0014 (Below Detection Limit)	<0.0014 (Below Detection Limit)	N/A
Total Asbestos Fibers for Fibers >5.0mm in Length as a Function of the Volume of Air Sampled.	Fibers/cm^3	<0.0028 (Below Detection Limit)	<0.0027 (Below Detection Limit)	<0.0014 (Below Detection Limit)	<0.0014 (Below Detection Limit)	N/A

0.1 f/cm^3 ACGIH TWA for all forms of asbestos

Environmental Assessment, Stronghold Freedom
(U) ~~(C//REL)~~ Table C-20, Air Sampling Results - Heavy Metals

Filter Number and Field ID	Matrix Description	Analyte Name	Concentration	MAG-L µg/m³	*assuming µg/m³ Units*	Reporting Limit
47-01-301 (FREPM101304P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-301 (FREPM101304P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-301 (FREPM101304P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-301 (FREPM101304P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-301 (FREPM101304P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-301 (FREPM101304P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-301 (FREPM101304P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-301 (FREPM101304P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-301 (FREPM101304P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-301 (FREPM101304P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-302 (FREPM101304P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-302 (FREPM101304P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-302 (FREPM101304P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-302 (FREPM101304P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-302 (FREPM101304P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-302 (FREPM101304P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-302 (FREPM101304P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-302 (FREPM101304P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-302 (FREPM101304P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-302 (FREPM101304P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-303 (FREPM101305P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1

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(U) ~~(C//REL)~~ Table C-20, Air Sampling Results - Heavy Metals

Filter Number and Field ID	Matrix Description	Analyte Name	Concentration	MAG-L µg/m³	*assuming µg/m³ Units*	Reporting Limit
47-01-303 (FREPM101305P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-303 (FREPM101305P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-303 (FREPM101305P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-303 (FREPM101305P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-303 (FREPM101305P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-303 (FREPM101305P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-303 (FREPM101305P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-303 (FREPM101305P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-303 (FREPM101305P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-304 (FREPM101305P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-304 (FREPM101305P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-304 (FREPM101305P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-304 (FREPM101305P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-304 (FREPM101305P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-304 (FREPM101305P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-304 (FREPM101305P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-304 (FREPM101305P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-304 (FREPM101305P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-304 (FREPM101305P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-305 (FREPM101306P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-305 (FREPM101306P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5

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(U) ~~(C//REL)~~ Table C-20, Air Sampling Results - Heavy Metals

Filter Number and Field ID	Matrix Description	Analyte Name	Concentration	MAG-L µg/m³	*assuming µg/m³ Units*	Reporting Limit
47-01-305 (FREPM101306P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-305 (FREPM101306P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-305 (FREPM101306P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-305 (FREPM101306P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-305 (FREPM101306P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-305 (FREPM101306P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-305 (FREPM101306P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-305 (FREPM101306P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-306 (FREPM101306P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-306 (FREPM101306P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-306 (FREPM101306P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-306 (FREPM101306P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-306 (FREPM101306P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-306 (FREPM101306P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-306 (FREPM101306P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-306 (FREPM101306P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-306 (FREPM101306P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-306 (FREPM101306P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-307 (FREPM101307P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-307 (FREPM101307P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-307 (FREPM101307P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5

Environmental Assessment, Stronghold Freedom

(U) ~~(C//REL)~~ Table C-20, Air Sampling Results - Heavy Metals

Filter Number and Field ID	Matrix Description	Analyte Name	Concentration	MAG-L µg/m³	*assuming µg/m³ Units*	Reporting Limit
47-01-307 (FREPM101307P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-307 (FREPM101307P)	Air, (filter)	Chromium	BRL	0.085 (VI)	ug/filter	0.5
47-01-307 (FREPM101307P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-307 (FREPM101307P)	Air, (filter)	Manganese	BRL	0.54	ug/filter	2
47-01-307 (FREPM101307P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-307 (FREPM101307P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-307 (FREPM101307P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-308 (FREPM101307P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-308 (FREPM101307P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-308 (FREPM101307P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-308 (FREPM101307P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-308 (FREPM101307P)	Air, (filter)	Chromium	BRL	0.085 (VI)	ug/filter	0.5
47-01-308 (FREPM101307P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-308 (FREPM101307P)	Air, (filter)	Manganese	BRL	0.54	ug/filter	2
47-01-308 (FREPM101307P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-308 (FREPM101307P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-308 (FREPM101307P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-309 (FREPM101308)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-309 (FREPM101308)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-309 (FREPM101308)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-309 (FREPM101308)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5

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(U) ~~(C//REL)~~ Table C-20, Air Sampling Results - Heavy Metals

Filter Number and Field ID	Matrix Description	Analyte Name	Concentration	MAG-L µg/m³	*assuming µg/m³ Units*	Reporting Limit
47-01-309 (FREPM101308)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-309 (FREPM101308)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-309 (FREPM101308)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-309 (FREPM101308)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-309 (FREPM101308)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-309 (FREPM101308)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-310 (FREPM101308P)	Air, (filter)	Antimony	BRL	0.14 (insoluble)	ug/filter	1
47-01-310 (FREPM101308P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-310 (FREPM101308P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-310 (FREPM101308P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-310 (FREPM101308P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-310 (FREPM101308P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-310 (FREPM101308P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-310 (FREPM101308P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-310 (FREPM101308P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-310 (FREPM101308P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-311 (FREPM101309)	Air, (filter)	Antimony	BRL	0.14 (insoluble)	ug/filter	1
47-01-311 (FREPM101309)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-311 (FREPM101309)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-311 (FREPM101309)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-311 (FREPM101309)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5

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(U) ~~(C//REL)~~ Table C-20, Air Sampling Results - Heavy Metals

Filter Number and Field ID	Matrix Description	Analyte Name	Concentration	MAG-L µg/m³	*assuming µg/m³ Units*	Reporting Limit
47-01-311 (FREPM101309)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-311 (FREPM101309)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-311 (FREPM101309)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-311 (FREPM101309)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-311 (FREPM101309)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-312 (FREPM101309P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-312 (FREPM101309P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-312 (FREPM101309P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-312 (FREPM101309P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-312 (FREPM101309P)	Air, (filter)	Chromium	BRL	0.058 (VI)	ug/filter	0.5
47-01-312 (FREPM101309P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-312 (FREPM101309P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-312 (FREPM101309P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-312 (FREPM101309P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-312 (FREPM101309P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-313 (FREPM101310P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-313 (FREPM101310P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-313 (FREPM101310P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-313 (FREPM101310P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-313 (FREPM101310P)	Air, (filter)	Chromium	BRL	0.058 (VI)	ug/filter	0.5
47-01-313 (FREPM101310P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1

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(U) ~~(C//REL)~~ Table C-20, Air Sampling Results - Heavy Metals

Filter Number and Field ID	Matrix Description	Analyte Name	Concentration	MAG-L µg/m³	*assuming µg/m³ Units*	Reporting Limit
47-01-313 (FREPM101310P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-313 (FREPM101310P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-313 (FREPM101310P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-313 (FREPM101310P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-314 (FREPM101310P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-314 (FREPM101310P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-314 (FREPM101310P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-314 (FREPM101310P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-314 (FREPM101310P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-314 (FREPM101310P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-314 (FREPM101310P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-314 (FREPM101310P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-314 (FREPM101310P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-314 (FREPM101310P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-315 (FREPM101311P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-315 (FREPM101311P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-315 (FREPM101311P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-315 (FREPM101311P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-315 (FREPM101311P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-315 (FREPM101311P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-315 (FREPM101311P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2

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(U) ~~(C//REL)~~ Table C-20, Air Sampling Results - Heavy Metals

Filter Number and Field ID	Matrix Description	Analyte Name	Concentration	MAG-L µg/m³	*assuming µg/m³ Units*	Reporting Limit
47-01-315 (FREPM101311P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-315 (FREPM101311P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-315 (FREPM101311P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-316 (FREPM101311P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-316 (FREPM101311P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-316 (FREPM101311P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-316 (FREPM101311P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-316 (FREPM101311P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-316 (FREPM101311P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-316 (FREPM101311P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-316 (FREPM101311P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-316 (FREPM101311P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-316 (FREPM101311P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-317 (FREPM101313P)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-317 (FREPM101313P)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-317 (FREPM101313P)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-317 (FREPM101313P)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-317 (FREPM101313P)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-317 (FREPM101313P)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-317 (FREPM101313P)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-317 (FREPM101313P)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5

(U) ~~(C//REL)~~ Table C-20, Air Sampling Results - Heavy Metals

Filter Number and Field ID	Matrix Description	Analyte Name	Concentration	MAG-L µg/m³	*assuming µg/m³ Units*	Reporting Limit
47-01-317 (FREPM101313P)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-317 (FREPM101313P)	Air, (filter)	Zinc	BRL		ug/filter	5
47-01-318 (FREPM101313)	Air, (filter)	Antimony	BRL	0.14 (trioxide)	ug/filter	1
47-01-318 (FREPM101313)	Air, (filter)	Arsenic	BRL	1.1	ug/filter	0.5
47-01-318 (FREPM101313)	Air, (filter)	Beryllium	BRL	0.014	ug/filter	0.5
47-01-318 (FREPM101313)	Air, (filter)	Cadmium	BRL	0.24 (ele)	ug/filter	0.5
47-01-318 (FREPM101313)	Air, (filter)	Chromium	BRL	0.068 (VI)	ug/filter	0.5
47-01-318 (FREPM101313)	Air, (filter)	Lead	BRL	1.5	ug/filter	1
47-01-318 (FREPM101313)	Air, (filter)	Manganese	BRL	0.34	ug/filter	2
47-01-318 (FREPM101313)	Air, (filter)	Nickel	BRL	0.14 (sol)	ug/filter	0.5
47-01-318 (FREPM101313)	Air, (filter)	Vanadium	BRL		ug/filter	2
47-01-318 (FREPM101313)	Air, (filter)	Zinc	BRL		ug/filter	5

(U) ~~(S//REL)~~ APPENDIX D

SITE PHOTOGRAPHS

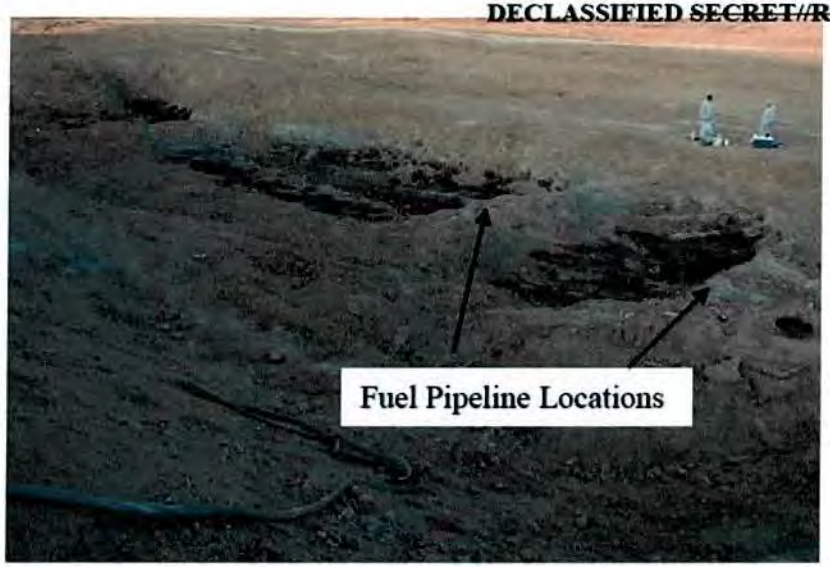
D-1

Figure D-1. (U) ~~(S//REL)~~ This photo shows broken asbestos-containing roofing material at the side of the main road leading to the airstrip.

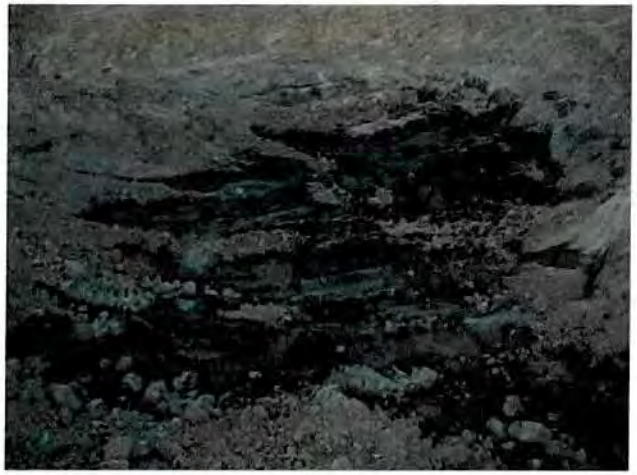
Figure D-2. (U) ~~(S//REL)~~ Broken asbestos-containing material near working and living areas

Figure D-3. (U) ~~(S//REL)~~ Piles of broken asbestos-containing material can be found in many areas of the Stronghold.

Figure D-4. (U) ~~(S//REL)~~ This photo shows missile debris that was removed from the former SAM site. Laboratory analysis of a similar piece of missile debris revealed 5% chrysotile asbestos.



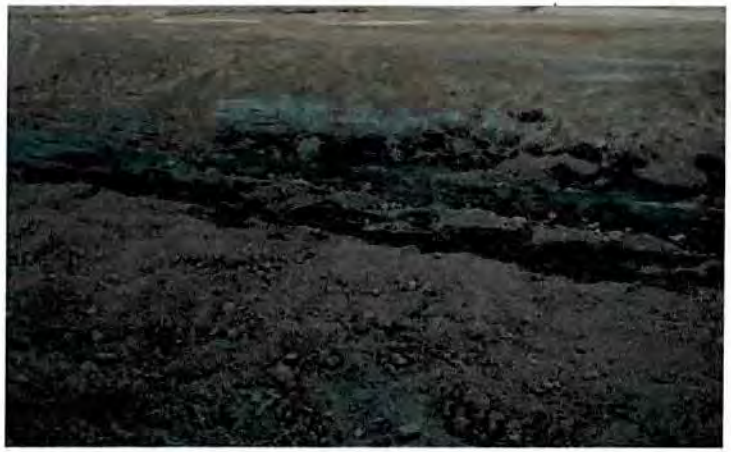
D-13



D-14

(U) ~~(S//REL)~~ D-13 shows waste/ "spooge" pit area from the top of the berm. Manhole visible in far right of picture - fuel pipeline locations as indicated. Waste pits labeled from right: Pits 1, 2, and 3. Notice extensive soil discoloration in each - black, brown, gray areas. The standing water/ product mix is in Pit 3 (D-15). Flags show some screening and sampling locations.

D-15



D-16

D-17

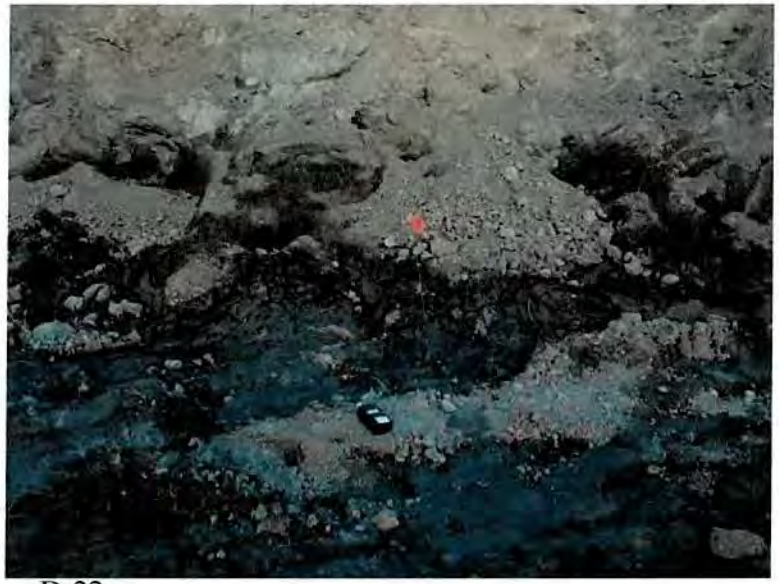
D-18

D-19

(U) ~~(S//REL)~~ Rain shows the discolored soil of exposed contamination particularly well. Above shots are of the spooge/ waste pits investigated first at Stronghold Freedom. All photographs taken from Force Protection Berm generally looking east and show most of Site 3 expansion area.

D-20

D-21



D-22

D-23

(U) ~~(S//REL)~~ Figure D-22: air sampler near soil sampling location in waste pit to evaluate substances volatilizing from soil; Figure D-23: broken fuel transmission pipe in one of elevated sections that divide the waste pits. Figure D-24: standing water/ product mix in Pit 3 with locations (soil) 1D and 1F.

D-24

D-25

D-26

Figure D-25: (U) ~~(S//REL)~~ manhole near Site 3 waste pit with air sampler nearby. Figure D-26: this manhole is suspected to have provided access to fuel transmission lines that are found in this site (Figure D-27).

D-27

D-28

D-29

D-30

D-31

D-28 through D-31. (U) ~~(S//REL)~~ Original waste pit (Site 3) pit being filled with clean fill as recommended. Figure D-31: emissions from host nation construction vehicles are also a concern. With construction activity, they contribute to air pathway exposures.

D-32

D-33

D-34

D-35

Figures D-32 through D-35 (U) ~~(S//REL)~~ Soil investigation at Site 3 - a planned area of expansion for Stronghold Freedom (e.g., east of tent city). As can be seen from borings, subsurface at this site is highly contaminated with jet kerosene fuel. The visual contamination starts at about a meter and a half below ground surface here (note color change in D-32 and D-34). Fuel lines appear to run to adjacent petroleum storage tank farm (Figure D-33).

D-36

D-37

D-38

D-39

(U) ~~(S//REL)~~ Southern tent city bunker (D-36) and transformer building. On engineering drawings obtained, fuel pipes from tank farm ended at this bunker. Inspection of bunker revealed pumping and electrical power generation equipment (mostly abandoned/ cannibalized). Composite samples taken around each of these locations tent city. Figures D-38 and D-39 depict ambient air sampling at Camp Freedom. D-38 - Mini-vol location two with collocated organic sample (e.g., pump with charcoal tube); D-39 depicts sample A-21 on northernmost berm.

D-40

(U) ~~(S//REL)~~ Easternmost portion of Site 1 is shown in these figures. Depth to bottom of trench was approximately 8 to 10 feet. Figure D-41 shows the discolored soil with JP-5 contamination. Notice the distinct color change between brown and grey in profile on lower left photo. High degree of correlation between the gray/ discolored soil and petroleum contamination. Figure D-40 shows nearby guard post from trench. Contamination here not as severe as observed in other locations. Some of this discolored soil was used in berm construction.

D-41

D-42

D-43

D-44

D-45

D-46

D-47

(U) ~~(S//REL)~~ These figures depict physical hazards/ unexploded ordnance at Site 1. Rocket tails/ motors (D-42, D-44, D-45, D-46) and other suspected ordnance items - such as hand grenades (D-43). Potential expansion areas at Stronghold Freedom were in need of clearance by engineer assets equipped with remote sensing equipment prior to area use (e.g., either for excavation for fill for living areas or occupation). equipment. D-47 - EOD detonated some of the physical hazards encountered.

D-48

D-49

D-50

D-51

(U) ~~(S//REL)~~ These photograhs show the suspected chemical decon site on imagery. D-48 is view of the former line/ road on imagery. Pavement hidden/ overgrown with grass (looking east). Figure D-49 - south side of decon site appears to have a secondary containment ditch that was purposefully constructed for this activity (also Figure D-50). Far eastern end of line (Figure D-51) appears to have remnants of concrete pads that appear on satellite photos.

D-52

D-53

(U) ~~(S//REL)~~ Figure D-52 - soil boring at suspected chemical decontamination site (all screened by Chemical Agent Monitors). All samples tested negative for chemical agent breakdown products; Figure D-53 - another view of the road and containment berm at this location.

D-54

D-55

D-56

D-57

(U) ~~(S//REL)~~ These figures depict sampling outside western force protection berm. Figure D-54 - excavation to build western berm provides good cross section of soil - none with obvious discoloration as on E and NE ends. Only area showing any type of activity was upper right - improved/ reinforced defensive positions. This is soil grid 20 - composite taken around this location from surface soils and in bottom of ditch. Figure D-56 - picture of one of borings from this location. No readings above background on FID. Background soil sample taken in this general area. Figure D-57 - pipe is believed to be a water pipe (not in service).

D-58

D-59

D-60

D-61

D-62

(U) ~~(S//REL)~~ Figure D-58: a series of storage sheds on western boundary of host nation maintenance facility with US tents in background. These conexes allegedly have aircraft parts inside. Figure D-61 - trucks parked here - no maintenance is done on trucks here according to host nation representatives. Figure D-59- a drip pan (with waste fluids inside) to catch fluids in an aircraft hangar. Figure D-60- open burning on ground surface behind maintenance facility. Figure D-62 - empty aircraft fuel tanks in hangars. Fuel is supposedly emptied elsewhere.

D-63

D-64

D-65

D-66

(U) ~~(S//REL)~~ Figure D-63: the "bottomless barrel" used to dispose hazardous wastes/ materials at maintenance facility. This was basically a funnel into the ground - as it is never emptied. For perspective, this is located just behind (to the left) of aircraft shown at D-64. Aircraft maintenance hangar and aircraft (SU series) at top right. Maintenance performed on aircraft on this apron - with obvious runoff to drainage ditch (which is off picture to left). Figure D-65: photos of waste site behind maintenance building taken from the top of the force protection berm. Notice the open waste disposal pits. These were covered in time for our formal, escorted sampling mission. Wastes observed in these pits when photos taken appeared to be large metal parts/ pieces - presumably from aircraft. This is a currently proposed expansion site.

D-67

D-68

D-69

D-70

(U) ~~(S//REL)~~ These figures depict open field to north of host nation aircraft maintenance facility. Figure D-67- open pit not yet covered on western edge at top left. Figures D-68, D-69, and D-70 show surface debris and recently covered waste pit and debris/ solid waste that was burned/ disposed at this site and hastily covered. Again, this waste on proposed expansion site for US.

Figure D-5. (U) ~~(S//REL)~~ This gazebo is located in an orchard adjacent to the PX. A bulk sample was taken from an existing broken corrugated tile atop the structure. Laboratory analysis revealed the bulk sample to contain 10% chrysotile asbestos. Area air sampling was conducted in this area (between the gazaebo, PX, and the adjacent road).

Figure D-6. (U) ~~(S//REL)~~ This photo shows the end of the PX building (which also houses the finance office). Broken asbestos-containing material is seen on the side and atop of the building.

Figure D-7. (U) ~~(S//REL)~~ Radiological Baseline Survey Locations - Stronghold Freedom.

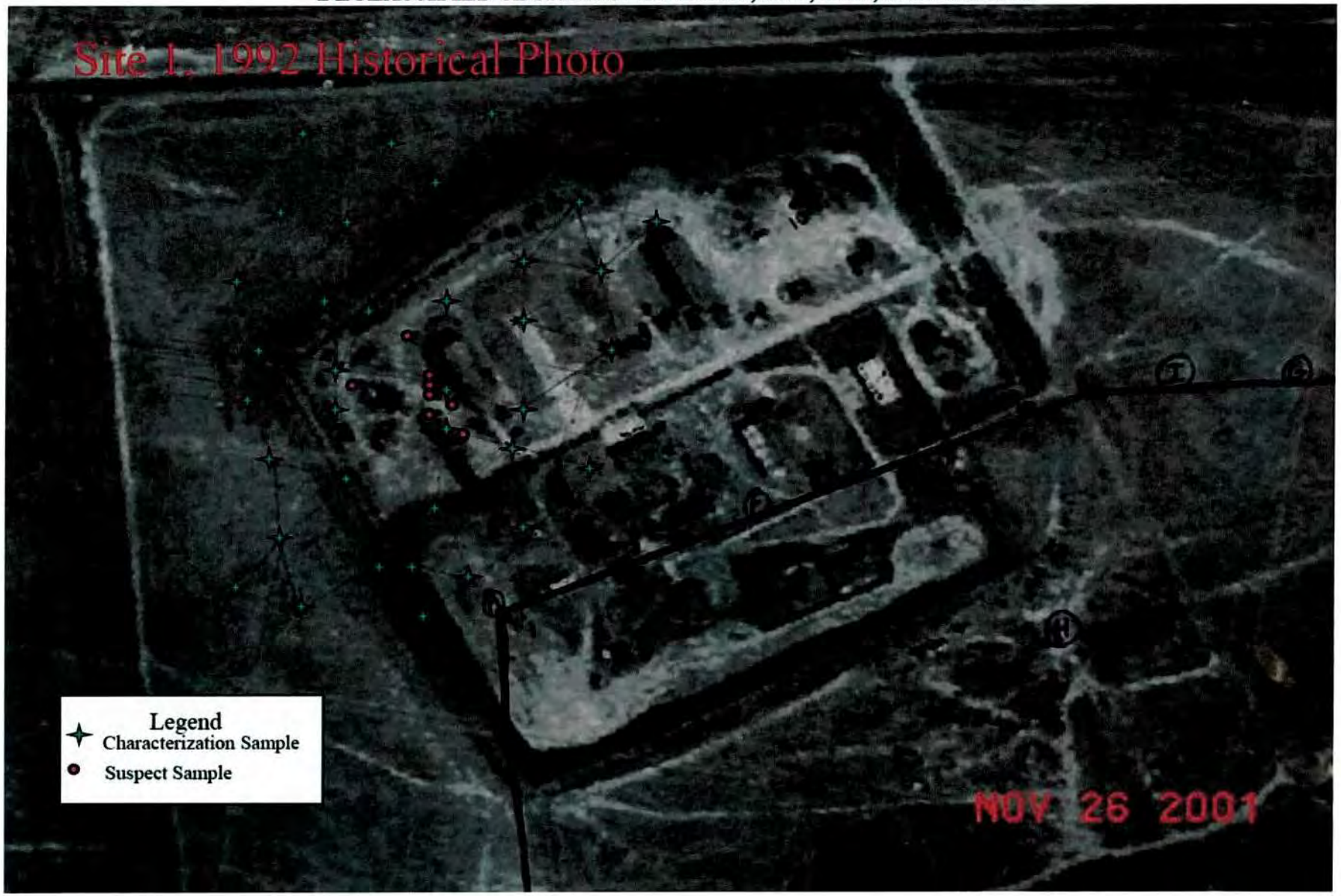


Figure D-8. (U) ~~(S//REL)~~ Radiological Characterization Survey at Site 1 - Sampling Locations.

D-9

D-10

Figures D-9 and D-10. (U) ~~(S//REL)~~ Yellow residue associated with suspect soils to include the 'pellet' ore material - Site 1.

D-11

D-12

Figures D-11 and D-12. (U) ~~(S//REL)~~ Depicts the three mounds at Site 1 with the highest concentration of radiological contamination.

(U) ~~(S//REL)~~ APPENDIX E

SAMPLING LOCATIONS

E-1

Environmental Assessment, Stronghold Freedom
(U) ~~(S//REL)~~ Table E-1. Soil Sampling Locations.

Soil Boring/Area ID	Latitude	Longitude
B	38° 49' 48" N	65° 54' 00" E
Berm 1	38° 50' 11" N	65° 54' 14" E
Berm 2	38° 50' 12" N	65° 54' 14" E
Berm 3	38° 50' 14" N	65° 54' 12" E
Berm 4	38° 50' 14" N	65° 54' 10" E
Berm 5	38° 50' 13" N	65° 54' 06" E
Berm 7	N/A	N/A
1A	38° 50' 11" N	65° 54' 15" E
1B	38° 50' 11" N	65° 54' 14" E
1C	38° 50' 11" N	65° 54' 14" E
1D	38° 50' 12" N	65° 54' 14" E
1E	38° 50' 12" N	65° 54' 14" E
1F	38° 50' 12" N	65° 54' 14" E
1G	38° 50' 12" N	65° 54' 14" E
1H	38° 50' 12" N	65° 54' 14" E
2A	N/A	N/A
2B	N/A	N/A
2C	N/A	N/A
4A	N/A	N/A
4B	N/A	N/A
4C	N/A	N/A
5B	N/A	N/A
5C	N/A	N/A
6A	N/A	N/A
6C	N/A	N/A
10A	N/A	N/A
10B	N/A	N/A
10C	N/A	N/A
Area 1	N/A	N/A
Area 2	N/A	N/A
Area 3	N/A	N/A
Area 4	N/A	N/A
Area 5	N/A	N/A
Area 6	N/A	N/A

Soil Boring/Area ID	Latitude	Longitude
Area 7	N/A	N/A
Area 8	N/A	N/A
Area 11	N/A	N/A
Area 12	N/A	N/A
Area 13	N/A	N/A
Area 14	N/A	N/A
Area 15	N/A	N/A
Area 16	N/A	N/A
Area 17	N/A	N/A
Area 18	N/A	N/A
Area 19	N/A	N/A
Area 20	N/A	N/A
20A	38° 50' 12" N	65° 54' 17" E
20B	38° 50' 15" N	65° 54' 24" E
20C	38° 50' 16" N	65° 54' 16" E
20D	38° 50' 11" N	65° 54' 16" E
20E	38° 50' 19" N	65° 54' 22" E
30A	38° 50' 23" N	65° 53' 99" E
30B	38° 50' 25" N	65° 53' 95" E
30C	38° 50' 22" N	65° 53' 93" E
30D	38° 50' 20" N	65° 53' 89" E
30E	38° 50' 19" N	65° 53' 93" E
30F	38° 50' 19" N	65° 54' 00" E
30G	38° 50' 16" N	65° 53' 94" E
Area 30	38° 49' 58" N	65° 54' 02" E
Area 31	38° 49' 58" N	65° 54' 04" E
Area 32	38° 50' 09" N	65° 54' 07" E
Area 33	38° 50' 09" N	65° 54' 10" E
40A	38° 50' 07" N	65° 53' 55" E
40B	38° 50' 01" N	65° 53' 58" E
40C	38° 49' 53" N	65° 54' 01" E
50A	38° 50' 16" N	65° 54' 04" E
50B	38° 50' 16" N	65° 54' 07" E

Soil Boring/Area ID	Latitude	Longitude
50C	38° 50' 16" N	65° 54' 09" E
50D	38° 50' 17" N	65° 54' 10" E
50E	38° 50' 16" N	65° 54' 06" E
50F	38° 50' 17" N	65° 54' 13" E
61A-E	38° 50' 03" N	65° 54' 14" E
62A-E	38° 49' 56" N	65° 54' 16" E
70A-F	38° 50' 04" N	65° 54' 21" E
80A	38° 50' 40" N	65° 54' 19" E
80B	38° 50' 10" N	65° 54' 17" E
80C	38° 50' 09" N	65° 54' 14" E
Area 81	N/A	N/A
Area 82	N/A	N/A
Area 83	N/A	N/A
Area 84	N/A	N/A

Environmental Assessment, Stronghold Freedom
(U) ~~(S//REL)~~ Table E-2. Radiological Survey Sampling Locations.

Basecamp Baseline Locations

Sample ID	Location (QD)	Elevation (Meters)
Background 1	52144E 02519N	390
Background 2	51737E 01945N	385
1	51641E 02519N	385
2	51829E 02470N	383
3	51836E 02204N	371
4	52022E 02663N	394
5	52250E 02231N	387
6	52115E 02310N	387
7	52267E 02733N	390
8	52265E 02893N	385
9	51961E 02823N	393
10	51702E 02723N	385
12a	51578E 02626N	390
12b	51578E 02626N	390
12c	51578E 02626N	390
13	51584E 02613N	377
14a	51598E 02602N	378
14b	51598E 02602N	378
15a	51592E 02615N	376
15b	51592E 02615N	376
16a	51550E 02617N	380
16b	51550E 02617N	380
17	51569E 02650N	380
18a	51580E 02628N	388
18b	51580E 02628N	388
19	51581E 02629N	388
20	51577E 02630N	388
21	51641E 02512N	380
22	52192E 02614N	380
23	52108E 02578N	380

Site 1 Characterization - Soil Sampling Locations

Quadrant A

Sample ID	Location (QD)
1A	51542E 02626N
1B	51510E 02628N
1C	51419E 02653N
1D	51531E 02653N
1E	51566E 02655N
1F	51549E 02685N
1G	51521E 02687N
1H	51505E 02722N
1I	51539E 02735N
1J	51577E 02746N

Quadrant B

Sample ID	Location (QD)
2A	51579E 02714N
2B	51622E 02716N
2C	51654E 02719N
2D	51635E 02688N
2E	51601E 02685N
2F	51577E 02648N
2G	51608E 02645N
2H	51649E 02648N
2I	51627E 02618N

Quadrant GZ

Sample ID	Location (QD)
GZ1	51580E 02622N
GZ2	51574E 02621N
GZ3	51573E 02620N

Quadrant C

Sample ID	Location (QD)
3A	51512E 02598N
3B	51546E 02597N
3C	51527E 02570N
3D	51561E 02568N
3E	51537E 02537N
3F	51577E 02536N
3G	51554E 02507N
3H	51525E 02510N
C1	51521E 02583N
C2	51556E 02592N
C3	51552E 02565N
C4	51545E 02540N

Quadrant D

Sample ID	Location (QD)
4A	51600E 02516N
4B	51616E 02534N
4C	51584E 02537N
4D	51599E 02565N
4E	51635E 02559N
4F	51657E 02598N
4G	51620E 02595N
4H	51588E 02597N
D1	51591E 02582N
D2	51600E 02625N
D3	51607E 02614N
D4	51622E 02618N
D5	51621E 02603N
D6	51609E 02610N
D7	51603E 02613N
D8	51604E 02585N

Radiological Survey - Air Sampling Locations

Sample ID	Location (QD)
Background 1	52144E 02696N
Background 2	51737E 01945N
GZ	51580E 02622N
A	51633E 02518N
B	51679E 02347N
C	51688E 02361N
D	51816E 02074N
E	51930E 02119N
F	51722E 02589N
G	51922E 02703N
H	51850E 02548N
I	51870E 02678N

(U) ~~(S//REL)~~ APPENDIX F

Local Communications

1) (U) ~~(C//REL)~~ CHPPM-Europe Memorandum, "Environmental Health Risk for "Pentagon" Area of Stronghold Freedom," 14 November 2001.

2) (U) ~~(S//REL)~~ CHPPM-Europe Memorandum, "Medical Opinion on Environmental Sampling Results from Berm Trench Area, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan," 18 November 2001.

3) (U) ~~(S//REL)~~ CHPPM-Europe Memorandum, " Interim Environmental Health Risk Assessment for Asbestos Roof Tiles, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan," 18 November 2001.

4) (U) Rampart (local Stronghold publication) Article, " CHPPM-Europe Team Checks the Environment at Stronghold Freedom," 20 November 2001.

(U) ~~(S//REL)~~ Final Environmental Site Characterization and Operational Health Risk Assessment, Stronghold Freedom, Karshi Khanabad Airfield, Uzbekistan, 27 October – 27 November 2001

MCHB-AE-M 14 November 2001

MEMORANDUM THRU Commander, Center for Health Promotion and Preventive Medicine – Europe (CHPPM-Europe) */original initialed/*

FOR Commander, JSOTF, Stronghold Freedom
Commander, Corps Support Group, Stronghold Freedom

SUBJECT: (U) ~~(C//REL)~~ Environmental Health Risk for "Pentagon" area of Stronghold Freedom

(U) REFERENCES:

(a) DoD Directive 6490.2, "Joint Medical Surveillance," August 30, 1997
(b) DoD Instruction 6490.3, "Implementation and Application of Joint Medical Surveillance for Deployments," August 7, 1997
(c) Joint Staff Memorandum MCM-251-98, "Deployment Health Surveillance and Readiness," 04 December 1998
(d) National Council on Radiation Protection and Measurements, Report No. 65 *Management of Persons Accidentally Contaminated with Radionuclides*, January 31, 1993
(e) American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, 2001
(f) Proctor NH, Hughes JP, Fischman ML, *Chemical Hazards of the Workplace*, 1988
(g) Code of Federal Regulations, Title 29, Part 1910.1001, Asbestos
(h) U.S. Army Center for Health Promotion and Preventive Medicine, *USACHPPM Reference Document (RD) 230 – Chemical Exposure Guidelines for Deployed Military Personnel* (Review Draft), August 2001

1. (U) ~~(C//REL)~~ This memorandum provides a medical opinion to date regarding environmental contaminants found in the "pentagon" area (possibly a former SAM site) of Stronghold Freedom. It is cautioned that this opinion is subject to change since the sampling and analysis of the area is still ongoing.

2. (U) ~~(C//REL)~~ The findings to date in this area include:
   a. (U) ~~(C//REL)~~ Uranium scattered throughout the area (in pellets, discrete pockets of yellow residue, and finely distributed throughout the soil) – The uranium appears to be milled, perhaps a product or by-product of the uranium enrichment process. Characterization of the isotopic ratios present in the pellets removed from the area is still ongoing. Testing to date implies that the uranium is not depleted uranium but rather an enriched product.
   b. (U) ~~(C//REL)~~ Asbestos – Chrysotile asbestos was found in a bulk sample taken from missile debris in the area. The asbestos was present in the material at 5%, thus classifying it as an asbestos-containing material. It is possible and likely that asbestos fibers are present to some degree in the soil of this area.

3. (U) ~~(C//REL)~~ The uranium in the soil poses two possible hazards.
   a. (U) (~~C//REL~~) First, uranium is radioactive. The exact ratios of the isotopes present have not yet been determined; results are expected shortly. Regardless, uranium isotopes have relatively small specific activity; the amount of radioactivity (alpha, beta, and gamma) is small. Externally, the uranium poses negligible health risk. The health risk comes with inhalation of airborne uranium, thus allowing the low-level radiation to be internalized and possible heavy metal toxicity to ensue (see below). Health effects do not occur without exposure to the dangerous entity. For every doubling of the distance from a radioactive source, the amount of radioactivity present at that distance is quartered (inverse square law). Given the distance of the nearest soldiers to the pentagon area (atop the adjacent berm), it is unlikely that the soldiers are receiving a dose of radioactivity that is above the baseline level. Dosimetry measurements will be done at the fighting positions shortly.
   b. (U) ~~(C//REL)~~ Second, uranium itself is a heavy metal. When inhaled in sufficient quantities, the kidneys may be affected. The effect upon the kidneys is dose-dependent. Small doses may be entirely removed from the body without consequence through its natural defense mechanisms. Larger doses may overcome the body's natural clearance mechanisms, resulting in effects upon the kidney that are detectable in the urine or blood; these effects are inconsequential and reversible. Even larger doses, however, may cause damage to the kidney that results in disease. The American Conference of Governmental Industrial Hygienists (ACGIH) has adopted a threshold limit value (TLV) of 0.2 milligrams per cubic meter of air. Below this level, changes in kidney function would not be expected when exposed below this level for 8 hours per day, 40 hours per week, for 30 years. It is unlikely that airborne uranium is present at the fighting positions, especially at levels approaching the TLV. Air monitoring for uranium will begin upon receipt of equipment from Europe.

4. (U) ~~(C//REL)~~ Asbestos is a known human cancer-causing agent (lung, gastrointestinal tract). The Occupational Safety and Health Administration (OSHA) and the ACGIH have set a standard of 0.1 fibers of asbestos per cubic centimeter of air as a permissible exposure limit (PEL) and TLV, respectively. Below this level, the cancer rate (in excess of the population baseline rate) is at an "acceptable" level. An acceptable level in the occupational setting has been set at one in one thousand (this number is probably greater for asbestos – reference not currently available). This means that one in one thousand individuals *exposed* to asbestos at the PEL may be expected to develop cancer specifically attributed to exposure to asbestos. However, given that the soil load of asbestos is probably low and that the berm is a distance away from the contaminated soil, there is probably not a detectable amount of airborne asbestos in any exposure pathway available to soldiers at the berm positions. Air monitoring is currently being done to definitively characterize any exposure to asbestos in the fighting positions.

5. (U) (~~C//REL~~) Soldiers that may be exposed to the uranium and asbestos are those soldiers that man the fighting positions atop the berm adjacent to the pentagon area. These soldiers typically man the fighting positions for 3 hours at a time, and then rotate to a different position. In

addition, soldiers/airmen that patrol the berm road may be intermittently exposed as they transverse the road adjacent to the pentagon. Given this exposure time, it is reasonable to use the ACGIH TLV, OSHA PEL, and the Nuclear Regulatory Commission (NRC) regulations as "safe" levels.

6. (U) ~~(C//REL)~~ Ongoing CHPPM activities:
   a. Definition of the boundary of radioactive soil
   b. Air monitoring for asbestos in the adjacent fighting positions
   c. Air monitoring for uranium in the adjacent fighting positions
   d. Radioactive dosimetry measurements in the adjacent fighting positions
   e. Characterization of the type of uranium found in the soil

7. (U) ~~(C//REL)~~ Recommendations to Stronghold Freedom:
   a. (U) ~~(C//REL)~~ A carefully planned yet aggressive risk communication program – Although the health effects of the radioactivity, chemical uranium, and the asbestos are likely to be nonexistent, the perception of a grave health risk is likely to be present among the stronghold population. Involve professional risk communicators (CHPPM has this capability).
   b. (U) ~~(C//REL)~~ Declare the pentagon area to be off-limits. Properly mark and cordon the area.
   c. (U) ~~(C//REL)~~ Consider methods to keep the dust level to a minimum (i.e., dust that could originate from the pentagon area). For example, gravel or pave the berm road adjacent to the pentagon. Consider capping the area with clean soil. If this is done, the current soil should not be disturbed; simply lay and compact soil over the top of the existing topsoil.

8. (U) This memorandum represents an interim assessment. As further data becomes available, modifications of this assessment may be necessary.

9. (U) POC is the undersigned.

/original signed/

William A. Rice
LTC, MC
Occupational & Environmental
Medicine Physician

(U) ~~(S//REL)~~ Final Environmental Site Characterization and Operational Health Risk Assessment, Stronghold Freedom, Karshi Khanabad Airfield, Uzbekistan, 27 October – 27 November 2001

MCHB-AE-M 18NOV01

MEMORANDUM THRU Commander, USACHPPM-Europe */original initialed/*

FOR Commander, Corps Support Group, Stronghold Freedom

SUBJECT: (U) ~~(S//REL)~~ Medical Opinion on Environmental Sampling Results from Berm Trench Area, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan

(U) REFERENCES:

(a) U.S. Army Center for Health Promotion and Preventive Medicine. *Technical Guide 230 Chemical Exposure Guidelines for Deployed Military Personnel (Final Review Draft)*, August 2001
(b) Agency for Toxic Substances and Disease Registry. *Toxicological Profile for Jet Fuels (JP-5 and JP-8)*, August 1998
(c) Proctor NH, Hughes JP, Fischman ML. *Chemical Hazards of the Workplace* (2 Ed.), 1988
(i) American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, 2001
(d) DoD Directive 6490.2, *Joint Medical Surveillance*, August 30, 1997
(e) DoD Instruction 6490.3, *Implementation and Application of Joint Medical Surveillance for Deployments*, August 7, 1997
(f) Joint Staff Memorandum MCM-251-98, *Deployment Health Surveillance and Readiness*, 04 December 1998
(g) U.S. Army Center for Health Promotion and Preventive Medicine, *USACHPPM Reference Document (RD) 230 – Chemical Exposure Guidelines for Deployed Military Personnel* (Review Draft), August 2001

1. (U) ~~(C//REL)~~ CHPPM-EUR was tasked to evaluate the environmental health implications of unknown contamination found in a trench that was being used as a source for building an adjacent earthen berm at Stronghold Freedom. This memorandum highlights abnormalities found in environmental samples obtained to date and provides a medical opinion regarding potential health effects of these abnormalities in soldiers deployed to Stronghold Freedom. It is cautioned that this opinion is subject to change since the sampling and analysis of the area is still ongoing.

2. (U) ~~(C//REL)~~ ABNORMAL FINDINGS: The following results exceeded known standards.

a. (U) ~~(C//REL)~~ Soil:
(1) Sample 1F2-2 (within the trench, two meters deep), naphthalene = 227 mg/kg (long-term soil MEG = 220 mg/kg)
(2) Sample 2A2 (immediately on other side of berm from the trench, 2 meters deep), total xylene = 270 mg/kg (long-term soil MEG = 210 mg/kg)
(3) Sample 2B2 (immediately on other side of berm from the trench, 2 meters deep), total xylene = 270 mg/kg (long-term soil MEG = 210 mg/kg)

(U) ~~(C//REL)~~ NOTE: Soil samples beginning with "1" are from the grossly contaminated pit. After the pit is filled in with "clean" soil, the source of these samples will be deep within the ground and thus not immediately available as a viable route of exposure. Air sampling in this area will be performed again to ensure that the soil cap is adequately containing the contaminants deep within the soil.

(U) ~~(C//REL)~~ NOTE: Methylene chloride was found in samples 2A35 and 2B35 in appreciable amounts (240 and 230 mg/kg, respectively). No soil MEG is published for methylene chloride. Due to its known toxic effects when exposed via air, it was imperative to ensure that methylene chloride was not present in the air in the vicinity of the contaminated soil. Air sampling in the vicinity did not detect the presence of methylene chloride or xylene.

b. (U) ~~(C//REL)~~ Air:

(1) Sample A-5 (within trench), kerosene fraction (C6-C10) = 14.63 mg/m3 (ATSDR MRL for JP-5 and JP-8 = 3 mg/m3)
(2) Sample A-6 (within trench), kerosene fraction (C6-C10) = 63.55 mg/m3 (ATSDR MRL for JP-5 and JP-8 = 3 mg/m3)
(3) Sample A-6 (within trench), propylbenzene = 1.1 mg/m3 (long-term air MEG = .025 mg/m3)
(4) Sample A-6 (within trench), 1,2,4-trimethylbenzene = 4.3 (long-term air MEG = 3.06 mg/m3)
(5) Sample A-6 (within trench), naphthalene = 1.2 mg/m3 (long-term air MEG = .0071 mg/m3)
(6) Sample A-7 (within trench), kerosene fraction (C6-C10) = 3.69 mg/m3 (ATSDR MRL for JP-5 and JP-8 = 3 mg/m3)
(7) Sample A-8 (within trench), kerosene fraction (C6-C10) = 33.01 mg/m3 (ATSDR MRL for JP-5 and JP-8 = 3 mg/m3)
(8) Sample A-16 (unmanned fighting position, abandoned due to odor, sampled shortly after digging), kerosene fraction (C6-C10) = 11 mg/m3 (ATSDR MRL for JP-5 and JP-8 = 3 mg/m3)
(9) Sample A-17 (unmanned fighting position, abandoned due to odor, sampled shortly after digging), kerosene fraction (C6-C10) = 11 mg/m3 (ATSDR MRL for JP-5 and JP-8 = 3 mg/m3)

c. (U) ~~(C//REL)~~ Water: Water was sampled from a puddle at the bottom of the contaminated trench. This sampling revealed several striking abnormalities consistent with jet fuel contamination. Now that the trench has been filled in with "clean" soil, these results are irrelevant to soldier exposures.

3. (U) ~~(C//REL)~~ CONCLUSIONS:

a. (C//REL) The contaminant present in the pit adjacent to the berm is consistent with kerosene-based jet fuel, similar to JP-5. ATSDR has published a toxicological profile on jet fuels JP-5 and JP-8. Given that these jet fuel formulations are made to American and NATO military specifications, it is unlikely that either of these fuels are the contaminant since the contaminant is likely to be a product of the Soviet era.

However, it is clear that the contaminant is a kerosene-based jet fuel and that it is reasonable to use JP-5 and JP-8 toxicology data and health-based exposure limits formulated by ATSDR to address the potential health effects from exposure to the jet fuel at Stronghold Freedom.

b. (U) ~~(C//REL)~~ ATSDR's Minimal Risk Level (MRL) for JP-5 and JP-8 is 3 mg/m^3 for a period of continuous exposure of 15-364 days. [This level is based upon a LOAEL (lowest observable adverse effect level) resulting in hepatocellular fatty changes and vacuolization in mice. The MRL was formulated by adjusting for human alveolar ventilation rate and by incorporating uncertainty factors for interspecies variability, intraspecies variability, and for the use of a LOAEL rather than a NOAEL (no observed adverse effect level).] Several air samples within and very near the contaminated pit revealed kerosene fractions that exceed the MRL. Once the pit is filled in with clean soil, it is likely that air monitoring will then reveal greatly reduced airborne concentrations of kerosene. Soldiers at fighting positions in this area are being rotated to other distant fighting positions every 1-3 hours, thus minimizing exposure to airborne jet fuel components. In the absence of acute symptoms (headache, lightheadedness, difficulty concentrating), it is unlikely that soldiers exposed to the current level of airborne jet fuel vapors at short intervals will experience exposure-related health problems now or in the future. Having air sampling results that are below the MRL means that it is extremely unlikely to see adverse health effects when the exposure to jet fuel vapor is less than one year in duration.

c. (U) ~~(C//REL)~~ The current, natural protective cap of soil over the contaminated areas below tent city is adequate to keep airborne vapors from the contamination to very low levels. The health risk from these vapors is negligible.

d. (U) ~~(C//REL)~~ The MRL will be exceeded when soldiers/airmen manually dig into the contaminated soil. Samples A-16 and A-17 illustrate this point. Both of these samples were taken from a freshly dug fighting position. Soldiers/airmen in the resulting hole will be exposed above the MRL and are likely to experience acute, reversible effects such as headache, dizziness, and decreased concentration.

4. (U) ~~(C//REL)~~ RECOMMENDATIONS:

a. (U) ~~(C//REL)~~ Risk communication – develop and implement a plan for communicating to the soldiers and airmen that summarizes our findings and conclusions in a manner consistent with effective environmental risk communication principles.

b. (U) ~~(C//REL)~~ After the pit has been filled in with clean soil, conduct air monitoring for organic compounds over the filled-in pit to ensure that the soil cap preventive countermeasure is effective in reducing airborne exposures to soil-based jet fuel. This sampling is currently underway.

c. (U) ~~(C//REL)~~ Disallow digging into soil contaminated with jet fuel (Tent city and areas on other side of berm around tent city). Include this in the risk communication

plan, along with recommendations for personal protective equipment when manual digging must be done.

d. (U) ~~(C//REL)~~ When digging must be done, it is recommended that the resulting hole/trench be filled back in at the earliest opportunity. If digging is to be done manually, then the following personal protective equipment is recommended:
   (1) Half- or full-face respirator with organic vapor cartridge and HEPA filter. The M40 mask meets this requirement. If the M40 mask is used, it is recommended that the cartridge/filter be changed when the digging work is complete so that the mask will be fully functional in case of chemical agent attack.
   (2) Tyvek suit with Saranex coating
   (3) Nitrile gloves (or similar impermeable gloves)
   (4) Rubberized overboots

5. (U) This memorandum represents an interim assessment. As further data becomes available, modifications of this assessment may be necessary.

6. (U) POC is the undersigned.

/original signed/

William A. Rice
LTC, MC
Occupational & Environmental Medicine Physician

CF: JSOTF Surgeon

(U) ~~(S//REL)~~ Final Environmental Site Characterization and Operational Health Risk Assessment, Stronghold Freedom, Karshi Khanabad Airfield, Uzbekistan, 27 October – 27 November 2001

MCHB-AE-M 18 November 2001

MEMORANDUM THRU Commander, Center for Health Promotion and Preventive Medicine – Europe (CHPPM-Europe) */original initialed/*
FOR Commander, Corps Support Group, Stronghold Freedom

SUBJECT: (U) ~~(S//REL)~~ Interim Environmental Health Risk Assessment for Asbestos Roof Tiles, Stronghold Freedom, Karshi-Khanabad Airfield, Uzbekistan

(U) REFERENCES:

a. DoD Directive 6490.2, "Joint Medical Surveillance," August 30, 1997
b. DoD Instruction 6490.3, "Implementation and Application of Joint Medical Surveillance for Deployments," August 7, 1997
c. Joint Staff Memorandum MCM-251-98, "Deployment Health Surveillance and Readiness," 04 December 1998
d. American Conference of Governmental Industrial Hygienists, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, 2001
e. Proctor NH, Hughes JP, Fischman ML, *Chemical Hazards of the Workplace*, 1988
f. Code of Federal Regulations, Title 29, Part 1910.1001, Asbestos

1. (U) ~~(C//REL)~~ This memorandum provides a medical opinion to date regarding asbestos in roof tiles at Stronghold Freedom. It is cautioned that this opinion is subject to change since the sampling and analysis of this issue is still ongoing.

2. (U) ~~(C//REL)~~ The findings to date with this issue include:
   a. Bulk sample, roof tile taken from gazebo in front of PX, within orchard - material consists of 10% chrysotile asbestos
   b. Several areas of the Stronghold are littered with broken asbestos roof tiles.
   c. Bulk sample, wall coating taken from backblast area of Forward Surgical Team hangar - no asbestos found.

3. (U) ~~(C//REL)~~ CONCLUSIONS:
   a. Corrugated roof tiles at Stronghold Freedom are asbestos-containing materials. Some of these tiles are broken; there is a possibility that the broken tiles could be releasing asbestos into the air. Air sampling for asbestos in the vicinity of the gazebo and the PX has concluded; results are pending.
   b. Broken asbestos tiles on the ground in some areas of the Stronghold pose a possible risk of airborne exposure to asbestos.
   c. The hangars pose no risk of asbestos exposure from the wall coating in the backblast areas.

4. (U) ~~(C//REL)~~ RECOMMENDATIONS:

a. Wet, double-bag, label, and properly dispose of asbestos tiles on the ground. Once the tiles are wet, workers should wear nitrile or similar nonpermeable gloves to handle the tiles. Workers should wash their hands after the work is completed.
b. Pending the results of the air sampling for asbestos, it is recommended that the roof tiles currently in place on existing structures not be disturbed.
c. If work needs to be done in which the roof tiles would be disturbed or replaced, contact CHPPM-Europe ([redacted] for recommendations on protective measures.
d. Since smoking increases the risk of lung cancer in workers exposed to asbestos ten-fold, commanders should encourage and support smoking cessation with their soldiers/airmen. Medical units at the Stronghold should be prepared to support a smoking cessation program.

5. (U) This memorandum represents an interim assessment. As further data becomes available, modifications of this assessment may be necessary.

6. (U) POC is the undersigned.

/original signed/

William A. Rice
LTC, MC
Occupational & Environmental
Medicine Physician

CF: JSOTF Surgeon
Commander, 261st ASMB

(U) ~~(S//REL)~~ Final Environmental Site Characterization and Operational Health Risk Assessment, Stronghold Freedom, Karshi Khanabad Airfield, Uzbekistan, 27 October – 27 November 2001

(U) **CHPPM-Europe Team Checks the Environment at Stronghold Freedom**
[Copy of Article which Appeared in Publication 'Rampart' at Stronghold Freedom, 20 Nov 01]

(U) The U.S. Army Center for Health Promotion and Preventive Medicine – Europe (CHPPM-Europe) has deployed a team to Stronghold Freedom to assess health aspects of the environment. CHPPM-Europe is a third-echelon multidisciplinary preventive medicine unit based in Landstuhl, Germany. Its area of responsibility (AOR) includes the EUCOM AOR (Europe and most of Africa) and the CENTCOM AOR (part of northern Africa, the Middle East, and Central Asia). The forward deployed team is tailored to accomplish a wide variety of environmental assessments. The team members are COL Brian [redacted] (CHPPM-Europe Commander and Environmental Toxicologist), LTC [redacted] (Occupational and Environmental Medicine Physician), MAJ [redacted] (Environmental Engineer), [redacted] (Environmental Engineer), CPT [redacted] (Health Physicist), SGT [redacted] (Preventive Medicine Technician), and SPC [redacted] (Preventive Medicine Technician). CHPPM-Europe has been asked to provide the initial characterization of potential environmental threats at Stronghold Freedom by the JSOTF Commander IAW DoD Directive 6490.2 that directs forces "to monitor environmental, occupational and epidemiological threats" for all deployments over thirty days.

(U) The CHPPM-Europe team has been busy sampling various environmental media (soil, water, air) throughout parts of the Stronghold. The CHPPM-Europe team is directly supported by a multidisciplinary group of preventive medicine professionals and environmental laboratories, both at their home station in Landstuhl and at CHPPM HQ at Aberdeen, Maryland.

(U) Attention has been focused upon a trench that lies alongside a berm near tent city. The trench has been emitting strong odors. The CHPPM-Europe team determined the soil in the trench is contaminated with jet fuel, most likely from a leaking Soviet-era underground fuel distribution system. Although the odor in the air is unpleasant, air monitoring in the fighting positions atop the berm reveals that the amount of fuel vapor in the air is at a level which is not harmful to health, neither immediately nor in the long-term. The fuel vapor level atop the berm is far below the Minimal Risk Level (MRL) developed by the Agency for Toxic Substances and Disease Registry (an agency of the Department of Health and Human Services). To further reduce airborne exposure to the vapor, contract workers will be filling in the trench with clean soil. This clean soil or "cap" will keep the fuel vapors trapped underground. By filling in the trench with clean soil, the vapors will not be inhaled by people working or living in the area.

(U) The CHPPM-Europe team has also been examining an area outside of the berm. Asbestos from a few pieces of missile debris has been found, along with some low-level radioactivity from uranium. Asbestos is only harmful if inhaled. Therefore, the team is monitoring the air for asbestos. The uranium that was found in the same area is low in radioactivity. This radioactivity is potentially harmful only if inhaled; the radioactivity is not strong enough to adequately penetrate one's skin. Air monitoring is also being done to assess the level of airborne radioactivity, if any, and to assess whether there are small amounts of uranium present as a dust in the air. The only possibility for exposure is to those soldiers that are in the direct vicinity on

top or outside the berm, and preliminary tests show that there is no exposure. Despite this demonstration of no exposure, the Stronghold command is taking steps to decrease the possibility of airborne exposures even further.

(U) "The radioactivity from the uranium poses minimal health risk. First, the level of radioactivity from the source is low. Second, no one is near enough to the source to be exposed to it. And, third, anyone getting close to it (directly in the cordoned area) will not be there long enough to receive an appreciable dose," says CPT [redacted], the radiation expert on the team.

(U) Currently, the CHPPM-Europe team is thoroughly monitoring other areas of the Stronghold. To date, they have not identified any harmful substances to which soldiers and airmen are exposed during the course of their normal duties. Once all of the lab results have been received and interpreted, a final report will be issued. Any questions/concerns that soldiers and airmen have regarding health and the environment at Stronghold Freedom can be referred to COL [redacted] or LTC [redacted] through CPT [redacted], 5th SFG (A) Environmental Science Officer.

(U) ~~(C//REL)~~ APPENDIX G

OPERATIONAL RISK MANAGEMENT ESTIMATE TABLES

G-1

(U) ~~(S//REL)~~ APPENDIX G. OPERATIONAL RISK ESTIMATE SUMMARY TABLE

(U) ~~(S//REL)~~ Final Environmental Site Characterization and Operational Health Risk Assessment, Stronghold Freedom, Karshi Khanabad Airfield, Uzbekistan, 27 October – 27 November 2001

(U) ~~(C//REL)~~ Table G-1. OEH Risk Summary and Recommended Controls

Chemical Hazard	Environmental Media	Hazard Ranking			Operational Risk Estimate		Potential Health Outcome		Controls
		Hazard Type	Hazard Probability	Hazard Severity	Risk Level	Confidence	During Deployment	After Deployment	
Methylene Chloride	Soil	Health Threat	Unlikely	Negligible	Low	Medium	Irritation to eyes, skin; fatigue, weakness, lightheadedness, numbness in extremities.	Cancer	Minimize soil contact, limit soil excavation.
Xylenes (mixed)	Soil	Health Threat	Unlikely	Negligible	Low	Medium	Respiratory irritation, lightheadedness, nausea, headache, confusion, ataxia, weakness, dizziness, vomiting, incoordination, loss of appetite, tremors, disturbed vision, salivation, difficulty breathing.	Dermatitis, liver and kidney damage, cardiac arrhythmias, reproductive and developmental effects.	Minimize soil contact, limit soil excavation.
1,2,4-Trimethylbenzene	Soil gas	Health Threat	Seldom	Marginal	Low	Medium	Irritation of skin, eyes, nose, and throat, bronchitis, drowsiness, fatigue, nausea.	Anemia	Minimize soil contact, limit soil excavation. If excavation must be conducted, use PPE and monitor.
Benzene	Soil gas	Health Threat	Seldom	Marginal	Low	Medium	Irritation of eyes, skin, nose, respiratory system; weakness/exhaustion; headache, nausea, fatigue, loss of appetite, staggered	Bone marrow depression, leukemia, cancer	Minimize soil contact, limit soil excavation. If excavation must be conducted, use PPE and monitor.

(U) ~~(S//REL)~~ Final Environmental Site Characterization and Operational Health Risk Assessment, Stronghold Freedom, Karshi Khanabad Airfield, Uzbekistan, 27 October – 27 November 2001

Chemical Hazard	Environmental Media	Hazard Ranking			Operational Risk Estimate		Potential Health Outcome		Controls
		Hazard Type	Hazard Probability	Hazard Severity	Risk Level	Confidence	During Deployment	After Deployment	
							gait, dermatitis.		
Ethylbenzene	Soil gas	Health Threat	Seldom	Marginal	Low	Medium	Irritation of eyes, skin, mucous membranes; headache, dermatitis, narcosis, coma.	Cancer	Minimize soil contact, limit soil excavation. If excavation must be conducted, use PPE and monitor.
Xylenes (mixed)	Soil gas	Health Threat	Seldom	Marginal	Low	Medium	Respiratory irritation, lightheadedness, nausea, headache, confusion, ataxia, weakness, dizziness, vomiting, incoordination, loss of appetite, tremors, disturbed vision, salivation, difficulty breathing.	Dermatitis, liver and kidney damage, cardiac arrhythmias, reproductive and developmental effects.	Minimize soil contact, limit soil excavation. If excavation must be conducted, use PPE and monitor.
Propylbenzene	Soil gas	Health Threat	Seldom	Marginal	Low	Medium	Irritation of eyes, nose, throat, and skin; CNS depression, incoordination, nausea, general anesthetic effects.		Minimize soil contact, limit soil excavation. If excavation must be conducted, use PPE and monitor.
Boron	Water	Health Threat	Frequent	Negligible	Moderate	Medium	Vomiting, abdominal pain, diarrhea, headache, tremors, restlessness, weakness, convulsions, skin rash, liver effects.	CNS and liver effects.	Conduct periodic monitoring if used for drinking water purposes.
1,2,4-	Ambient air	Health	Occasional	Negligible	Low	Low	Irritation of skin,	Anemia	Continue to

(U) ~~(S//REL)~~ Final Environmental Site Characterization and Operational Health Risk Assessment, Stronghold Freedom, Karshi Khanabad Airfield, Uzbekistan, 27 October – 27 November 2001

Chemical Hazard	Environmental Media	Hazard Ranking			Operational Risk Estimate		Potential Health Outcome		Controls
		Hazard Type	Hazard Probability	Hazard Severity	Risk Level	Confidence	During Deployment	After Deployment	
Trimethylbenzene		Threat					eyes, nose, and throat, bronchitis, drowsiness, fatigue, nausea.		monitor ambient air.
PM_{10}	Ambient air	Health Threat	Likely	Marginal	Moderate	Low	Irritation of eyes, skin, throat, and respiratory system.		Mitigate health threat by paving or graveling dirt roads, wet down berms and dirt areas during periods of high winds, use dust masks if necessary. Continue monitoring.
Kerosene Fraction (JP-5/JP-8)	Ambient Air	Health Threat	Occasional	Negligible	Low	Low	Headache, lightheadedness, loss of appetite, poor coordination, and difficulty concentrating.		Continue to monitor ambient air.

(U) ~~(S//REL)~~ Final Environmental Site Characterization and Operational Health Risk Assessment, Stronghold Freedom, Karshi Khanabad Airfield, Uzbekistan, 27 October – 27 November 2001

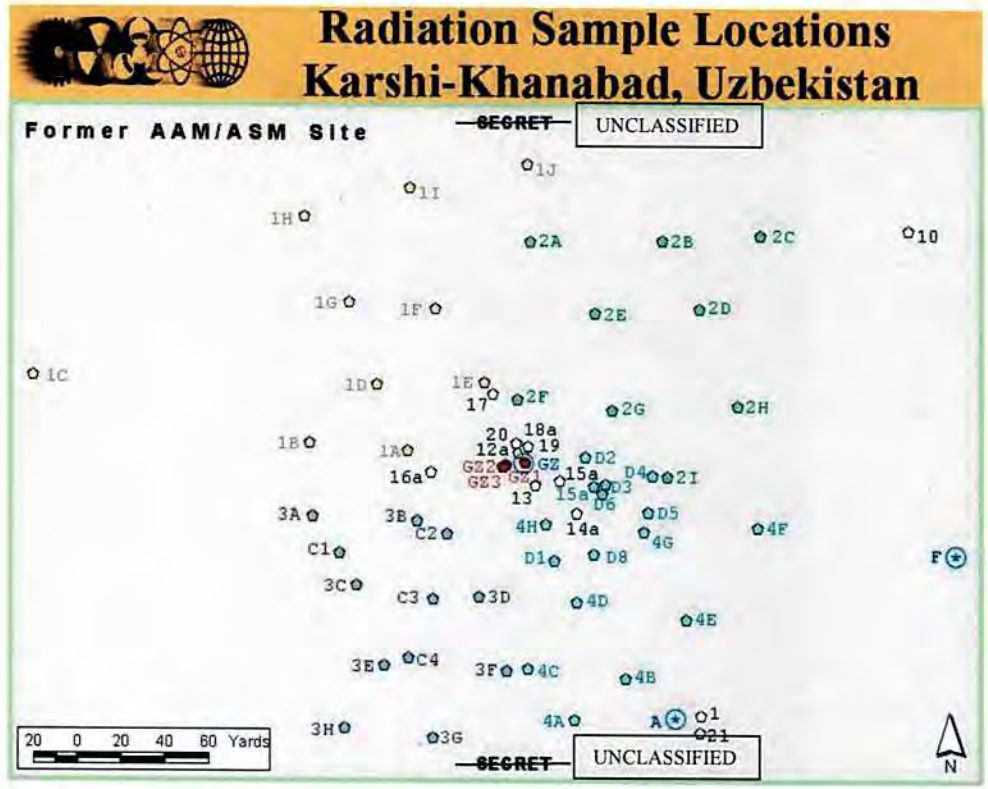


Figure. (U) ~~(S//REL)~~ Site 1 (AAM/ASM) Radiation Sampling Locations, Karshi Khanabad Airfield

(U) APPENDIX H

HANTAVIRUS SURVEY RESULTS

H-1

MCHB-AE-EN (40-5f)

MEMORANDUM FOR Commander, Stronghold Freedom, Attention: Preventive Medicine Detachment

SUBJECT: (U) CHPPM Europe Report on laboratory testing of submitted rodent specimens for presence of Hantavirus infection

1. (U) EXECUTIVE SUMMARY: There is very little health risk from the presence of the tested Hantavirus strains Tula, Puumala, Hantaan, and Dobrava provided no processing failures occurred before and during shipment (see paragraph 5a.) and the sampling was representative (see paragraph 5b.). A rodent control program should be implemented to prevent other potential rodent borne health risks. Procedures for blood sampling should be improved as described in paragraph 7.

2. (U) PROCESSING OF SPECIMENS. Box with specimens arrived at CHPPM-EUR on the morning of 12 Dec 2001. The dry ice fill was still in good shape. Decision to use the State of Baden-Württemberg health office laboratory at Stuttgart was made within 30 minutes. Security measures concerning origin of samples (e.g., location) was maintained throughout the entire process. Location information provided to the laboratory included only a general region of the world, specifically Central Asia, to ensure proper primers could be prepared. Box with specimens was then hand carried to Stuttgart lab and specimens were immediately placed in freezer. Preparation of first specimen for PCR analysis started the same day.

3. (U) LABORATORY METHODS. Enclosure 1 provides laboratory methodology.

4. (U) RESULTS.

a. All results of the PCR analysis are summarized by field identification number on Table H-1 (next page). No positive samples were found in any of the submitted specimens.

Table H-1. (U) Hantavirus PCR Test Results - Stronghold Freedom.

Trap	Date	PCR Tula	PCR Puumala	PCR Hantaan	Dobrava PCR
4	30-Nov-01	neg	Neg	neg	neg
18	30-Nov-01	neg	Neg	neg	neg
25	30-Nov-01	neg	Neg	neg	neg
32	1-Dec-01	neg	Neg	neg	neg
40	1-Dec-01	neg	Neg	neg	neg
43	1-Dec-01	neg	Neg	neg	neg
50	1-Dec-01	neg	Neg	neg	neg
55	1-Dec-01	neg	Neg	neg	neg
64	3-Dec-01	neg	Neg	neg	neg
70	3-Dec-01	neg	Neg	neg	neg
71	3-Dec-01	neg	Neg	neg	neg
84	3-Dec-01	neg	Neg	neg	neg
90	4-Dec-01	neg	Neg	neg	neg
91	4-Dec-01	neg	Neg	neg	neg
93	4-Dec-01	neg	Neg	neg	neg
94	4-Dec-01	neg	Neg	neg	neg
96	4-Dec-01	neg	Neg	neg	neg
98	4-Dec-01	neg	Neg	neg	neg
99	4-Dec-01	neg	Neg	neg	neg
100	4-Dec-01	neg	Neg	neg	neg
102	4-Dec-01	neg	Neg	neg	neg
104	4-Dec-01	neg	Neg	neg	neg
108	4-Dec-01	neg	Neg	neg	neg
110	4-Dec-01	neg	Neg	neg	neg
111	4-Dec-01	neg	Neg	neg	neg
115	4-Dec-01	neg	Neg	neg	neg
119	4-Dec-01	neg	Neg	neg	neg
120	7-Dec-01	neg	Neg	neg	neg
122	7-Dec-01	neg	Neg	neg	neg
123	7-Dec-01	neg	Neg	neg	neg
124	7-Dec-01	neg	Neg	neg	neg
125	7-Dec-01	neg	Neg	neg	neg
128	7-Dec-01	neg	Neg	neg	neg
130	7-Dec-01	neg	Neg	neg	neg
132	7-Dec-01	neg	Neg	neg	neg
133	7-Dec-01	neg	Neg	neg	neg
135	7-Dec-01	neg	Neg	neg	neg
138	7-Dec-01	neg	Neg	neg	neg
151	9-Dec-01	neg	Neg	neg	neg
152	9-Dec-01	neg	Neg	neg	neg
155	9-Dec-01	neg	Neg	neg	neg
157	9-Dec-01	neg	Neg	neg	neg
159	9-Dec-01	neg	Neg	neg	neg
161	9-Dec-01	neg	Neg	neg	neg
162	9-Dec-01	neg	Neg	neg	neg
163	9-Dec-01	neg	Neg	neg	neg
172	9-Dec-01	neg	Neg	neg	neg
178	9-Dec-01	neg	Neg	neg	neg
179	9-Dec-01	neg	Neg	neg	neg

b. (U) Results of antibody screening revealed two positive results for Hantavirus strain Hantaan. PCR was repeated for these two mice with negative result.

Table H-2. (U) Hantavirus Antibody Screening Test Results - Stronghold Freedom

Trap	Date	IgG-Hantaan	IgG-Puumala
4	30-Nov-01	neg	neg
18	30-Nov-01	neg	neg
25	30-Nov-01	neg	neg
32	1-Dec-01	neg	neg
40	1-Dec-01	neg	neg
43	1-Dec-01	neg	neg
50	1-Dec-01	neg	neg
55	1-Dec-01	neg	neg
64	3-Dec-01	neg	neg
70	3-Dec-01	neg	neg
71	3-Dec-01	neg	neg
84	3-Dec-01	neg	neg
90	4-Dec-01	neg	neg
91	4-Dec-01	neg	neg
93	4-Dec-01	pos	neg
94	4-Dec-01	pos	neg
96	4-Dec-01	neg	neg
98	4-Dec-01	neg	neg
99	4-Dec-01	neg	neg
100	4-Dec-01	neg	neg
102	4-Dec-01	neg	neg
104	4-Dec-01	neg	neg
108	4-Dec-01	neg	neg
110	4-Dec-01	neg	neg
111	4-Dec-01	neg	neg
115	4-Dec-01	neg	neg
119	4-Dec-01	neg	neg
120	7-Dec-01	neg	neg
122	7-Dec-01	neg	neg
123	7-Dec-01	neg	neg
124	7-Dec-01	neg	neg
125	7-Dec-01	neg	neg
128	7-Dec-01	neg	neg
130	7-Dec-01	neg	neg
132	7-Dec-01	neg	neg
133	7-Dec-01	neg	neg
135	7-Dec-01	neg	neg
138	7-Dec-01	neg	neg
151	9-Dec-01	neg	neg
152	9-Dec-01	neg	neg
155	9-Dec-01	neg	neg
157	9-Dec-01	neg	neg
159	9-Dec-01	neg	neg
161	9-Dec-01	neg	neg
162	9-Dec-01	neg	neg
163	9-Dec-01	neg	neg
172	9-Dec-01	neg	neg
178	9-Dec-01	neg	neg
179	9-Dec-01	neg	neg

5. (U) DISCUSSION.

a. (U) Reliability of results. During laboratory processing, all measures were taken to ensure the target RNA was not destroyed or inhibited. Positive controls were obtained in each gel run. Processing of the specimen prior to arrival at CHPPM-EUR, however, was out of our control. For example, if trapped mice were left unrefrigerated or frozen over a period of more than 24 hrs after killing them, the target RNA could already have been inactivated before shipment, thus creating false negatives. CHPPM-EUR can not accept any responsibility for such potential deviations from the protocol.

b. (U) Statistical Significance. A total of 49 mice can only be considered statistically significant and representative sampling if it covered a relatively small area or a uniform mouse habitat. Hantavirus has been shown to occur in quite small foci. If the 49 specimens were collected from diverse habitats over a larger area, such small foci may not have been sampled. Responsibility for representative sampling is with the personnel performing the sampling.

c. (U) Significance of antibody screening results. The two positive serology results indicate only that Hantavirus strain Hantaan has been present in the area where the two mice were trapped. It allows no conclusion on the actual infection status of the mice. This can only be confirmed by tissue testing , preferably lung tissue, or by virus isolation. In this case, repeated PCR testing indicated that no actual infection was existing in the trapped mice with positive serology results.

d. (U) Risk assessment. If no processing failures have occurred and the sampling was representative, the risk for presence of the tested Hantavirus strains Tula, Puumala, Hantaan, and Dobrava in the sampling area is very low. Results also indicate that Hantavirus has been in the area and may still be existing in mouse populations not tested. If soldiers move into areas which have not been representatively sampled, a higher Hantavirus risk may exist.

6. (U) CONCLUSION. Provided all protocols were followed, there is very little health risk and Stronghold Freedom personnel do not need to implement any special Hantavirus protection measures at this time. Antibody screening results indicate that Hantavirus has been in the area and may still be existing in mouse populations not tested. If there is any doubt with respect to proper processing of the dead mice that would have generated false negatives or questions regarding the statistical significance of sampling, Stronghold Freedom personnel should comply with recommendations provided in Enclosure 2 as a precautionary measure.

7. (U) RECOMMENDATIONS. Ensure Hantavirus sampling protocols are followed to exclude false negatives as discussed above. If there is any doubt regarding the validity of this sampling by field personnel, ensure personnel are properly trained on Hantavirus protection measures as outlined in Appendix A. Implement a professional rodent control program to minimize other potential health risks from large rodent populations. In the future, blood samples should be centrifuged and only sera be shipped in frozen stage. If a centrifuge is not available, whole blood samples should be shipped in non-frozen stage.

8. (U) TECHNICAL ASSISTANCE. Points of contact for further technical information are Dr. [redacted]; e-mail [redacted] or CPT [redacted] email [redacted], Entomological Sciences Division, CHPPM-Europe.

2 Enclosures

1. (U) Laboratory Methods
2. (U) Extracted from Armed Forces Pest Management Board Technical Information Memorandum No. 41, Protection from Rodent-Borne Diseases with Special Emphasis on Occupational Exposure to Hantavirus.

Enclosure 1

LABORATORY METHODS
As provided by Rainer Oehme, lab manager Stuttgart.

(U) For detection of Hanta-Virus in rodents, RNA was extracted from homogenized lung tissues by the acid guanidinium thiocyanate-phenol-chloroform method (Chomczynski and Sacchi 1987; Boom et al. 1990).
(U) The Reverse Transcription was performed with the Primer described by Schmaljohn et al. 1985).
(U) Hantavirus RNA was detected by RT-PCR with a genus-reactive S-segment primer pair (S1-S2) as described (Sibold et al. 1995).

(U) RT-primer: 5'>TAGTAGTAGACTCC<3' (Schmaljohn et al. 1985)
first PCR: Hantavirus specific primer pair: (Sibold et al. 1995)
S1: 5'>CCAAGTGG(AG)CA(AG)AC(AT)GC(AT)GA(CT)TGG<3'
S2: 5'>CTGAG(CT)TCAGG(AG)TCCAT(AG)TC(AG)TC<3'

(U) For the species-specific detection three nested primer pairs were used:

(U) nested PCR: Tula specific primer pair: (Sibold et al. 1999)
MaS4F: 5'>CATCACAGG(GC)(CT)TGCACTTGCAAT<3'
MaS5C: 5'>TCCTGAGGCTGCAAGGTCAA<3'

(U) nested PCR: Puumala specific primer pair: (Sibold et al. 1995)
PS1n: 5'>ATGGAAAA(AG)GA(AG)TGCCC(AC)TT<3'
PS2n: 5'>ACCAT(CT)TC(CT)TT(GT)CCCCATTC<3'

(U) nested PCR: Hantaan specific primer pair: (Xiao et al. 1994)
DS2: 5'>TC(AC)AC(AT)GCCTCTTTTCCCCAG<3'
S 598: 5'>ATGAAGGCAGAAGAGATTACACC(AT)GG<3'

(U) The amplified products were sequenced with the genetic analizer ABI Prism 310

(U) Antibody screening:

(U) The rodent sera were tested by an ELISA for human sera (Progen Art.Nr. 911179: Hanta-Virus Puumala IgG) and (Progen Art.Nr. 903179 Hanta-Virus Hantaan IgG) with a peroxidase-labeled anti-mouse antibody (The Binding Site, Code: AP271).
The variations in the test are also described by Bowen et al. 1997 and Niklasson et al. 1995

(U) LITERATURE CITED:

(U) Boom R, Sol CJ, Salimans MM, Jansen CL, Wertheim-van Dillen PM, van der Noordaa J.Rapid and simple method for purification of nucleic acids.
J Clin Microbiol. 1990 Mar;28(3):495-503.

(U) Bowen MD, Gelbmann W, Ksiazek TG, Nichol ST, Nowotny N.Puumala virus and two genetic variants of Tula virus are present in Austrian rodents.
J Med Virol. 1997 Oct;53(2):174-81.

(U) Chomczynski P, Sacchi N. Single-step method of RNA isolation by acid guanidinium thiocyanate-phenol-chloroform extraction.
Anal Biochem. 1987 Apr;162(1):156-9.

(U) Niklasson B, Hornfeldt B, Lundkvist A, Bjorsten S, Leduc J.Temporal dynamics of Puumala virus antibody prevalence in voles and of nephropathia epidemica incidence in humans.
Am J Trop Med Hyg. 1995 Aug;53(2):134-40.

(U) Schmaljohn CS, Hasty SE, Dalrymple JM, LeDuc JW, Lee HW, von Bonsdorff CH, Brummer-Korvenkontio M, Vaheri A, Tsai TF, Regnery HL, et al.
Antigenic and genetic properties of viruses linked to hemorrhagic fever with renal syndrome.
Science. 1985 Mar 1;227(4690):1041-4.

(U) Sibold C, Sparr S, Schulz A, Labuda M, Kozuch O, Lysy J, Kruger DH, Meisel H. Genetic characterization of a new hantavirus detected in Microtus arvalis from Slovakia.
Virus Genes. 1995;10(3):277-81.

(U) Sibold C, Meisel H, Kruger DH, Labuda M, Lysy J, Kozuch O, Pejcoch M, Vaheri A, Plyusnin A. Recombination in Tula hantavirus evolution: analysis of genetic lineages from Slovakia.
J Virol. 1999 Jan;73(1):667-75.

(U) Xiao SY, Leduc JW, Chu YK, Schmaljohn CS. Phylogenetic analyses of virus isolates in the genus Hantavirus, family Bunyaviridae.
Virology. 1994 Jan;198(1):205-17.

(U) Enclosure 2

(U) Extracted from
Armed Forces Pest Management Board
TECHNICAL INFORMATION MEMORANDUM NO. 41
PROTECTION FROM RODENT-BORNE DISEASES
WITH SPECIAL EMPHASIS ON OCCUPATIONAL EXPOSURE TO HANTAVIRUS

(U) NOTE: THE FULL TEXT OF TIM 41 IS AVAILABLE AT:
http://www.afpmb.org/pubs/tims/tims.htm

(U) CHAPTER 4
PRECAUTIONS FOR PERSONNEL CAMPING, HIKING, OR CONDUCTING OTHER OUTDOOR ACTIVITIES

1. (U) Individuals on military installations may participate in a variety of outdoor activities where rodents are present. The risk of acquiring hantavirus outdoors is greatly reduced compared to entering rodent-contaminated buildings or structures. However, since some contact with rodents may occur outdoors, the following precautions, recommended by CDC (see Reference 5 for additional information), should be taken:

a. (U) Avoid coming in contact with rodents and rodent burrows or disturbing dens (such as pack rat nests).

b. (U) Do not use cabins or other enclosed shelters that are rodent infested until they have been appropriately cleaned and disinfected (this includes field latrines that are used infrequently or seasonally). See Chapter 7 for cleanup procedures.

c. (U) Do not pitch tents or place sleeping bags in areas near rodent feces or burrows or near possible rodent shelters (e.g., garbage dumps or woodpiles).

d. (U) If possible, do not sleep on the bare ground. Use a cot with a sleeping surface at least 12 inches above the ground. Use tents with floors.

e. (U) Keep food in rodent-proof containers.

f. (U) Promptly bury (or--preferably--burn and bury, when in accordance with local requirements) all garbage and trash, or discard in covered trash containers.

g. (U) Use only bottled water or water that has been disinfected by filtration, boiling,chlorination, or iodination for drinking, cooking, washing dishes, and brushing teeth.

2. (U) Soldiers bivouacking in the field are at minimal risk if the procedures listed above are followed. However, if soldiers are required to use seasonal buildings or shelters, then an initial inspection for rodents or signs of rodent contamination should be made before troops enter and begin to disturb dust and furnishings inside. Care must also be taken when entering bunkers, sheds or other structures that are infrequently used. If evidence of rodents (live or dead animals, droppings, urine or nesting material) is found inside the building, then entry and use should be prohibited until rodent contamination is removed or personnel wear equipment that protects them against hantavirus infection.

3. (U) Individuals using horse stables should be at low risk of acquiring hantavirus. Rodents that carry hantavirus are usually not found in large numbers in stalls where horses are kept, but

significant numbers of rodents may be encountered in barns, feed bins, or other structures in and around the stables. If rodent contamination is encountered, adequate precautions should be taken to limit access to the contaminated areas until proper inspection, cleanup and decontamination can be performed (see Chapters 6, 7 and 9).

(U) CHAPTER 6
PROTECTION FOR PERSONNEL INSPECTING OR WORKING IN RODENT-CONTAMINATED BUILDINGS AND STRUCTURES

1. (U) Many rodents naturally seek food and shelter in buildings and other structures on military installations. Available food is always an attractant, whether the building is occupied or vacant. Frequently used buildings on the cantonment, such as offices, clinics and hospitals, and other administrative facilities, are usually infested with commensal rodents, primarily the house mouse, *Mus musculus*, and/or the Norway rat, *Rattus norvegicus*. Neither of these two species has been implicated as a reservoir of hantaviruses causing Hantavirus Pulmonary Syndrome in the United States, but Norway rats may serve as reservoirs of Seoul virus, both in CONUS and in overseas areas. Warehouses, bunkers, and other storage facilities may be subject to infestation by both commensal and field rodents. Because it is not always possible for workers to determine which species of rodents are infesting buildings and structures, certain precautions should be taken to prevent hantavirus infection.

2. (U) Some occupational workers on the installation may infrequently come in contact with rodent-contaminated buildings or structures. Most such contact will be incidental but, occasionally, heavily-contaminated areas may be encountered. If visible signs of rodent infestations are present (droppings, dead rodents, nesting materials), then the worker should leave the building and request that an inspection team evaluate the contaminated site.

a. (U) Workers should be informed about the symptoms of hantavirus and be given detailed guidance on preventive measures. Information should include how to recognize rodent infestations or contamination.

b. (U) Workers who develop a febrile or respiratory illness within 45 days of the last exposure to rodent-infested or contaminated areas should seek medical attention immediately and inform the attending physician of the potential occupational risk of hantavirus infection.

c. (U) The following personal protective measures should be taken:

(1) (U) Coveralls, work shoes or boots, and gloves should always be worn, not only to protect the individual from rodent contamination, but from other environmental contaminants as well.

(2) (U) If working in confined spaces (e.g., crawl spaces under buildings), goggles should be worn.

(3) (U) If there are signs of rodents, and the work to be performed in the building cannot be postponed for proper inspection and decontamination, then respirators fitted with HEPA filters should be worn.

(4) (U) Adequate handwashing facilities should be provided at the site, especially if rodent-contaminated dust and soil are encountered.

(U) NOTE. The procedures listed above are for situations where contact with rodents is infrequent or light rodent contamination is encountered. Degrees of contamination are often

difficult to determine since there are no standards by which to judge. Light contamination may mean several rodent droppings, whereas heavy contamination may be characterized by the presence of rodent droppings throughout the facility. If the level of contamination is unclear, then the procedures described below should be followed.

3. (U) Certain installation personnel may be tasked with inspecting buildings for rodent contamination. Medical personnel and pest controllers may be requested to perform inspections following complaints from workers or building managers who have encountered rodents. Personnel from other directorates (e.g., Public Works, Range Control) may be detailed to inspect infrequently used buildings or buildings that are going to be demolished. These individuals may be at higher risk than occupational workers, who may infrequently encounter rodent-contaminated buildings. The following procedures should be adopted by those individuals who perform rodent inspections.

a. (U) A baseline serum sample, preferably drawn at the time of employment, should be available from all persons whose occupations involve frequent rodent contact. The serum sample should be stored at -20 ° C.

b. (U) Workers in potentially high-risk settings should be informed about the symptoms of hantavirus and given detailed guidance on preventive measures. Information should include how to recognize rodent infestations or contamination.

c. (U) Workers who develop a febrile or respiratory illness within 45 days of the last exposure to rodent-infested or contaminated areas should seek medical attention immediately and inform the attending physician of the potential occupational risk of hantavirus infection.

d. (U) The minimum personal protective equipment should include:

(1) Coveralls.

(2) Gloves. Either disposable or cleanable, reusable (e.g., nitrile). Cloth or leather glovesshould not be worn since they are difficult to decontaminate.

(3) Goggles. These afford eye protection from direct contact with rodent-contaminated soil or dust or from gloved hands that have handled rodent-contaminated materials.

(4) Work boots or shoes.

(5) Half or full-face respirator with HEPA cartridges. This device protects against breathing aerosolized rodent urine or fecal particles containing virus and also provides protection of the mouth and nose from gloved hands that have handled rodent-contaminated materials.

e. (U) All individuals who are required to wear a respirator must be evaluated and fit-tested by their appropriate medical authority. Respirators that require fit-testing (i.e., those that have a tight seal around the respirator edges) are not considered protective if facial hair interferes with the face seal, since proper fit cannot be assured. Respirators that rely on positive pressure for protection (e.g., PAPR - Powered Air Purifying Respirator) can be worn by individuals with or without facial hair. In fact, if the individual will be wearing a respirator for a prolonged period of time (e.g., more than one hour), then a positive pressure type device may be more comfortable since it provides a flow of air across the face. This is particularly desirable under hot conditions. An added feature of a PAPR is that it accommodates wearing glasses under the device.

f. (U) Provisions should be made for individuals to decontaminate their hands at the inspection site prior to resuming normal duties (e.g., driving a vehicle away from the site, taking a break to smoke, eat or drink, using toilet facilities). This can be accomplished by washing the gloved hands with soap and water, either provided in the building or carried on the vehicle, or with a dilute solution of household disinfectant; gloves can also be decontaminated with spray

disinfectant. Three tablespoons of household bleach in one gallon of water may be used in place of a commercial disinfectant. At the end of the inspection procedure, the outside of the respirator and goggles should be sprayed with a mild disinfectant, such as Lysol or a dilute solution of water and hypochlorite bleach. When using a chlorine solution, avoid spilling the mixture on clothing or other items that may be damaged. Thoroughly wash hands with soap and water after removing gloves.

(U) CHAPTER 7
CLEANUP PROCEDURES FOR RODENT CONTAMINATED BUILDINGS

1. (U) The building to be decontaminated should be declared off limits to unauthorized personnel. This can be done by placing placards and a tape barrier around the structure. All entrances should be closed except for one designated entry/exit point. A econtamination station should be located in the immediate vicinity of the exit door (within the taped boundary) for personnel exiting the cleanup area. Windows should be opened to allow dissipation of contaminants that may have aerosolized inside the building. More information on decontamination of personnel following cleanup can be found in Chapter 9.

2. (U) Areas with evidence of rodent infestations (e.g., rodent droppings, chewed materials) should be thoroughly treated with a wet disinfectant and cleaned to reduce the possibility of exposure to hantavirus-infected materials. Cleaning procedures must be performed in a manner that limits the potential for aerosolization of rodent-contaminated dust and other materials. Follow these procedures when cleaning up rodent infestations.

a. (U) A site supervisor should be designated. This individual will act as team leader to ensure that all cleanup personnel are adequately briefed on the risks of acquiring hantavirus and the proper wearing of personal protective clothing and equipment. The site supervisor will provide a safety briefing to all individuals involved in the cleanup. See Appendices C and D for a Health and Safety Plan and a Hantavirus Safety Briefing.

b. (U) All personnel involved in cleaning should wear protective equipment and clothing -- individually fit-tested respirators (with high-efficiency particulate air (HEPA) filters) or powered air purifying respirators (PAPR), goggles, solvent-resistant gloves, coveralls, and boots. More information on personal protection and personal decontamination procedures can be found in Chapter 9.

c. (U) Spray the floors and those portions of the walls where evidence of rodent activity is present with a general-purpose disinfectant solution. Special attention must be given to dead rodents, rodent nests, droppings, food, or other items that have been contaminated by rodents; thoroughly soak these items with the disinfectant and place them in a double plastic bag. Use a shovel to remove the soaked material. Seal the plastic bags(s) when full or when the cleanup is completed and dispose of them in accordance with the installation's medical practices. More information on disposal of waste can be found in Appendix E.

(U) Do not attempt to remove dry contaminated materials with a vacuum or by sweeping.
(U) NOTE: an exception to vacuuming can be made if the vacuum is equipped with a HEPA filter to capture minute particles of dust and other materials.

d. (U) Mop all floors with water containing a general-purpose disinfectant and detergent. Clean carpets and upholstered furniture by steam cleaning or shampooing with commercial-

grade equipment. Carpets can be effectively disinfected with household disinfectant, but care should be taken not to damage them with hypochlorite solutions. If rodents have nested inside furniture and the nests are not accessible for decontamination, the furniture should be sprayed with a disinfectant, then removed and burned. Spray all buildings with dirt floors with a general-purpose disinfectant before use. Remove rodent nests from furniture or equipment and decontaminate. Materials that cannot be decontaminated should be disposed of by burning or burying in accordance with the installation's medical practices.

e. (U) Disinfect all work surfaces, storage cabinets, drawers, etc., by washing them with a solution of water containing a general-purpose disinfectant and a detergent followed by an additional wiping-down with disinfectant.

f. (U) Launder any potentially contaminated clothing and bedding in hot water with a detergent. Use rubber or plastic gloves when handling the dirty laundry, then wash and disinfect the gloves in the decontamination solution. Items that cannot be laundered may be dry cleaned. NOTE: clothing and bedding should first be treated with a disinfectant to prevent contamination of individuals involved in laundering or dry cleaning.

(U) APPENDIX I

RISK COMMUNICATION GUIDELINES

I-1

RISK COMMUNICATION GUIDELINES

(U) Academic research has proven numerous times that the effectiveness of any risk communication process is directly related to the quality of the relationship between "messenger" and "receiver." A strong relationship, and therefore a successful risk communication process must be based on a high level of trust between the Camp Freedom commander/ staff and the service members. Other factors contributing to this relationship include the level of leadership commitment to effective communication, and the communication skill level of designated spokespersons.

(U) In addition, experience and research has shown that incorporating risk communication as early as possible in the Operational Risk Management (ORM) process will:

a) (U) Help strengthen relationships necessary to more effectively discuss risk issues, both real and perceived;
b) (U) Help identify existing and potential concerns/ knowledge/ perceptions, which will help in communication planning/ strategy efforts;
c) (U) Increase the likelihood that communication efforts will be successful;
d) (U) Help minimize service member concerns; and
e) (U) Garner service member support in the event of a crisis.

(U) In essence, trust, credibility, and a commitment to effective communication are essential in the ORM process because if risk-related information is not provided clearly without raising alarm, the information itself is useless.

Critical Risk Communication Guidelines

1. **(U) Risk communication is a process, not an event.**
   While risk-related information must be provided, the communication itself is but one element of a deliberative process that involves not only delivering the message(s), but receiving feedback, and making adjustments to the process on an ongoing basis.
2. **(U) Camp Freedom leaders and designated spokespersons must fully support the risk communication process.**
   Leadership commitment to this process provides the foundation for the relationship between the Camp Freedom Commander/ staff and all service members (discussed above) that is necessary for information/ direction to be delivered without causing undue concern. This commitment will help ensure that appropriate messages are developed/ delivered, so that service members understand and believe that protection of their health/ safety is the focus of ORM decisions.
3. **(U) Communicate clearly and honestly.**
   All information – written and verbal, must be presented at the audience's level of understanding. Providing familiar examples and concrete information can help put the risk in perspective. Those who deliver risk-related information must be currently serving at Camp Freedom, because he/ she is accessible and can speak from personal experience, which adds to the credibility necessary to be most effective. In addition, identified spokespersons must be honest, yet as positive as possible.

4. **(U) Remember that soldiers are human beings first, service members second.** Remembering this will help demonstrate the care and concern necessary to establish/ strengthen the relationships that effective risk communication efforts need to be successful.
5. **(U) Listening to service member concerns is equally (if not more important) than the information being delivered.**
   Although the Camp Freedom Commander/ staff needs to share risk-related information in order to protect service members, obligating time/ resources to gather information **from** service members throughout the risk communication process offers several important benefits:

   a. (U) Ensures that communication products and messages are appropriate and are truly addressing those issues of most concern to service members;
   b. (U) Demonstrates to service members that their opinions and concerns are important to those making decisions to protect their health/ safety; and
   c. (U) Provides service members an opportunity to voice their concerns, and to obtain accurate information first-hand.

Risk Communication Outline

(U) In order to be effective, the basic steps listed below should be conducted in this order:

1) (U) Briefly identify the goal/ purpose of the risk communication strategy.
What is to be achieved through risk communication efforts? (e.g., Establish dialogue? Strengthen relationships? Change behavior? Simply inform?)

2) (U) Identify uncertainties/ constraints.
Are resources limited? Does the Commander/ staff support a risk communication process? What people are available to support a risk communication process (are there enough)? Where do risk communication efforts fall within the list of all priorities? Is time limited? Etc.

3) **(U) Identify stakeholder groups.**
Who is or could be affected by the outcome of decisions/ actions about potential risks at Camp Freedom? Service members perform different functions necessary to operate Camp Freedom (e.g., intelligence, food service, etc.), and may have different concerns, may rely on different communication methods, may have a different average education level, etc.

4) (U) Identify stakeholder concerns/ interests.
Effective messages and communication methods can only be developed when interests/ concerns of each stakeholder group are identified through surveys, interviews, focus groups, etc.

5) (U) Develop communication messages and methods appropriate to each stakeholder group.

The interests/ concerns of each stakeholder group will determine what messages and tools will be effective with each one. Methods could include fact sheets, flyers/ posters, staff meeting updates, town hall meetings, mandatory briefings, etc. Again, those who deliver risk-related information must be currently serving at Camp Freedom, because he/ she is accessible and can speak from personal experience, which adds to the credibility necessary to be most effective. When developing messages/ methods, service members will expect you to:

- **(U) *Tell them what you know.*** Service members will likely be concerned in varying degrees, and will expect to hear all the facts – both good and bad, about the potential risks. They need this information in order to clearly understand what actions need to be taken in response to potential threats. Along with that, service members need a certain level of reassurance that Camp Freedom leadership is committed to doing everything possible to ensure service member safety. Therefore, Camp Freedom leaders must develop and use no more than three (3) overarching "key" messages that capture what service members need to know in order to alleviate their concerns. These key messages should be used to reinforce leadership's commitment to service members' safety, as well as their commitment to being open and honest with all information – both good and bad. Key messages must address underlying concerns (which were identified as outlined in Step #4 above); be short (10-15 words each); be as positive as possible; be clear/ understandable (no jargon, acronyms, etc.); and be simple (6^{th} to 8^{th} grade reading level). The next 'layer' of key messages should present to service members those actions critical to their personal safety. For instance, possible key messages might be:
    - Do not dig in areas known to contain jet fuel.
    - Stay away from Site 1.
    - Avoid areas with noticeable odors, if possible.

  Again, these messages should follow basic risk communication principles so that your goal (see step #1 above) is accomplished, and that people recognize the importance of providing you with information you deem critical.
- **(U) *Tell them what you don't know.*** Risk communication research indicates that people generally understand and accept that you don't know the answer to every question. By sharing information about what you don't know, you demonstrate that the risk communication process is transparent, and that you're being as open with details as possible. In addition, doing so provides an opportunity to solicit critical information from service members (e.g., where odors are found, etc.). At the same time, telling what you don't know allows you to share your plan of action, which demonstrates your commitment to their continued health and safety.
- **(U) *Tell them what you're planning to do to find out and when you'll provide that information.*** This step is critical to reaffirm that you are committed to keeping service members informed as new information arises. This step also demonstrates your commitment to follow through on promises, and that you recognize that ***when*** you provide the information is just as important as the information itself.

6) **(U) Evaluate the effectiveness of the overall risk communication process.** This ensures that future risk communication efforts are responsive to the needs of each stakeholder group, allows for improvements/ corrections, and will make future risk communication efforts more effective. This information can be obtained through the

feedback methods developed early in the risk communication process (e.g., mandatory briefings, suggestion boxes, etc.)

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