HAFB 05

HYDRO GeoLogic INC.

Received
[illegible] - 1 2005
District 1

Via Federal Express

July 29, 2005

Mr. Cornelius Amindyas
Project Manager
State of New Mexico Environment Department
Hazardous Waste Bureau
5500 San Antonio NE
Albuquerque, New Mexico 87109

Re: Supplemental RFI Work Plan
Holloman Air Force Base, New Mexico
EPA ID# NM6572124422

Dear Mr. Amindyas:

On behalf of Holloman Air Force Base, HydroGeoLogic Inc. is pleased to provide you with two copies of the *Supplemental RCRA Facility Investigation Work Plan, Holloman Air Force Base*, for your review. The work plan describes additional characterization efforts that will be performed at the following sites:

Received
AUG 1 [illegible]
District 1

SWMUs 101 and 109 / LF-10	Old Main Base Landfill
SWMU 105 / LF-19	Golf Course Landfill
SWMU 115 / LF-22	West Area Landfill No. 1
SWMU 108 / LF-23	MOBSS Landfill
SWMU 104 / LF-29	Former Army Landfill
SWMU 113B / DP-30/SD-33	Grease Trap/Cooking Grease Disposal Pits
SWMUs 165/177/179/181 / SS-39	Missile Fuel Spill Area

Please call Dan Holmquist of Holloman Air Force Base at (505) 572-5395 should you have any questions or comments.

Sincerely,

Kenneth J. Cottrell, C.P.G., P.G.
Senior Project Manager

Enclosure

HydroGeoLogic, Inc.
1155 Herndon Parkway • Suite 900 • Herndon, VA 20170 • USA
Tel: (703) 478-5186 • Fax: (703) 471-4180 • http://www.hgl.com

cc: Mr. Daniel Holmquist (w/5 enclosures)
Remedial Project Manager
49 CES/CEV
550 Tabosa Avenue
Holloman AFB, NM 88330-8258

Mr. Rene G. Hefner, P.G., Project Manager (w/o enclosure via e-mail)
HQ AFCEE/ICC

Mr. John P. Hopping, Project Manager (w/o enclosure via e-mail)
HQ ACC/CEVRW

Mr. James L. Haggins, Project Manager (w/o enclosure via e-mail)
HQ ACC/CEVRW

SUPPLEMENTAL RCRA FACILITY INVESTIGATION WORK PLAN HOLLOMAN AIR FORCE BASE ALAMOGORDO, NEW MEXICO

Prepared for

U.S. Air Force Center for Environmental Excellence
3300 Sidney Brooks
Brooks City-Base, Texas 78235-5344

Prepared by

HydroGeoLogic, Inc.
1155 Herndon Parkway, Suite 900
Herndon, Virginia 20170-5545

Contract No. F41624-03-D-8602
Task Order No. 0037

July 2005

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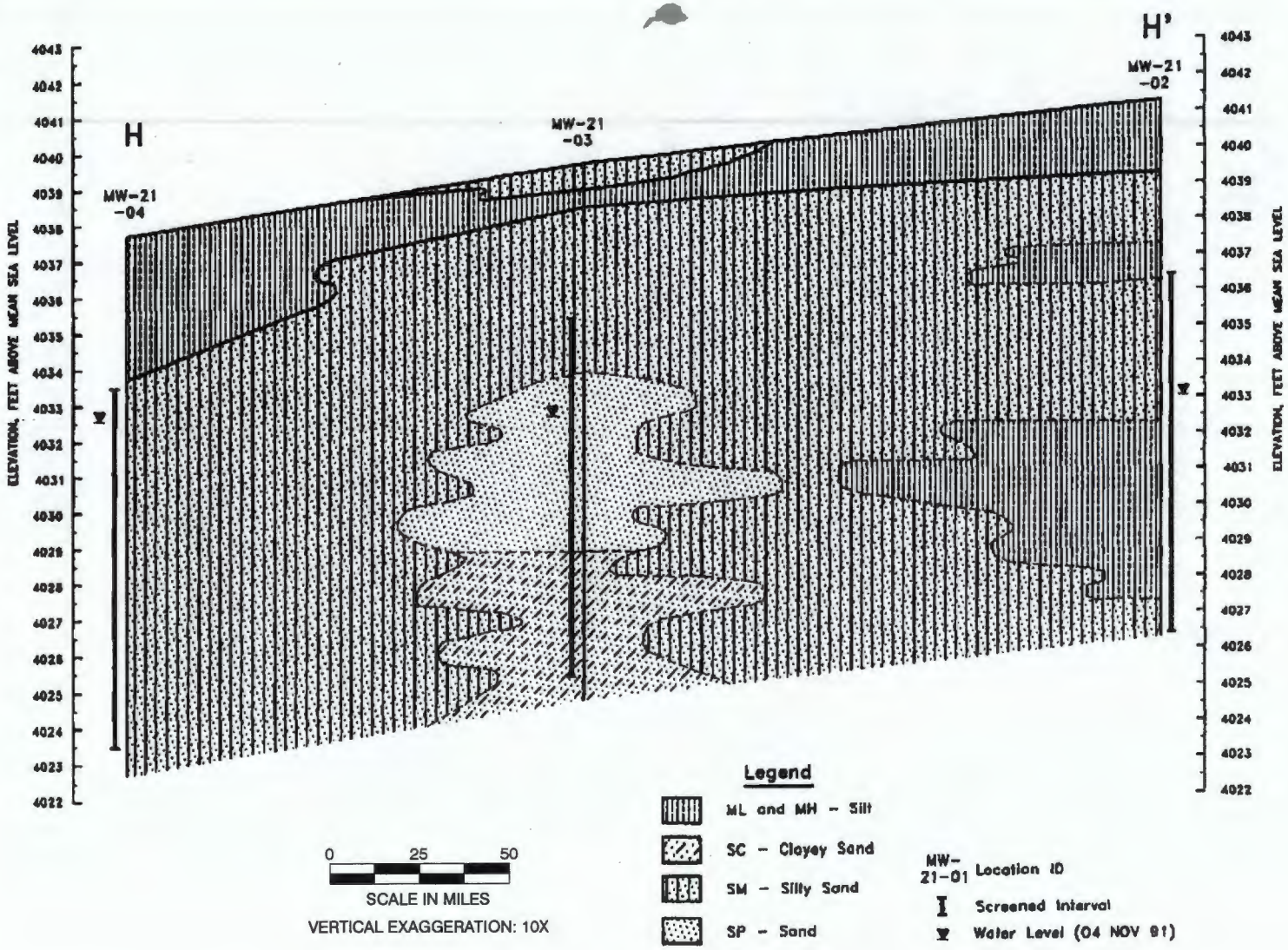

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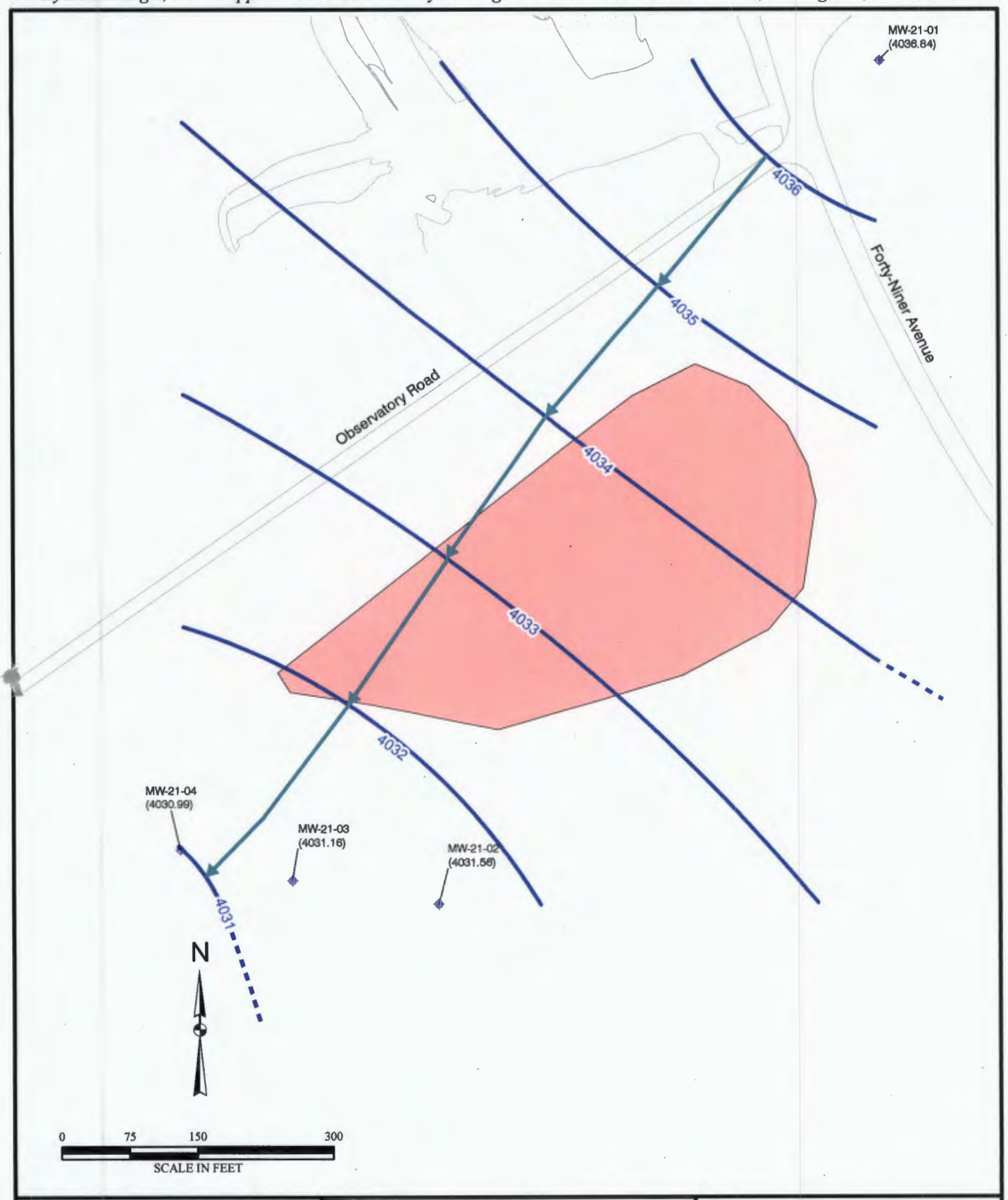
Revised: 07/28/05 TH
Source: Radian, 1992

Figure 2.14
Geologic Cross Section
LF-21



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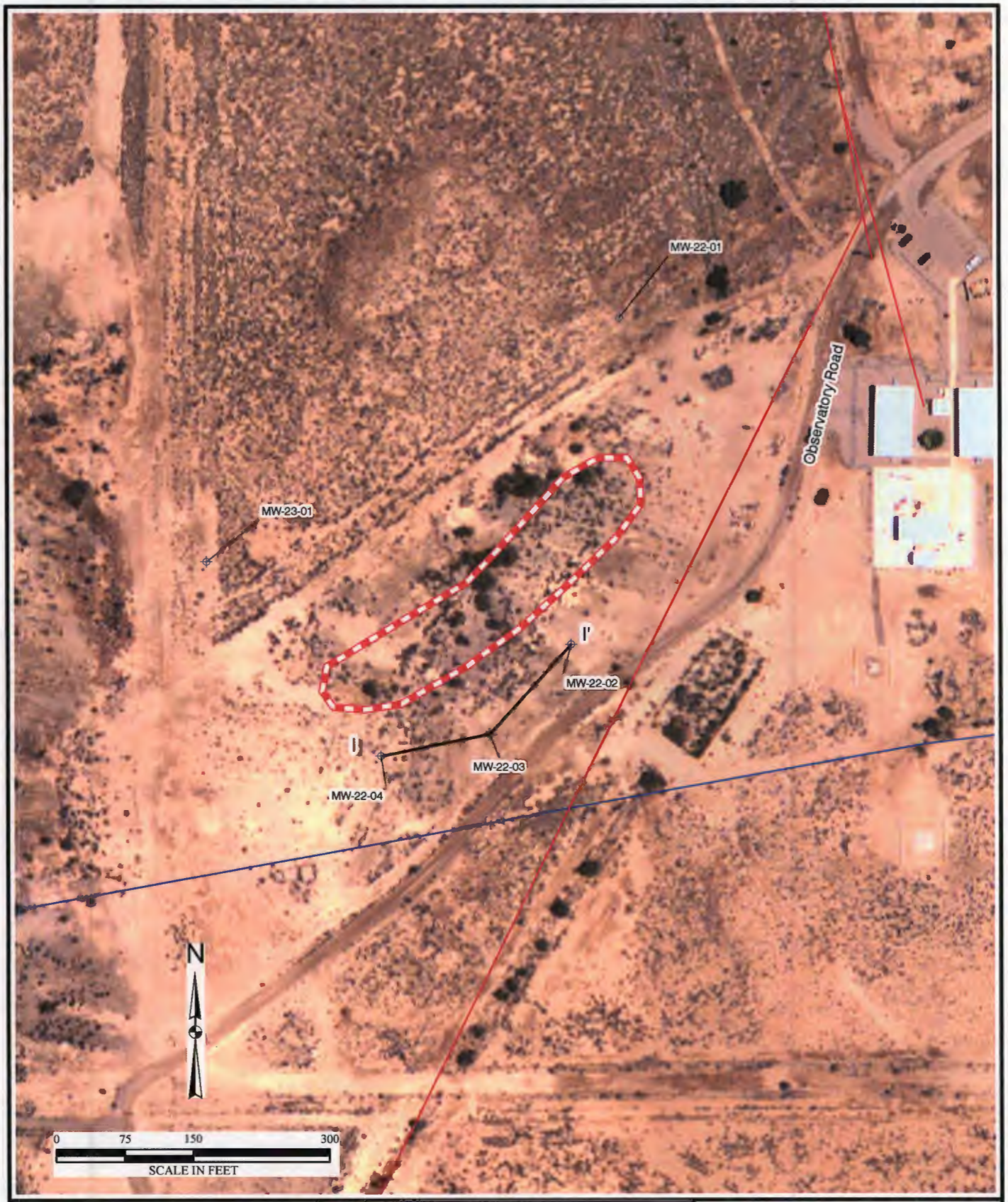
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Operable Unit Boundary (Approx.)
- Monitoring Well
- Groundwater Elevevation Contour
- (4030) Groundwater Elevevation (msl) (Apr. 2003)
- Groundwater Flow

Figure 2.15
Groundwater Elevation Contour Map
LF-21



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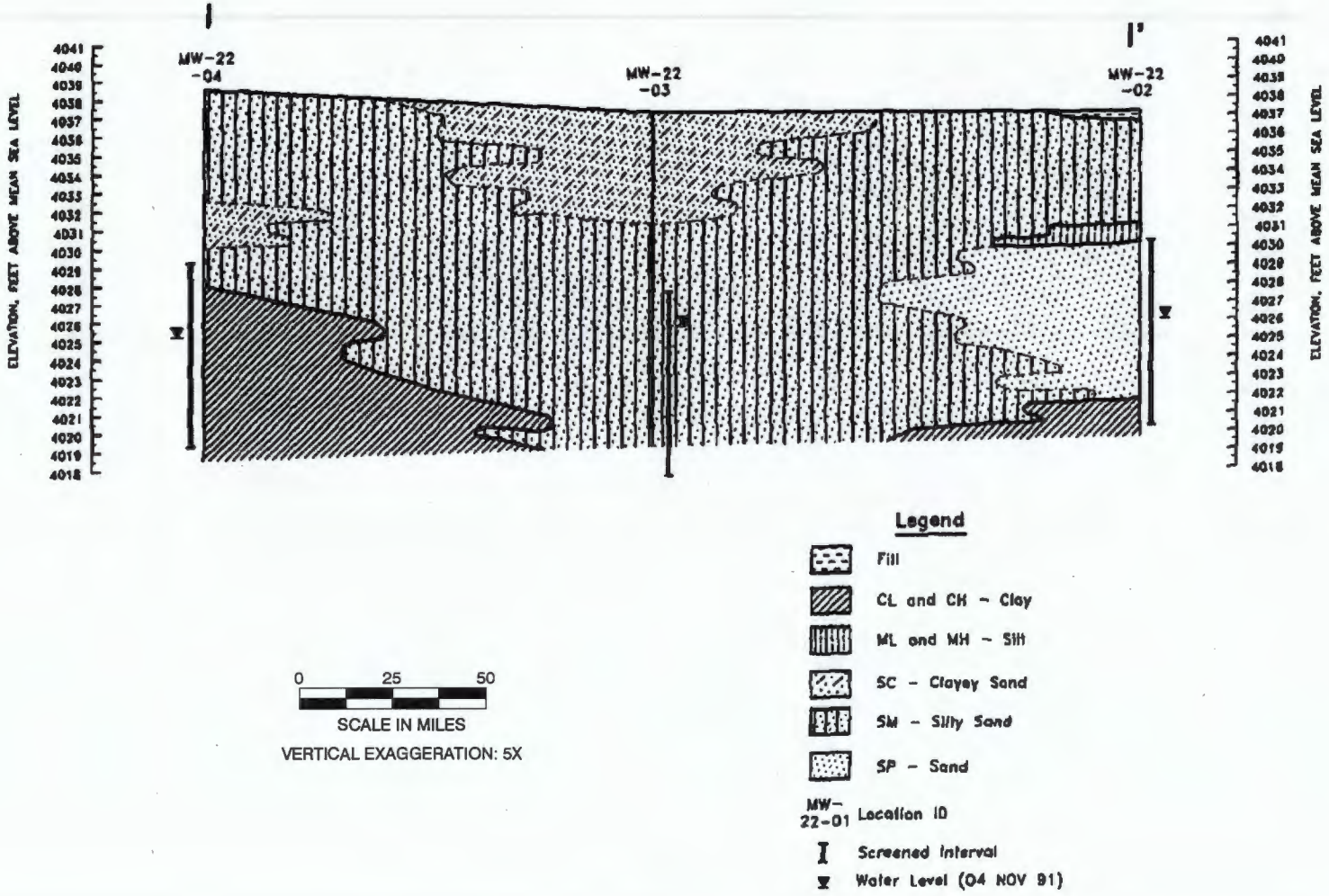
Project: AFC002-037-04-11-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Operable Unit Boundary (Approx.)
- Monitoring Well
- Line of Section
- Water Line
- Electrical

Figure 2.16
Site LF-22



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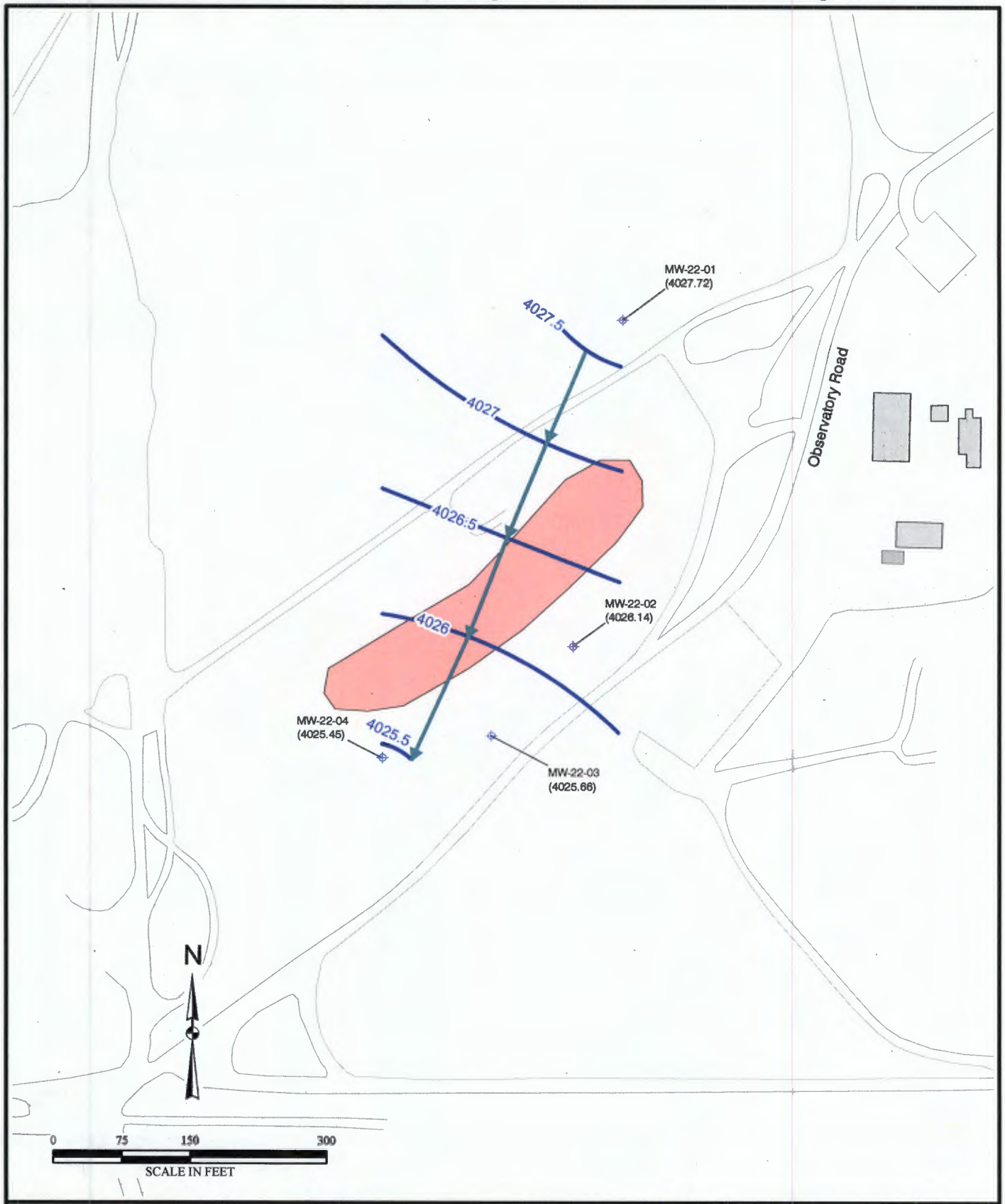
Revised: 07/28/05 TH
Source: Radian, 1992

Figure 2.17
Geologic Cross Section
LF-22



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Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Operable Unit Boundary (Approx.)
- Monitoring Well
- Groundwater Elevevation Contour
- (4026) Groundwater Elevevation (msl) (Apr. 2003)
- Groundwater Flow

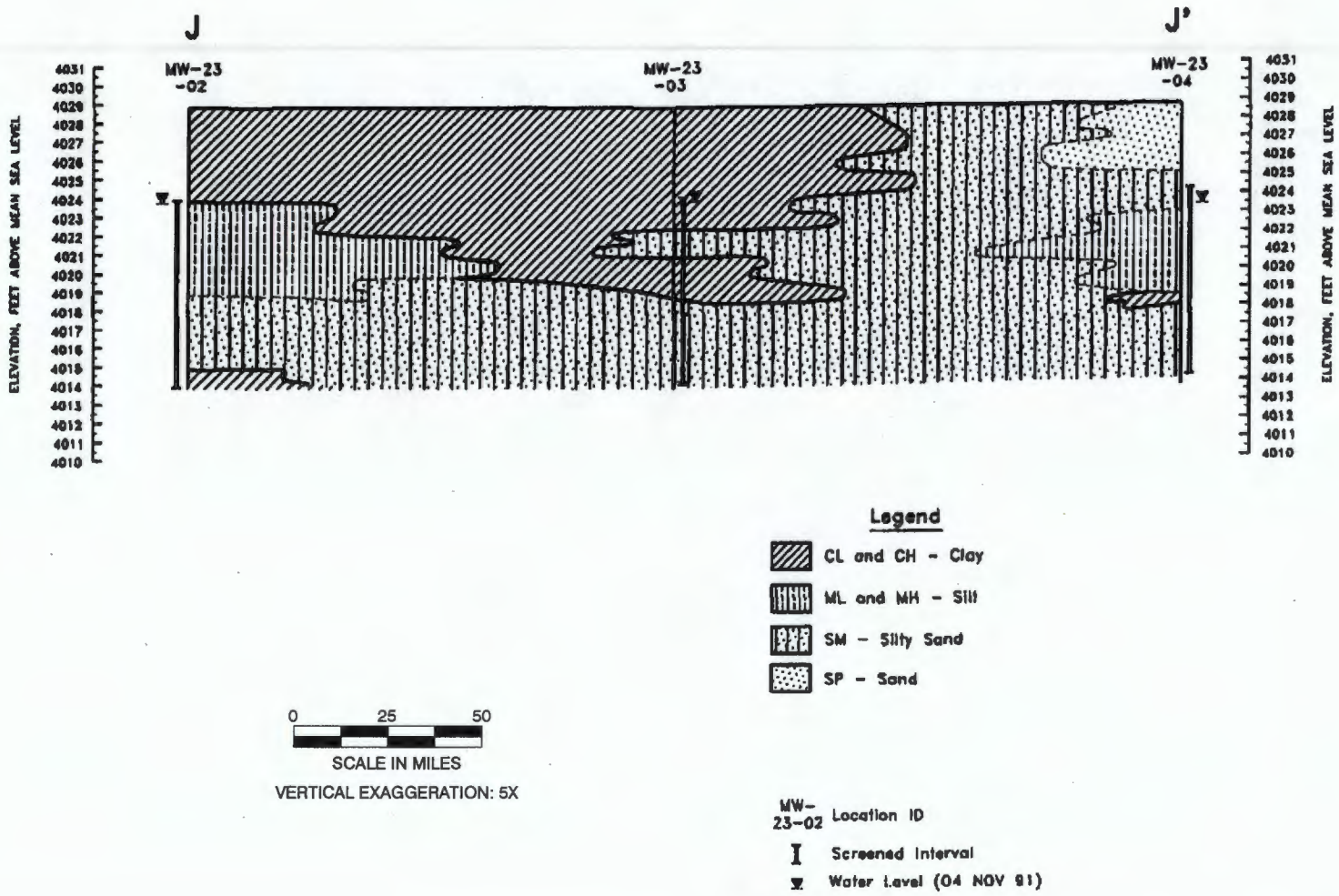
Figure 2.18
Groundwater Elevation Contour Map
LF-22

File X:\AFC002\Holloman_AFB\TO37\Maps\RCRA_Work_Plan\LF-23.mxd
Project: AFC002-037-04-11-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Operable Unit Boundary (Approx.)
- Monitoring Well
- J——J' Line of Section
- Water Line
- Electrical

Figure 2.19
Site LF-23



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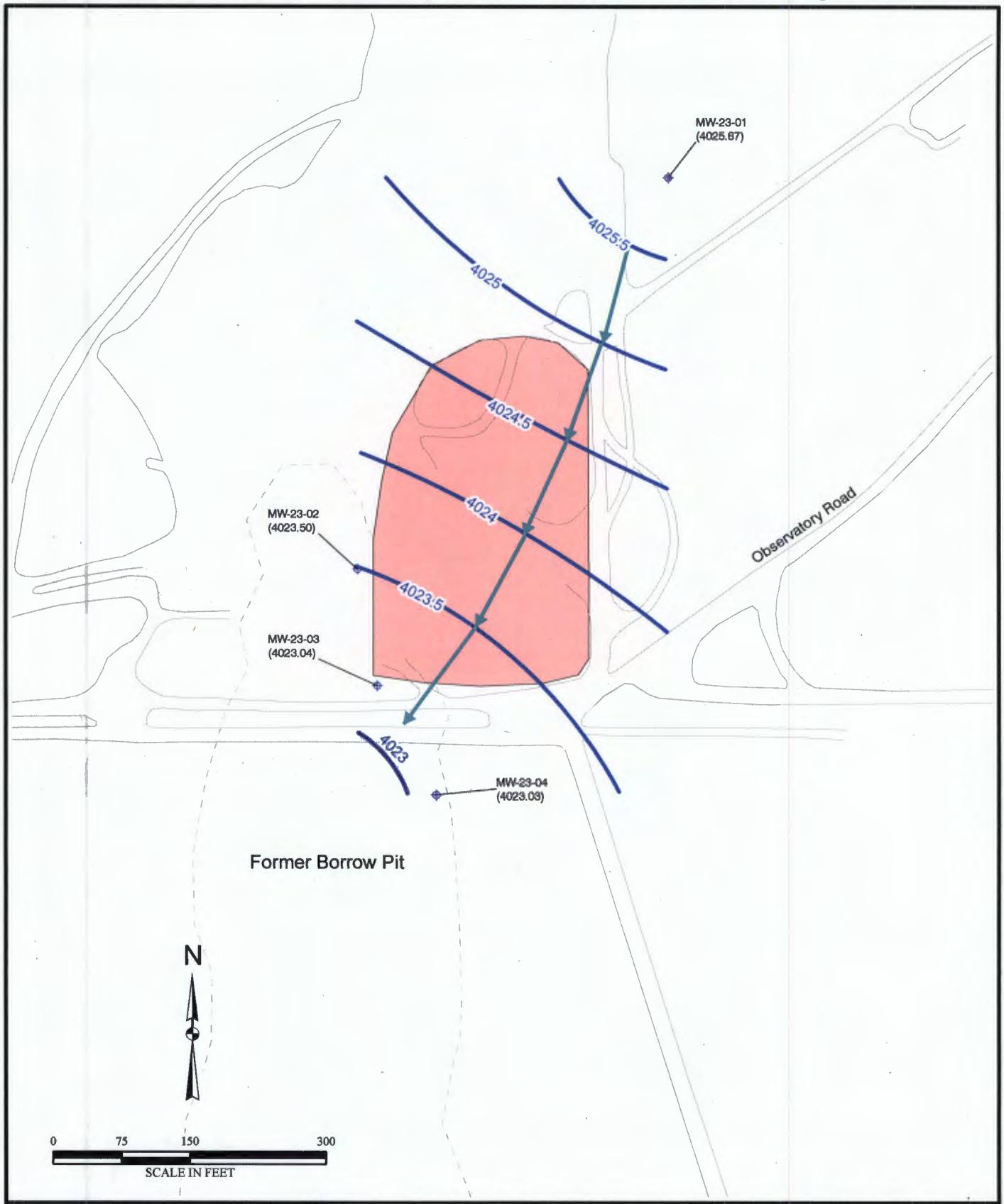
Revised: 07/28/05 TH
Source: Radian, 1992

Figure 2.20
Geologic Cross Section
LF-23



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Project: AFC002-037-04-02-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Operable Unit Boundary (Approx.)
- Monitoring Well
- Groundwater Elevevation Contour
- (4024) Groundwater Elevevation (msl) (Apr. 2003)
- Groundwater Flow

Figure 2.21
Groundwater Elevation Contour Map
LF-23

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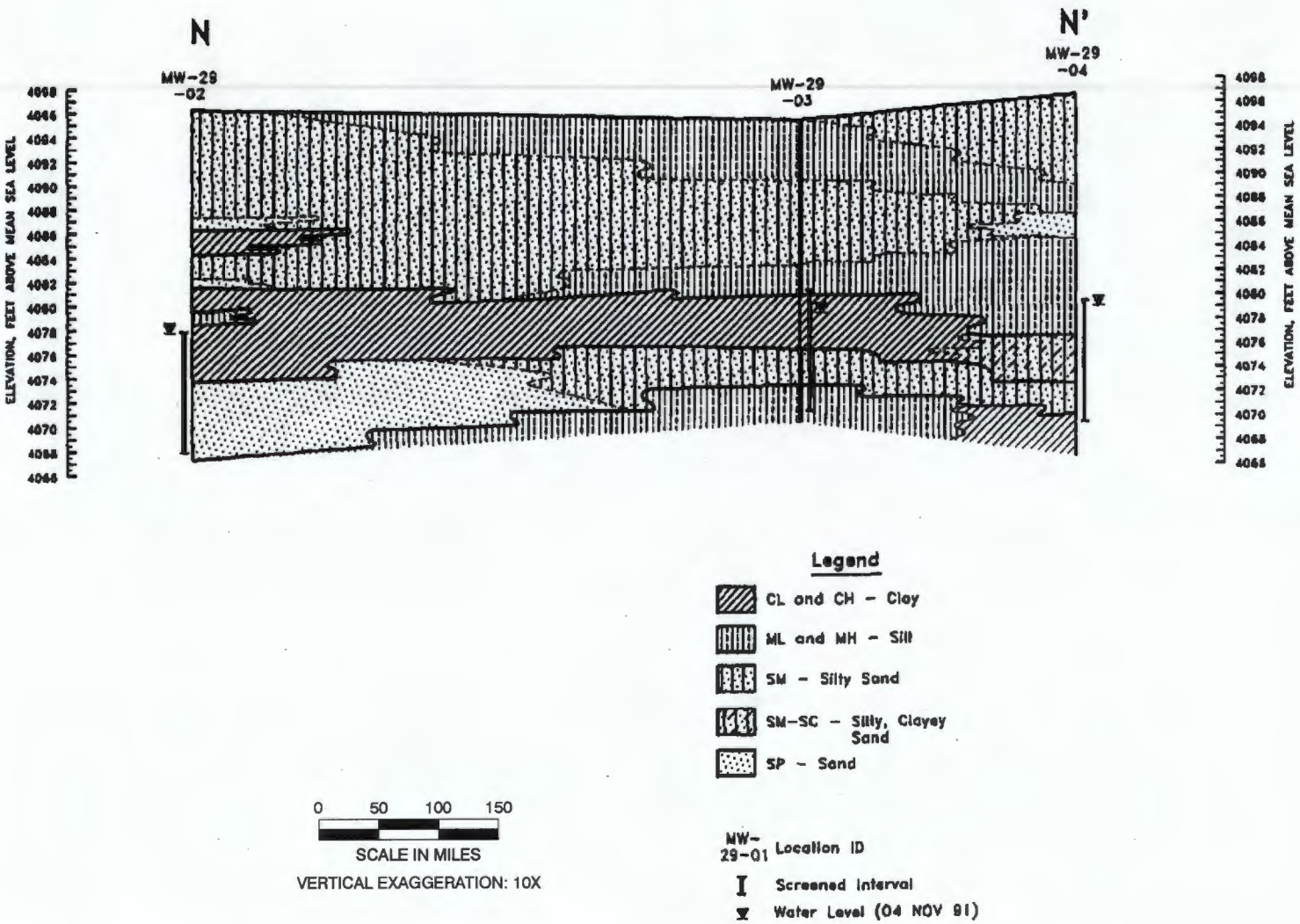
Project: AFC002-037-04-11-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Monitoring Well
- N——N' Line of Section
- Electric
- Potable Water
- Waste Water

Figure 2.22
Site LF-29



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Revised: 07/28/05 TH
Source: Radian, 1992

Figure 2.23
Geologic Cross Section
LF-29

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Project: AFC002-037-04-11-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

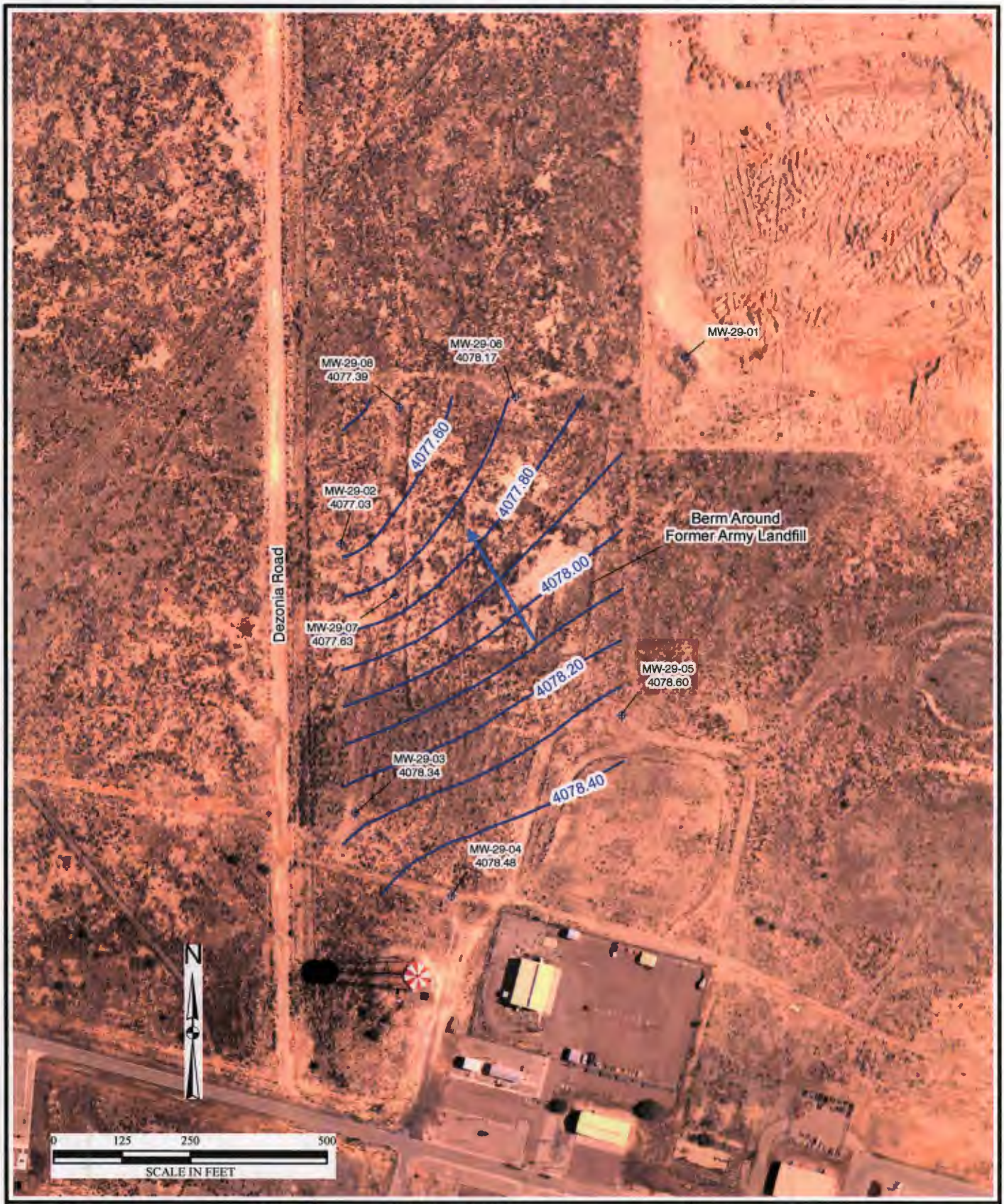
Legend

Monitoring Well

(4077.44) Groundwater Elevation (msl) (Nov. 1991)

Groundwater Flow Direction

Figure 2.24
Groundwater Elevations
1991
LF-29



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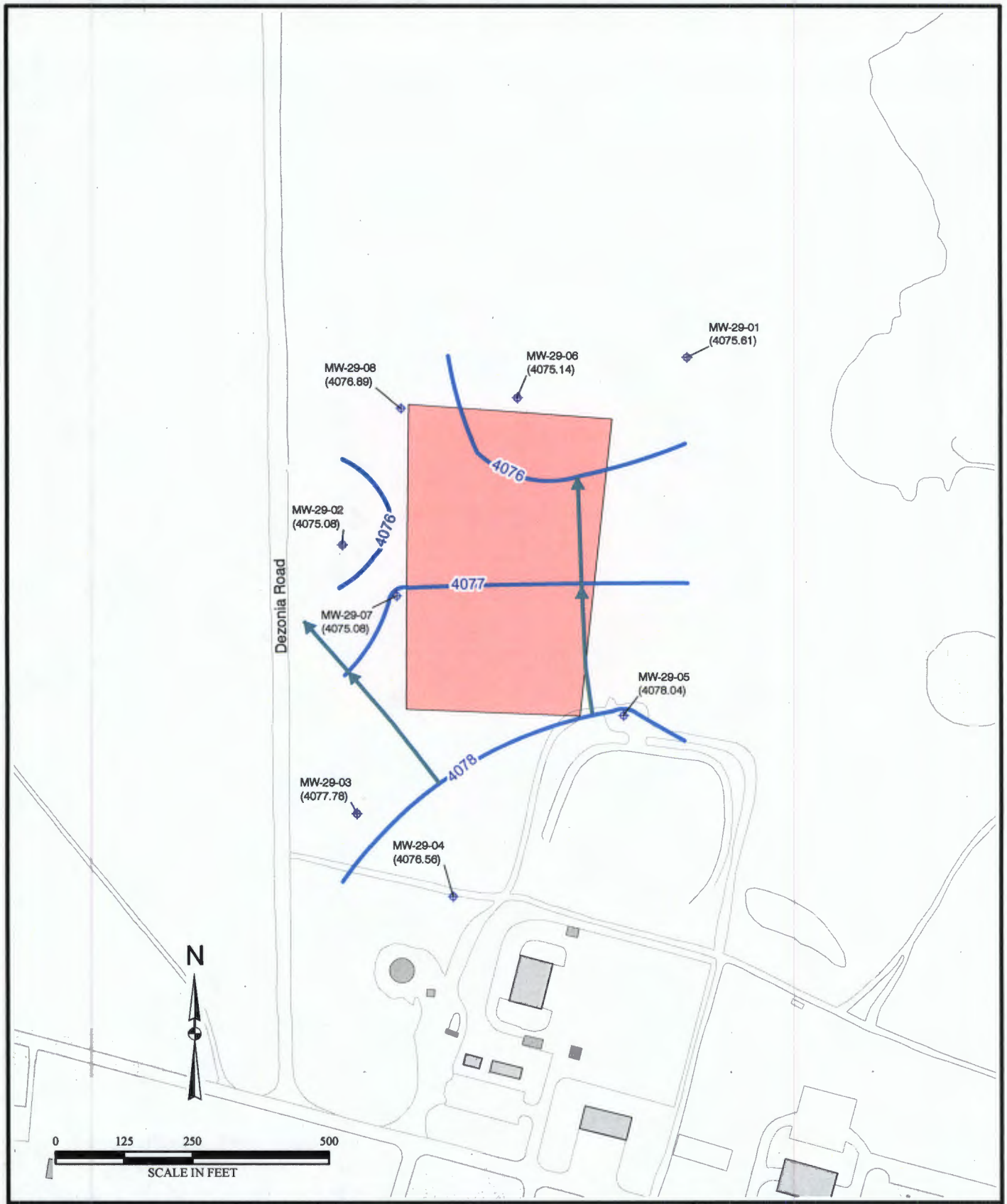
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Monitoring Well
- Groundwater Elevation Contour
- (4077.44) Groundwater Elevation (msl) (1994)
- Groundwater Flow Direction

Figure 2.25
Groundwater Elevation Contour Map
1994
LF-29



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Project: AFC002-037-04-02-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Operable Unit Boundary (Approx.)
- Monitoring Well
- Groundwater Elevevation Contour
- (4077) Groundwater Elevevation (msl) (Apr. 2003)
- Groundwater Flow

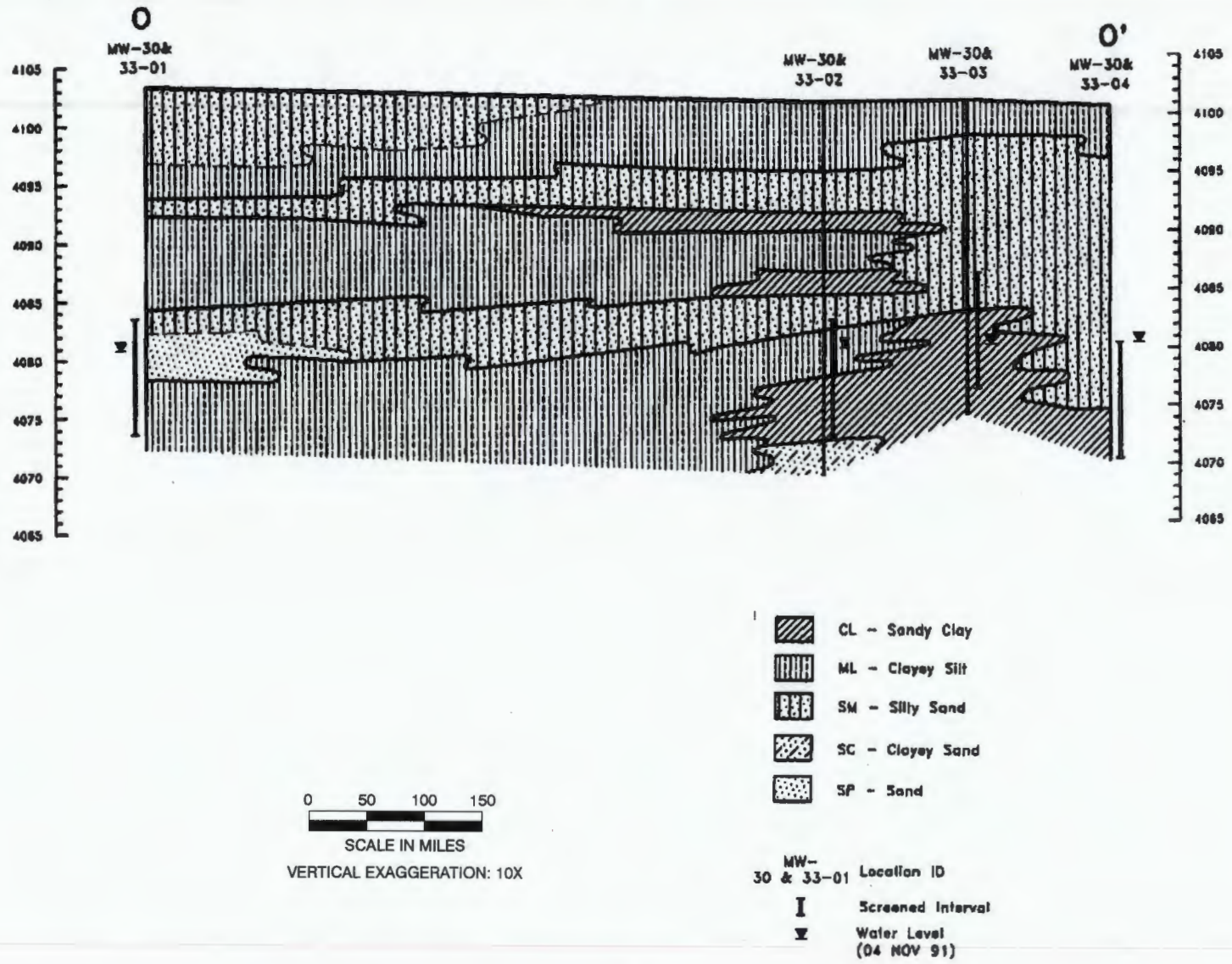
Figure 2.26
Groundwater Elevation Contour Map
LF-29

File X:\AFC002\Holloman_AFB\TO37\Maps\RCRA_Work_Plan\DP30_SD33.mxd
Project: AFC002-037-04-11-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Approximate Location of Trenches
- Monitoring Well
- Soil Boring
- O—O' Line of Section
- Electric

Figure 2.27
Site DP-30/SD-33



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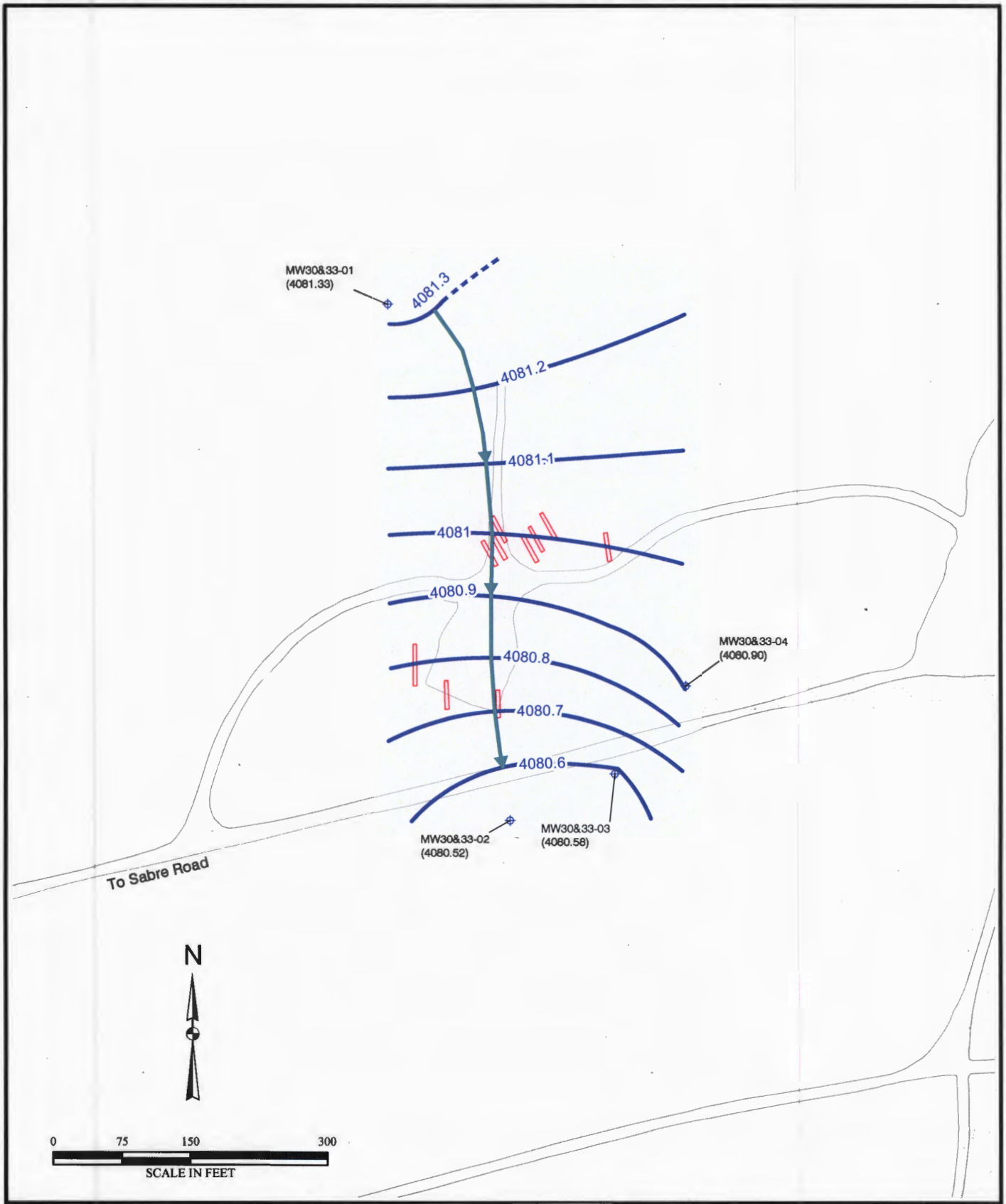
Project: AFC002-037-04-11-02
Revised: 07/28/05 TH
Source: Radian, 1992

Figure 2.28
Geologic Cross Section
DP-30/SD-33



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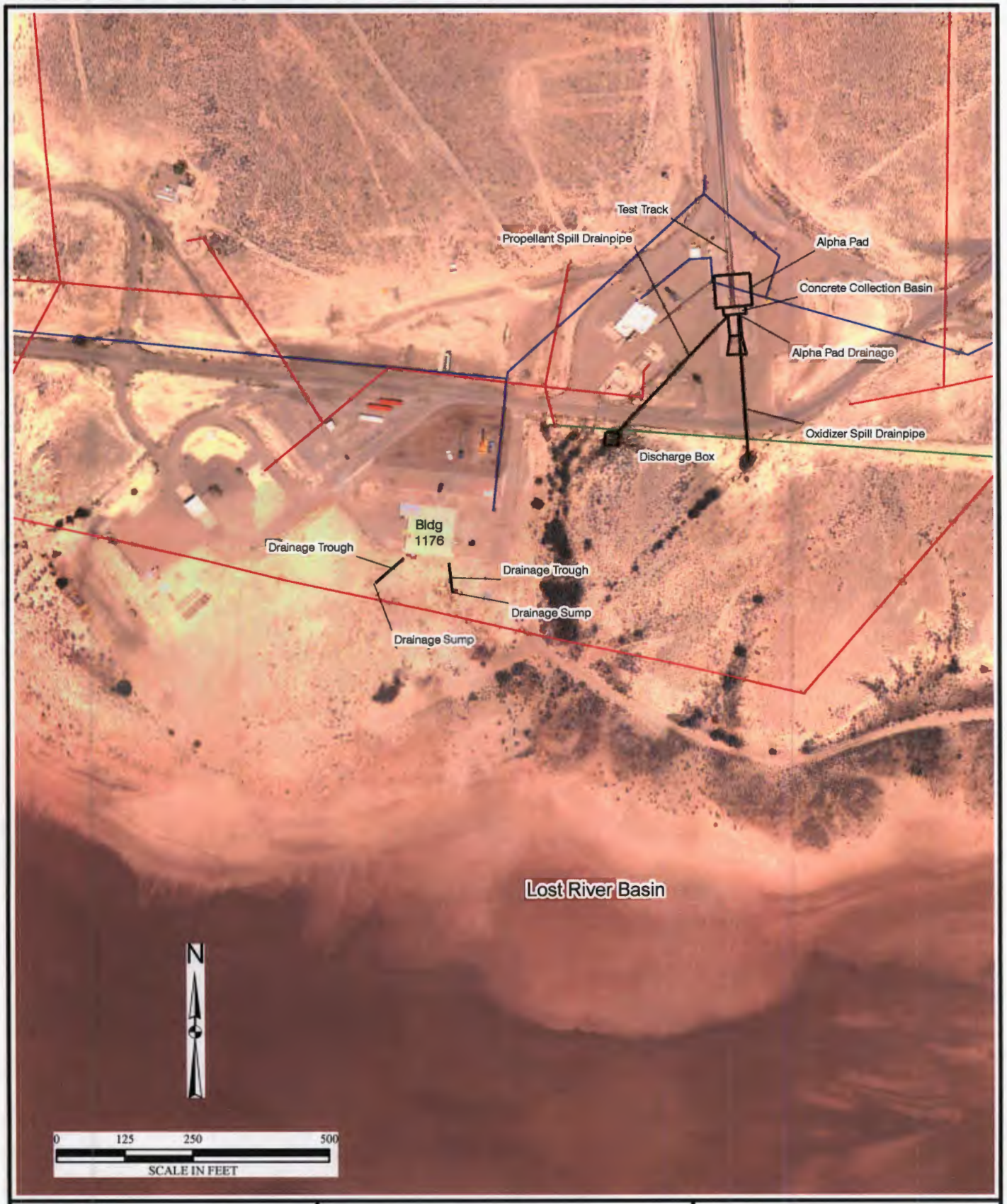
Project: AFC002-037-04-11-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Approximate Location of Trenches
- Monitoring Well
- Groundwater Elevevation Contour
- (4080) Groundwater Elevevation (msl) (Apr. 2003)
- Groundwater Flow

Figure 2.29
Groundwater Elevation Contour Map
DP-30/SD-33



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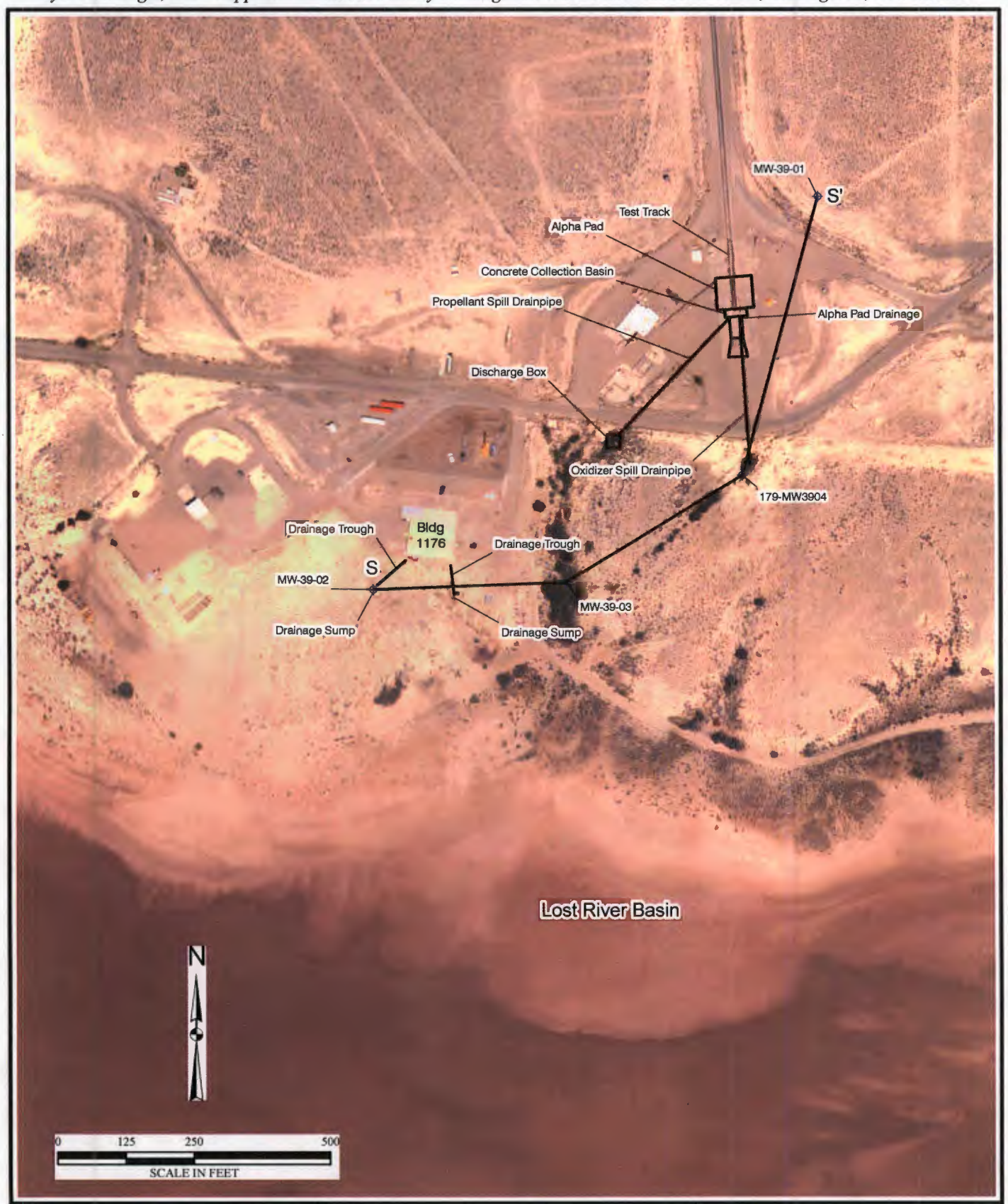
Project: AFC002-037-04-11-02
Revised: 7/27/05 TH
Map Source: Holloman AFB

Legend

- Electric
- Potable Water
- Waste Water

Figure 2.30
Site SS-39



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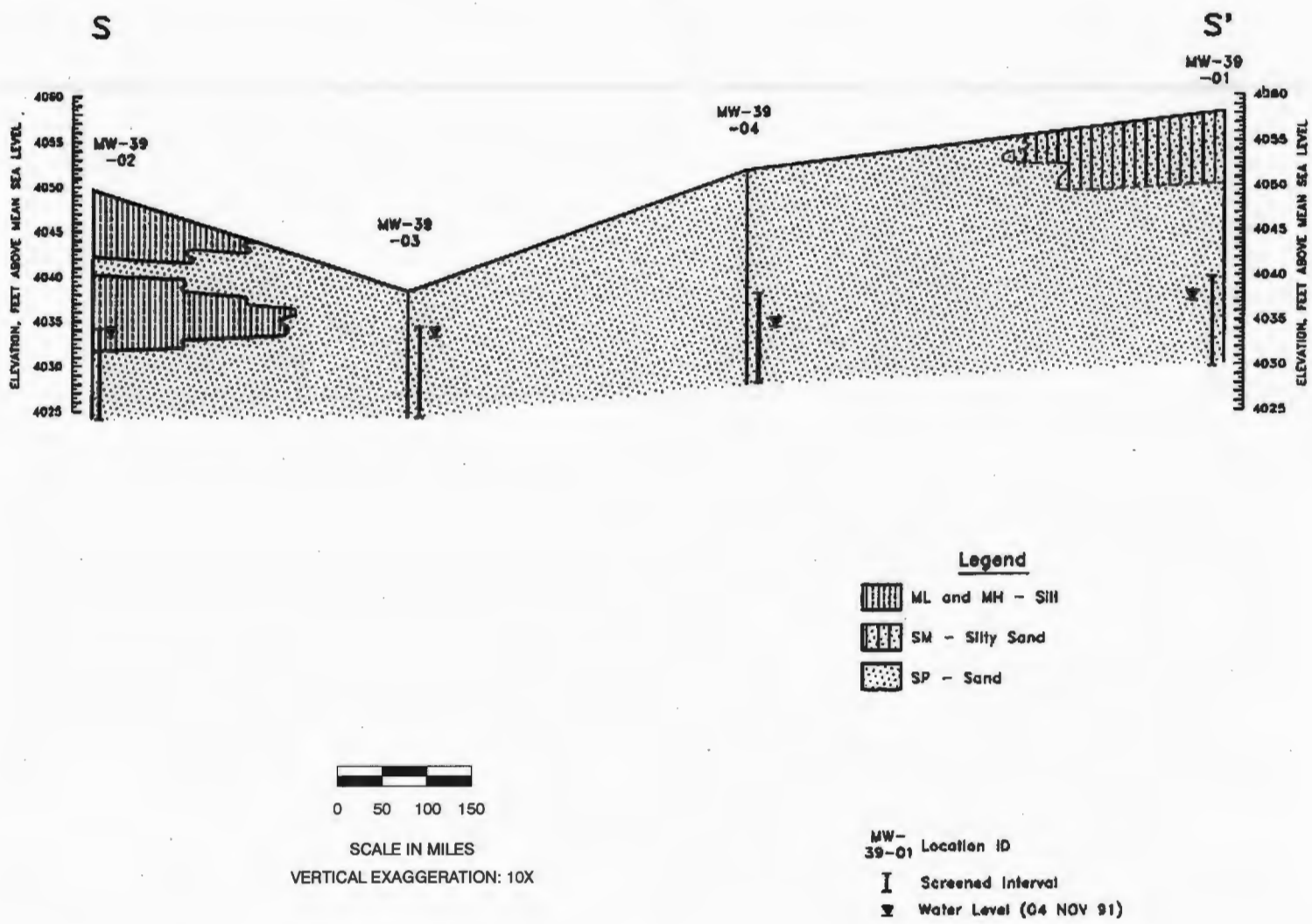
Project: AFC002-037-04-11-02
Revised: 7/27/05 TH
Map Source: Holloman AFB

Legend

Monitoring Well

S ——— S' Line of Section

Figure 2.31
Well Locations/
Line of Section
Site SS-39



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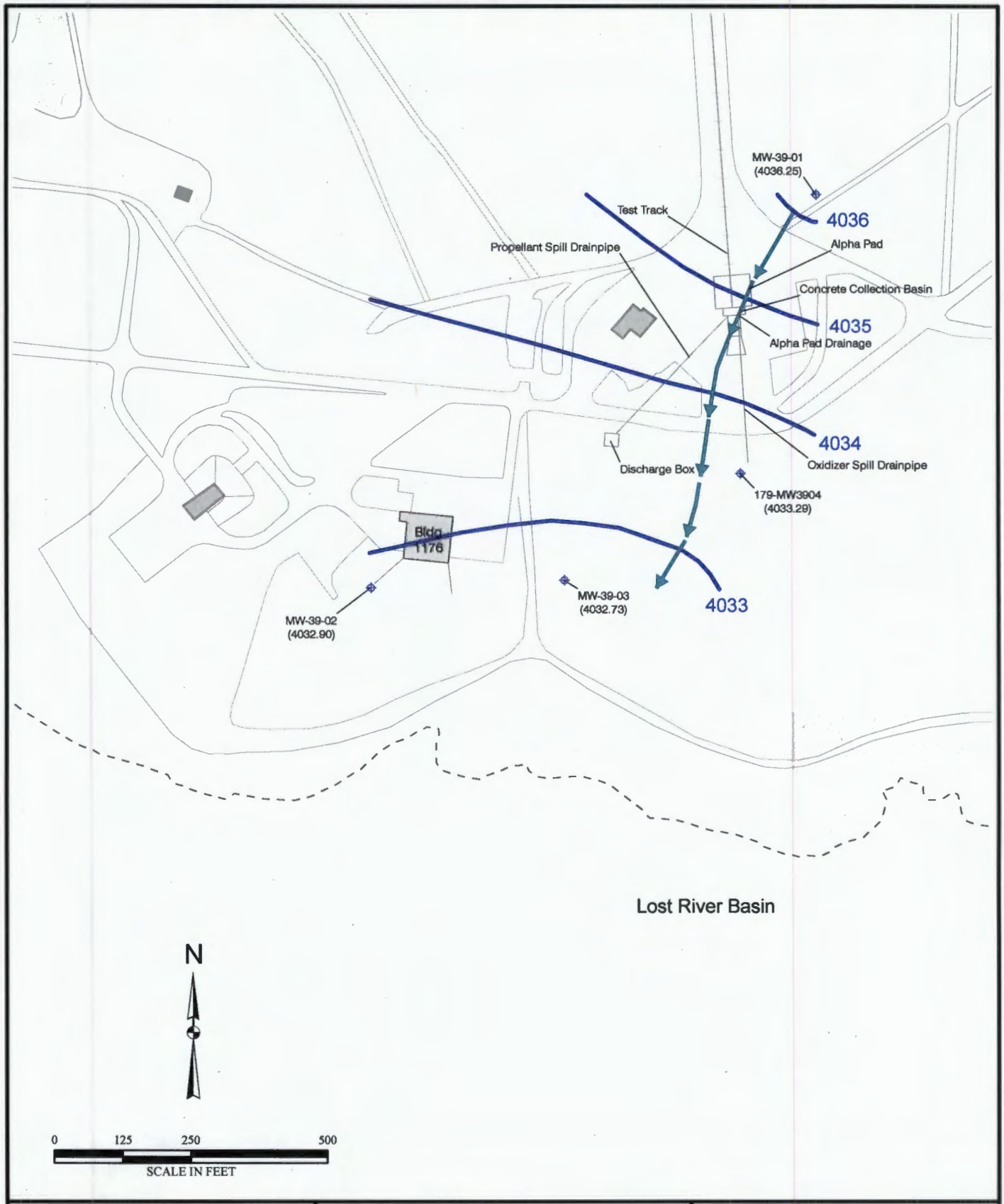
Project: AFC002-037-04-11-02
Revised: 07/28/05 TH
Source: Radian, 1992

Figure 2.32
Geologic Cross Section
SS-39



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Project: AFC002-037-04-11-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

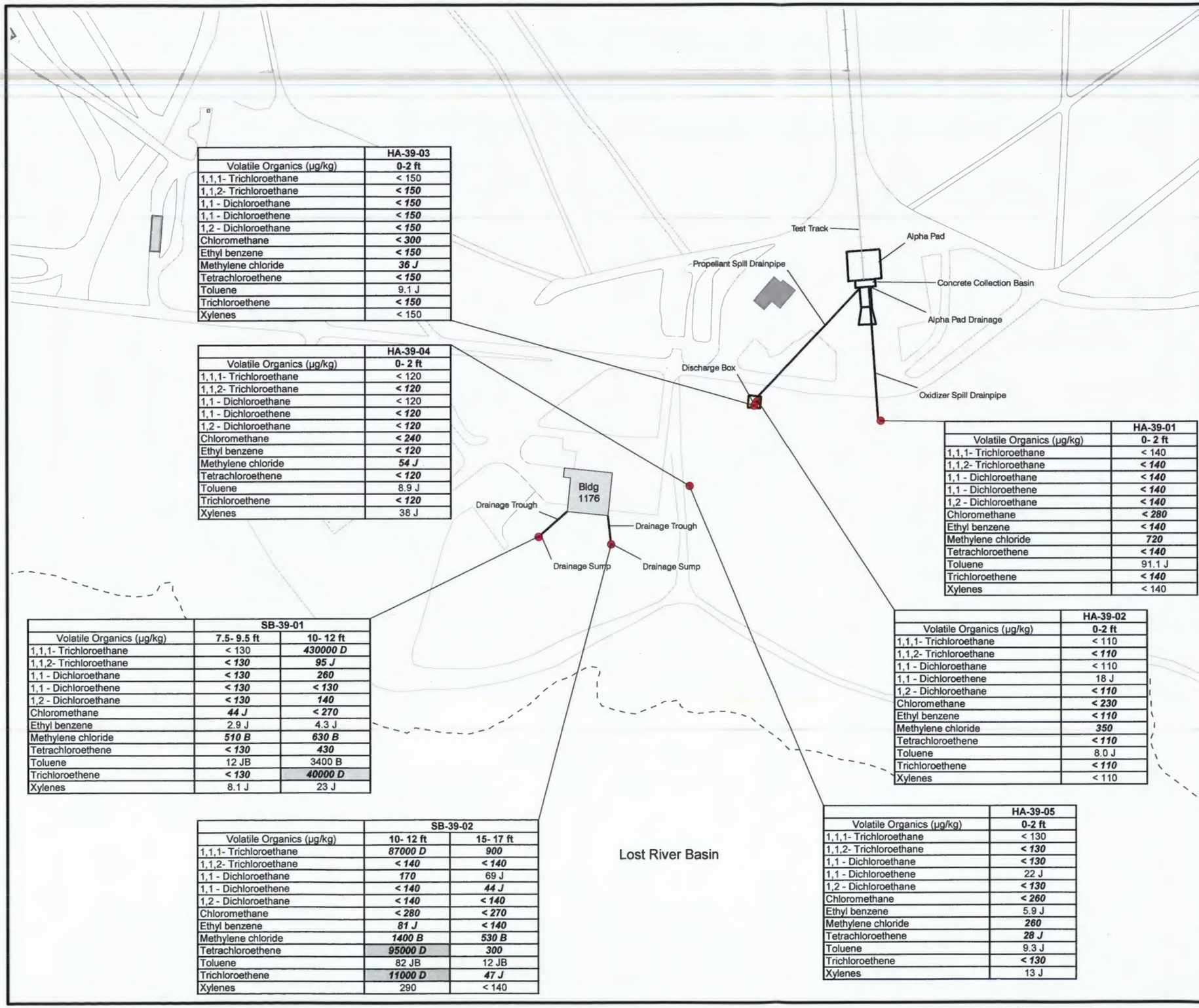
Legend

- Monitoring Well
- Groundwater Elevevation Contour
- (4024) Groundwater Elevevation (msl) (Apr. 2003)
- Groundwater Flow

Figure 2.33
Groundwater Elevation Contour Map
SS-39

HydroGeoLogic, Inc.
Supplemental RCRA Facility Investigation Work Plan
Holloman AFB, Alamogordo, New Mexico

Figure 2.34
Phase I Soil Sampling Locations with VOC Results 1991 SS-39



Volatile Organics (µg/kg)	HA-39-03 0-2 ft
1,1,1- Trichloroethane	< 150
1,1,2- Trichloroethane	***< 150***
1,1 - Dichloroethane	***< 150***
1,1 - Dichloroethene	***< 150***
1,2 - Dichloroethane	***< 150***
Chloromethane	***< 300***
Ethyl benzene	***< 150***
Methylene chloride	***36 J***
Tetrachloroethene	***< 150***
Toluene	9.1 J
Trichloroethene	***< 150***
Xylenes	< 150

Volatile Organics (µg/kg)	HA-39-04 0- 2 ft
1,1,1- Trichloroethane	< 120
1,1,2- Trichloroethane	***< 120***
1,1 - Dichloroethane	< 120
1,1 - Dichloroethene	***< 120***
1,2 - Dichloroethane	***< 120***
Chloromethane	***< 240***
Ethyl benzene	***< 120***
Methylene chloride	***54 J***
Tetrachloroethene	***< 120***
Toluene	8.9 J
Trichloroethene	***< 120***
Xylenes	38 J

Volatile Organics (µg/kg)	HA-39-01 0- 2 ft
1,1,1- Trichloroethane	< 140
1,1,2- Trichloroethane	***< 140***
1,1 - Dichloroethane	***< 140***
1,1 - Dichloroethene	***< 140***
1,2 - Dichloroethane	***< 140***
Chloromethane	***< 280***
Ethyl benzene	***< 140***
Methylene chloride	***720***
Tetrachloroethene	***< 140***
Toluene	91.1 J
Trichloroethene	***< 140***
Xylenes	< 140

Volatile Organics (µg/kg)	SB-39-01 7.5- 9.5 ft	SB-39-01 10- 12 ft
1,1,1- Trichloroethane	< 130	***430000 D***
1,1,2- Trichloroethane	***< 130***	***95 J***
1,1 - Dichloroethane	***< 130***	***260***
1,1 - Dichloroethene	***< 130***	***< 130***
1,2 - Dichloroethane	***< 130***	***140***
Chloromethane	***44 J***	***< 270***
Ethyl benzene	2.9 J	4.3 J
Methylene chloride	***510 B***	***630 B***
Tetrachloroethene	***< 130***	***430***
Toluene	12 JB	3400 B
Trichloroethene	***< 130***	***40000 D***
Xylenes	8.1 J	23 J

Volatile Organics (µg/kg)	HA-39-02 0-2 ft
1,1,1- Trichloroethane	< 110
1,1,2- Trichloroethane	***< 110***
1,1 - Dichloroethane	< 110
1,1 - Dichloroethene	18 J
1,2 - Dichloroethane	***< 110***
Chloromethane	***< 230***
Ethyl benzene	***< 110***
Methylene chloride	***350***
Tetrachloroethene	***< 110***
Toluene	8.0 J
Trichloroethene	***< 110***
Xylenes	< 110

Volatile Organics (µg/kg)	SB-39-02 10- 12 ft	SB-39-02 15- 17 ft
1,1,1- Trichloroethane	***87000 D***	***900***
1,1,2- Trichloroethane	***< 140***	***< 140***
1,1 - Dichloroethane	***170***	69 J
1,1 - Dichloroethene	***< 140***	***44 J***
1,2 - Dichloroethane	***< 140***	***< 140***
Chloromethane	***< 280***	***< 270***
Ethyl benzene	***81 J***	***< 140***
Methylene chloride	***1400 B***	***530 B***
Tetrachloroethene	***95000 D***	***300***
Toluene	82 JB	12 JB
Trichloroethene	***11000 D***	***47 J***
Xylenes	290	< 140

Volatile Organics (µg/kg)	HA-39-05 0-2 ft
1,1,1- Trichloroethane	< 130
1,1,2- Trichloroethane	***< 130***
1,1 - Dichloroethane	***< 130***
1,1 - Dichloroethene	22 J
1,2 - Dichloroethane	***< 130***
Chloromethane	***< 260***
Ethyl benzene	5.9 J
Methylene chloride	***260***
Tetrachloroethene	***28 J***
Toluene	9.3 J
Trichloroethene	***< 130***
Xylenes	13 J

Legend

● Soil Boring (1994 Table 2 Phase I RFI)

95000 D — Results shaded in ***BOLD and italics*** exceed a DAF20 standard, a Human Health Standard, and are greater than the background values.

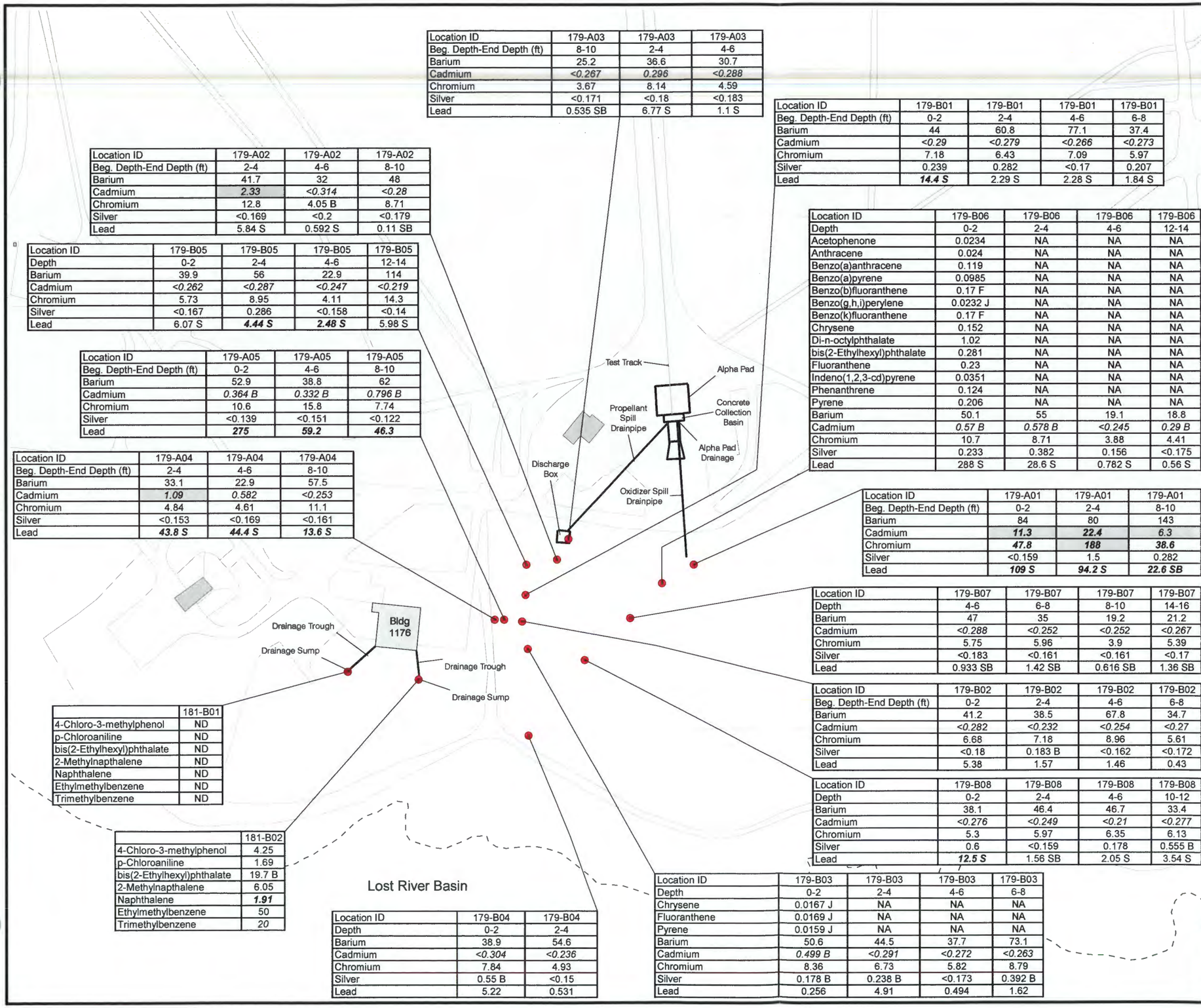
530 B — Results in ***BOLD and italics*** exceed a DAF20 standard and are greater than the background values.

N

0 100 200 400
SCALE IN FEET

File X:/AFC002/Holloman_AFB/TO37/Maps/RCRA_Work_Plan/SS-39_Tables.mxd
Project: AFC002-037-04-11-02
Revised: 7/28/05 TB
Map Source: Holloman AFB

Figure 2.35
Phase II Soil Sampling Locations and Results 1993
SS-39



Location ID	179-A03	179-A03	179-A03
Beg. Depth-End Depth (ft)	8-10	2-4	4-6
Barium	25.2	36.6	30.7
Cadmium	*<0.267*	*0.296*	*<0.288*
Chromium	3.67	8.14	4.59
Silver	<0.171	<0.18	<0.183
Lead	0.535 SB	6.77 S	1.1 S

Location ID	179-A02	179-A02	179-A02
Beg. Depth-End Depth (ft)	2-4	4-6	8-10
Barium	41.7	32	48
Cadmium	*2.33*	*<0.314*	*<0.28*
Chromium	12.8	4.05 B	8.71
Silver	<0.169	<0.2	<0.179
Lead	5.84 S	0.592 S	0.11 SB

Location ID	179-B05	179-B05	179-B05	179-B05
Depth	0-2	2-4	4-6	12-14
Barium	39.9	56	22.9	114
Cadmium	*<0.262*	*<0.287*	*<0.247*	*<0.219*
Chromium	5.73	8.95	4.11	14.3
Silver	<0.167	0.286	<0.158	<0.14
Lead	6.07 S	***4.44 S***	***2.48 S***	5.98 S

Location ID	179-A05	179-A05	179-A05
Beg. Depth-End Depth (ft)	0-2	4-6	8-10
Barium	52.9	38.8	62
Cadmium	*0.364 B*	*0.332 B*	*0.796 B*
Chromium	10.6	15.8	7.74
Silver	<0.139	<0.151	<0.122
Lead	***275***	***59.2***	***46.3***

Location ID	179-A04	179-A04	179-A04
Beg. Depth-End Depth (ft)	2-4	4-6	8-10
Barium	33.1	22.9	57.5
Cadmium	*1.09*	*0.582*	*<0.253*
Chromium	4.84	4.61	11.1
Silver	<0.153	<0.169	<0.161
Lead	***43.8 S***	***44.4 S***	***13.6 S***

Location ID	179-B01	179-B01	179-B01	179-B01
Beg. Depth-End Depth (ft)	0-2	2-4	4-6	6-8
Barium	44	60.8	77.1	37.4
Cadmium	*<0.29*	*<0.279*	*<0.266*	*<0.273*
Chromium	7.18	6.43	7.09	5.97
Silver	0.239	0.282	<0.17	0.207
Lead	***14.4 S***	2.29 S	2.28 S	1.84 S

Location ID	179-B06	179-B06	179-B06	179-B06
Depth	0-2	2-4	4-6	12-14
Acetophenone	0.0234	NA	NA	NA
Anthracene	0.024	NA	NA	NA
Benzo(a)anthracene	0.119	NA	NA	NA
Benzo(a)pyrene	0.0985	NA	NA	NA
Benzo(b)fluoranthene	0.17 F	NA	NA	NA
Benzo(g,h,i)perylene	0.0232 J	NA	NA	NA
Benzo(k)fluoranthene	0.17 F	NA	NA	NA
Chrysene	0.152	NA	NA	NA
Di-n-octylphthalate	1.02	NA	NA	NA
bis(2-Ethylhexyl)phthalate	0.281	NA	NA	NA
Fluoranthene	0.23	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.0351	NA	NA	NA
Phenanthrene	0.124	NA	NA	NA
Pyrene	0.206	NA	NA	NA
Barium	50.1	55	19.1	18.8
Cadmium	*0.57 B*	*0.578 B*	*<0.245*	*0.29 B*
Chromium	10.7	8.71	3.88	4.41
Silver	0.233	0.382	0.156	<0.175
Lead	288 S	28.6 S	0.782 S	0.56 S

Location ID	179-A01	179-A01	179-A01
Beg. Depth-End Depth (ft)	0-2	2-4	8-10
Barium	84	80	143
Cadmium	***11.3***	***22.4***	***6.3***
Chromium	***47.8***	***188***	***38.6***
Silver	<0.159	1.5	0.282
Lead	***109 S***	***94.2 S***	***22.6 SB***

Location ID	179-B07	179-B07	179-B07	179-B07
Depth	4-6	6-8	8-10	14-16
Barium	47	35	19.2	21.2
Cadmium	*<0.288*	*<0.252*	*<0.252*	*<0.267*
Chromium	5.75	5.96	3.9	5.39
Silver	<0.183	<0.161	<0.161	<0.17
Lead	0.933 SB	1.42 SB	0.616 SB	1.36 SB

Location ID	179-B02	179-B02	179-B02	179-B02
Beg. Depth-End Depth (ft)	0-2	2-4	4-6	6-8
Barium	41.2	38.5	67.8	34.7
Cadmium	*<0.282*	*<0.232*	*<0.254*	*<0.27*
Chromium	6.68	7.18	8.96	5.61
Silver	<0.18	0.183 B	<0.162	<0.172
Lead	5.38	1.57	1.46	0.43

Location ID	179-B08	179-B08	179-B08	179-B08
Depth	0-2	2-4	4-6	10-12
Barium	38.1	46.4	46.7	33.4
Cadmium	*<0.276*	*<0.249*	*<0.21*	*<0.277*
Chromium	5.3	5.97	6.35	6.13
Silver	0.6	<0.159	0.178	0.555 B
Lead	***12.5 S***	1.56 SB	2.05 S	3.54 S

	181-B01
4-Chloro-3-methylphenol	ND
p-Chloroaniline	ND
bis(2-Ethylhexyl)phthalate	ND
2-Methylnapthalene	ND
Naphthalene	ND
Ethylmethylbenzene	ND
Trimethylbenzene	ND

	181-B02
4-Chloro-3-methylphenol	4.25
p-Chloroaniline	1.69
bis(2-Ethylhexyl)phthalate	19.7 B
2-Methylnapthalene	6.05
Naphthalene	***1.91***
Ethylmethylbenzene	50
Trimethylbenzene	*20*

Location ID	179-B04	179-B04
Depth	0-2	2-4
Barium	38.9	54.6
Cadmium	*<0.304*	*<0.236*
Chromium	7.84	4.93
Silver	0.55 B	<0.15
Lead	5.22	0.531

Location ID	179-B03	179-B03	179-B03	179-B03
Depth	0-2	2-4	4-6	6-8
Chrysene	0.0167 J	NA	NA	NA
Fluoranthene	0.0169 J	NA	NA	NA
Pyrene	0.0159 J	NA	NA	NA
Barium	50.6	44.5	37.7	73.1
Cadmium	*0.499 B*	*<0.291*	*<0.272*	*<0.263*
Chromium	8.36	6.73	5.82	8.79
Silver	0.178 B	0.238 B	<0.173	0.392 B
Lead	0.256	4.91	0.494	1.62

Legend

- Soil Boring (1994 Table 2 Phase I RFI)

188 — Results shaded in ***BOLD and italics*** exceed a DAF20 standard, a Human Health Standard, and are greater than the background values.

38.6 — Results in ***BOLD and italics*** exceed a DAF20 standard and are greater than the background values.

6.3 — Results shaded and *italics* exceed Human Health Standard and are greater than the background values.

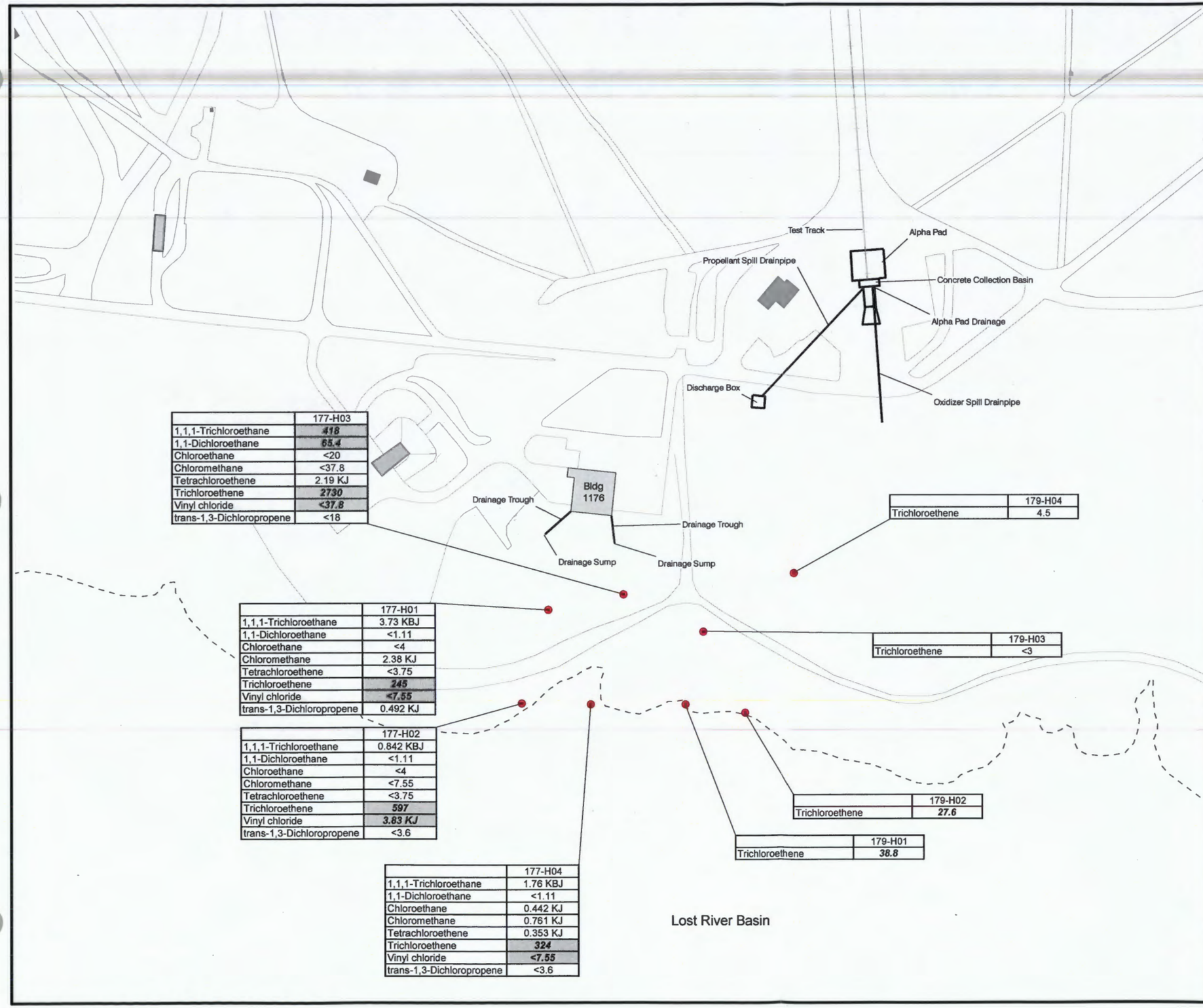
0.296 — Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels.

N

0 100 200 400
SCALE IN FEET

File X:/AFC002/Holloman_AFB/TO37/Maps/RCRA_Work_Plan/SS-39_PhaseI_RI.mxd
Project: AFC002-037-04-11-02
Revised: 7/28/05 TB
Map Source: Holloman AFB

Figure 2.36
Phase II Groundwater Sampling Results 1993 SS-39



	177-H03
1,1,1-Trichloroethane	***418***
1,1-Dichloroethane	***65.4***
Chloroethane	<20
Chloromethane	<37.8
Tetrachloroethene	2.19 KJ
Trichloroethene	***2730***
Vinyl chloride	***<37.8***
trans-1,3-Dichloropropene	<18

	179-H04
Trichloroethene	4.5

	177-H01
1,1,1-Trichloroethane	3.73 KBJ
1,1-Dichloroethane	<1.11
Chloroethane	<4
Chloromethane	2.38 KJ
Tetrachloroethene	<3.75
Trichloroethene	***245***
Vinyl chloride	***<7.55***
trans-1,3-Dichloropropene	0.492 KJ

	179-H03
Trichloroethene	<3

	177-H02
1,1,1-Trichloroethane	0.842 KBJ
1,1-Dichloroethane	<1.11
Chloroethane	<4
Chloromethane	<7.55
Tetrachloroethene	<3.75
Trichloroethene	***597***
Vinyl chloride	***3.83 KJ***
trans-1,3-Dichloropropene	<3.6

	179-H02
Trichloroethene	***27.6***

	179-H01
Trichloroethene	***38.8***

	177-H04
1,1,1-Trichloroethane	1.76 KBJ
1,1-Dichloroethane	<1.11
Chloroethane	0.442 KJ
Chloromethane	0.761 KJ
Tetrachloroethene	0.353 KJ
Trichloroethene	***324***
Vinyl chloride	***<7.55***
trans-1,3-Dichloropropene	<3.6

Legend

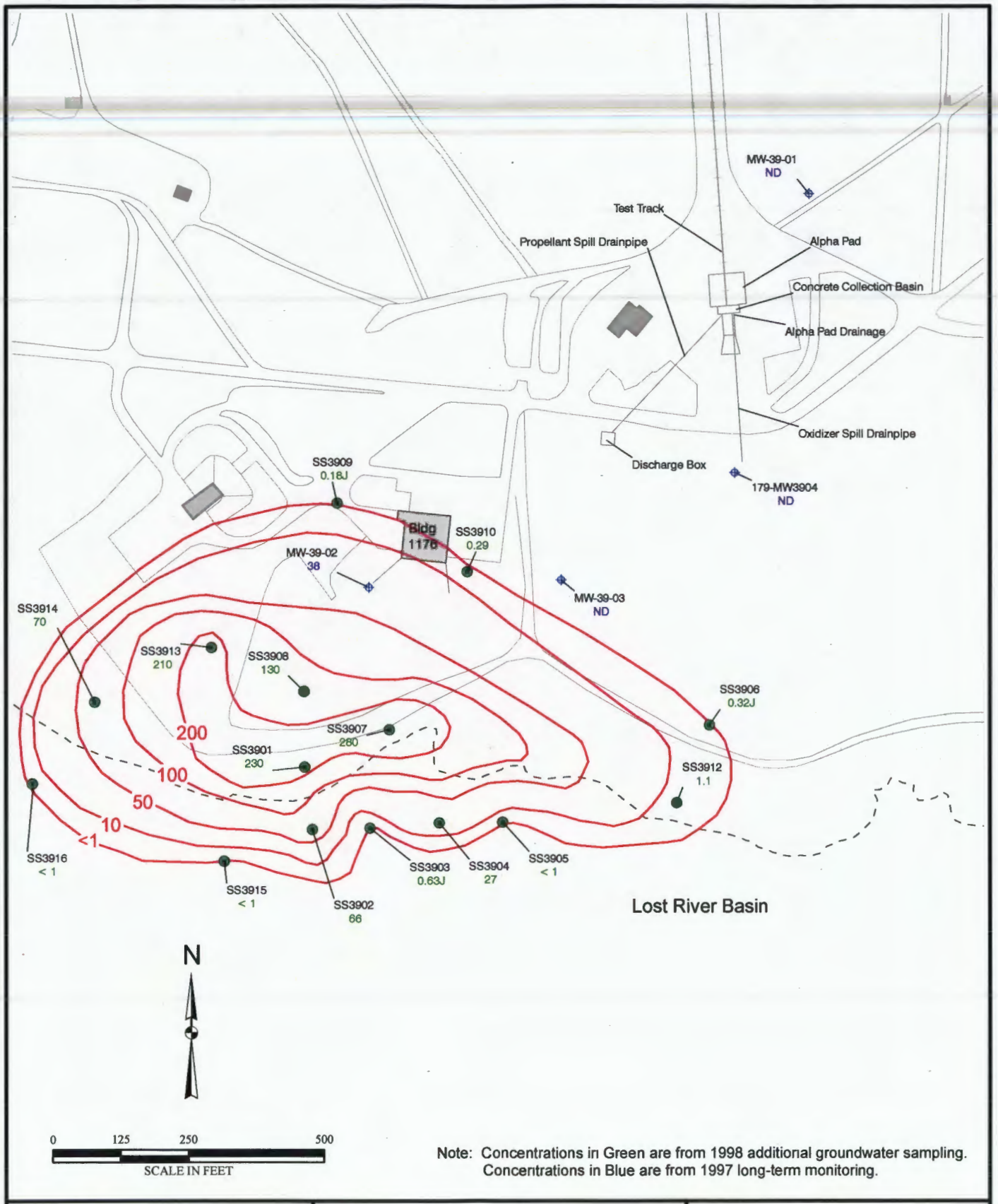
- Soil Boring (1994 Table 2 Phase I RFI)

47.8 Results in ***BOLD and italics*** exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values.

22.4 Results shaded in ***BOLD and italics*** exceed NWGWQ Standards for Human Health and are greater than the background and upgradient values.

0.296 Results in *italics* exceed USEPA or NMGWQ standards but are below background and/or upgradient levels.

File X:/AFC002/Holloman_AFB/TO37/Maps/RCRA_Work_Plan/SS-39_PhaseII_GW.mxd
Project: AFC002-037-04-11-02
Revised: 7/28/05 TB
Map Source: Holloman AFB



Note: Concentrations in Green are from 1998 additional groundwater sampling.
Concentrations in Blue are from 1997 long-term monitoring.

File X:\AFC002\Holloman_AFB\TO37\Maps\RCRA_Work_Plan\SS-39_TCE.mxd
Project: AFC002-037-04-11-02
Revised: 7/27/05 TH
Map Source: Holloman AFB

Legend

- Monitoring Well (1997 Data)
- DPT Location (1998 Data)
- Trichloroethene Contour

Figure 2.37
TCE Detected in Groundwater Isopleth Map, 1997/1998
Site SS-39

TABLES

Table 2.1
Summary of Documents Relevant to Sites in Supplementary RFI Work Plan
Holloman AFB, New Mexico

IRP Site No.	SWMU No.	1983 Records Search (CH2MHill)	1983 Notification of Hazardous Waste Site (Holloman AFB)	1988 RFA PR/VSI (A.T. Kearney & DPRA)	1989 RI (Walk, Haydel and Associates)	1990 Decision Documents (Walk, Haydel and Associates)	1991 RCRA Permit (USEPA Region VI)	1992 29 Waste Sites RI (Table 1 SWMUs) (Radian)	1992 Corrective Measures Study Plan (Radian)	1994 Decision Documents (Radian)	1994 Table 2 Phase I RFI (Radian)	1995 Decision Documents (Radian)	1995 LTM (EBASCO/GTI)	1997 Phase II RFI Report, Table 1 SWMUs (Foster Wheeler/Radian)	1997 LTM (Foster Wheeler)	1998 Additional DPT Fieldwork (GTI)	1999 LTM (Foster Wheeler)	2001 LTM (Foster Wheeler)	2003 LTM (Bhate)
LF-10	SWMU 101/109	•	•	•	•	•	•			•			•		•		•	•	•
LF-19	SWMU 105	•	•	•			•	•		•			•		•		•	•	•
LF-21	SWMU 116	•	•	•			•	•		•			•		•		•	•	•
LF-22	SWMU 115	•	•	•			•	•		•			•		•		•	•	•
LF-23	SWMU 108	•	•	•			•	•		•			•		•		•	•	•
LF-29	SWMU 104	•	•	•			•	•						•	•		•	•	•
DP-30/SD-33	SWMU 113B	•	•	•			•	•	•			•	•		•		•	•	•
SS-39	SWMU 165/177/179/181	•	•	•			•	•			•	•			•	•	•	•	•

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Table 2.2
Soil Analytical Results, 1988 Remedial Investigation
LF-10

	NMED Soil Screening Levels					Boring					
Analyte	Background[1]	Residential	Industrial/ Occupational	Construction Worker	DAF 20	8A25-523			8A25-524		
Depth						7.5-9'	9-10.5'	13.5-15'	7.5-9'	12.5-14'	12.5-14'D
Volatiles (mg/kg)											
Acetone	--	70400	100000	100000	2.06						
Benzene	--	27	73.6	157	0.0283						
2-Butanone	--	573	2100	1880	6.63						
Ethylbenzene	--	10600	25400	571000	10.5						
Hexane	--	38	38	38	14.6						
Toluene	--	248	248	248	6.8						
1,1,1-Trichloroethane	--	551	551	551	0.498						
Xylene	--	132	132	132	10.1						
TRPH (mg/kg)	--	--	--	--	--		36		20	51	
BNA Organic											
Di-n-Butylphthalate	--	6000	68400	23300	3670						
Metals (mg/kg)											
Arsenic	6.9	3.9	17.7	85.2	58.3		*5*	3	2		
Barium	84.4	5450	78300	1440	823		50	79	81	37	42
Beryllium	1.3	156	2250	56.2	63.2		2	2	2	2	2
Cadmium	1.0	74.1	8600	0.00474	7.52		***2***	***3***	***5***	***3***	***5***
Chromium	24.6	234	3400	180	19.2		*20*	12	13	6	10
Copper	21.2	3130	45400	12400	703		28	23	31	27	30
Iron	6362	23500	100000	92900	65.4		***16415***	***9236***	***10428***	*2763*	*4967*
Lead	12.3	400	750	750	9.17		5	3	4	0.5	1.6
Manganese	146.9	1550	21800	148	1.05		***176***	*108*	*89*	***683***	***562***
Nickel	18.1	1560	22500	561	261		18	13	18	16	19
Silver	0.73	391	5680	1550	8.47			2	2	3	3
Sodium	5000	--	--	--	--		3557	2588	3149	1606	1551
Zinc	48.7	23500	100000	92900	12400		44	26	31	15	68

[1] Source: Radian (1992c) and Radian (1993b)

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values.
Results shaded and *italics* exceed Human Health Standard and are greater than the background values.
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels.

Table 2.2
Soil Analytical Results, 1988 Remedial Investigation
LF-10

	NMED Soil Screening Levels					Boring					
Analyte	Background[1]	Residential	Industrial/ Occupational	Construction Worker	DAF 20	8A25-528		8A25-532		8A25-532-D	
Depth						22.5-24'	27.5-29'	15-16.5'	27.5-29'	13.5-15'	27.5'
Volatiles (mg/kg)											
Acetone	--	70400	100000	100000	2.06			0.034		0.047	
Benzene	--	27	73.6	157	0.0283	0.03	0.026	0.005	0.003	0.006	
2-Butanone	--	573	2100	1880	6.63			0.21		0.24	
Ethylbenzene	--	10600	25400	571000	10.5			0.004		0.005	
Hexane	--	38	38	38	14.6				0.006		
Toluene	--	248	248	248	6.8			0.002		0.003	
1,1,1-Trichloroethane	--	551	551	551	0.498			0.004		0.005	
Xylene	--	132	132	132	10.1			0.005		0.002	
TRPH (mg/kg)	--	--	--	--	--	21	25	49	69		61
BNA Organic											
Di-n-Butylphthalate	--	6000	68400	23300	3670					0.48	
Metals (mg/kg)											
Arsenic	6.9	3.9	17.7	85.2	58.3	1					
Barium	84.4	5450	78300	1440	823	81	26	41	120		
Beryllium	1.3	156	2250	56.2	63.2	2	2	2	2		
Cadmium	1.0	74.1	8600	0.00474	7.52	*7*	*7*	***8***	***9***		
Chromium	24.6	234	3400	180	19.2	16	5	7	6		
Copper	21.2	3130	45400	12400	703	18	24	19	21		
Iron	6362	23500	100000	92900	65.4	***10624***	*3351*	*2260*	*4452*		
Lead	12.3	400	750	750	9.17	4	0.8	0.5	1.6		
Manganese	146.9	1550	21800	148	1.05	***216***	*67*	*2*	*64*		
Nickel	18.1	1560	22500	561	261	25	21	25	27		
Silver	0.73	391	5680	1550	8.47	2	2	2	3		
Sodium	5000	--	--	--	--	1813	1519	372	771		
Zinc	48.7	23500	100000	92900	12400	31	12	10	15		

[1] Source: Radian (1992c) and Radian (1993b)

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background val
Results shaded and *italics* exceed Human Health Standard and are greater than the backgroun
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard a
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below backgrou

Table 2.3
Groundwater Analytical Results, 1988 Remedial Investigation
LF-10

Analyte	Background[1]	EPA MCL (µg/L)	NMGWQ Standard (µg/L)	Monitoring Well						
				MW2 (upgradient)	MW5 (upgradient)	MW7 (upgradient)	MW1	MW3	MW4	MW6
BA/NE (µg/l)										
2,4-Dinitrotoluene	NV	NV	NV	--	--	57	--	--	--	--
Isoporone	NV	NV	NV	--	--	64	--	--	--	--
2-Methylnapthalene	NV	NV	NV	3	--	--	--	--	--	--
Napthalene	NV	NV	NV	15	--	--	--	--	--	--
Phenol	NV	NV	NV	10	--	--	--	--	--	--
Pesticides/PCB										
Aldrin	NV	NV	NV	--	--	0.17	--	--	--	--
Endosulfan I	NV	NV	NV	--	--	0.53	--	--	--	--
Endrin	NV	2	NV	--	--	0.12	--	--	--	--
Heptachlor Epoxide	NV	0.2	NV	--	--	*0.86*	--	--	--	--
Methoxychlor	NV	40	NV	1.1	--	--	--	--	--	--
TRPH	NV	NV	NV	--	--	--	--	3	3	--
Tentatively Identified Compounds										
1-Ethyl-2-Methylbenzene	NV	NV	NV	113	--	--	--	--	--	--
1,3,5-Trimethylbenzene	NV	NV	NV	49	--	--	--	--	--	--
Metals										
Antimony	89.6	6	NV	--	--	*38*	--	*36*	*47*	--
Arsenic	72.3	10	100	*< 125**	*< 125**	*43*	*21*	6	*21*	*< 50**
Barium	929.3	2000	1000	230	286	677	637	169	492	474
Beryllium	3.8	4	NV	*6*	*6*	*20*	***20***	*6*	***14***	***11***
Cadmuim	8.3	5	10	--	--	*14*	*7*	--	5	*12*
Chromium	234	100	50	*51*	37	*124*	*108*	25	*52*	*75*
Copper	38.6	NV	1000	109	115	179	259	108	191	140
Cyanide	NV	200	200	--	--	--	40	--	--	--
Iron	NV	NV	1000	*19990*	*23083*	*100485*	***83308***	*16561*	***42660***	***58313***
Lead	19.9	15	50	*< 200**	*< 70**	*50*	*38*	*22*	*18*	***< 500****
Manganese	NV	NV	200	*316*	*575*	*976*	***1604***	184	***389***	***1204***
Mercury	0.03	2	2	0.881	--	--	0.294	0.427	***2.012***	--
Nickel	43.6	NV	200^	134	145	154	***218***	77	130	70
Selenium	79.3	50	50	*< 70**	*< 500**	*< 500**	15	37	13	***< 500****
Silver	7.3	NV	50	16	--	6	26	11	17	22
Sodium	NV	NV	NV	8749720	20438320	1420871	2817036	8544135	3269065	13427300
Thallium	94.3	2	NV	*< 200**	*< 175**	--	--	--	--	*< 20**
Zinc	253.4	NV	10000	128	100	333	261	73	124	195

-- Not detected
NV = no value or standard was found
* Elevated detection limit due to matrix interference
^ NMGWQ Ground Water Standard for Irrigation Use
Results shaded in **BOLD** and *italics* exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values.
Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values.
Results in *italics* exceed USEPA or NMGWQ standards but are below background and/or upgradient levels.

[1] Radian, 1993b

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Table 2.4
Analytical Groundwater Results, 2003 Long-Term Monitoring Results
LF-10

	BACKGROUND[5] (µg/L)	EPA MCL (µg/L)	NMGWQ Standard (µg/L)	Well S10-MW2[4]					Well S10-MW-3				
				Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Acetone	--	--	--	ND	ND	<5	NA	NA	ND	ND	<5	NA	NA
1,2-Dichloroethane	--	5.00	10	ND	ND	<3	NA	NA	ND	ND	<3	NA	NA
Methylene chloride	--	--	100	6.6UB	ND	<3	NA	NA	ND	ND	<3	NA	NA
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	*15.5 B (J)*	*10.1*	*21.1*	10	ND	*18.5 B (J)*	*11.9*	*21.2*
Barium	85.2	2000	1000	ND	ND	11.4 B (J)	9.5 B	8.09 J	ND	ND	13.5 B (J)	12.1	9.6 J
Cadmium	7.4	5	10	ND	ND	0.5B	NA	NA	ND	ND	0.5B	NA	NA
Chromium	7.2	100	50	ND	ND	10.6 (J)	<20	NA	ND	ND	<0.6	<20	NA
Iron	--	--	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	5.6	15	50	ND	ND	<1.5	<10 (UJ)	NA	**93**	ND	<1.5	<10 (UJ)	NA
Manganese	--	--	200	ND	ND	2.2 B (J)	<10 (UJ)	<10	ND	ND	3.3 B (J)	1.1 B (J)	<10
Selenium	85.3	50	50	ND	ND	14.6 B (J)	7.9 B	6.41 UJ	ND	ND	14.2 B (J)	8.5 B	<19
Silver	6.7	--	50	ND	ND	<0.5	NA	NA	ND	ND	6.2 B (J)	NA	NA
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
[5] Radian, 1993b.
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
NV - no value
-- - no value or standard was found
VOC's - volatile organic compounds
µg/L - micrograms per liter
Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Table 2.4
Analytical Groundwater Results, 2003 Long-Term Monitoring Results
LF-10

	BACKGROUND[5] (µg/	EPA MCL (µg/L)	NMGWQ (mg/L)	Well S10-MW-4					Well S10-MW6				
				Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Acetone	--	--	--	ND	ND	1 J	NA	NA	ND	ND	<5	NA	NA
1,2-Dichloroethane	--	5.00	10	ND	ND	<3	NA	NA	ND	ND	1 J	NA	NA
Methylene chloride	--	--	100	ND	ND	<3	NA	NA	ND	ND	<3	NA	NA
Metals[2] (µg/L)													
Arsenic	35.4	10	100	*13*	*17 J*	*14.9 B (J)*	*11.7*	*19.3*	10	*17 J*	*20.6 B (J)*	*11.9*	*25.9*
Barium	85.2	2000	1000	ND	20	30.9 B (J)	28.4	9.88 J	ND	ND	12.2 B (J)	11.4	8.29 J
Cadmium	7.4	5	10	ND	ND	1.2 B	NA	NA	ND	ND	<0.3	NA	NA
Chromium	7.2	100	50	ND	ND	1.2 B (J)	<20	NA	ND	ND	<0.6	<20	NA
Iron	--	--	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	5.6	15	50	***150***	ND	<1.5	<10 (UJ)	NA	***42***	ND	<1.5	<10 (UJ)	NA
Manganese	--	--	200	ND	80	114 J	80.2 (J)	71.3	ND	110	50.5 (J)	18.2 (J)	66.7
Selenium	85.3	50	50	ND	ND	12.7 B (J)	8.4 B	<13.9	ND	ND	10.6 B (J)	3.9 B	<11.2
Silver	6.7	--	50	ND	ND	1.4 B (J)	NA	NA	ND	ND	<0.5	NA	NA
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
[5] Radian, 1993
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
-- no value or standard was found
VOCs - colatile organic compounds

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.
Bold values indicate analytes above the New Mexico Groundwater Quality Standards.

µg/L - micrograms per liter
Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Table 2.5
LF-19 Groundwater Analytical Results, 1991 Remedial Investigation

Analyses	Background[1]	EPA MCL	NMGWQ Standard	Detection Limit	MW-19-01 (upgradient)	MW-19-02	MW-19-03
Inorganic Results (mg/L)							
EPA 160.1- Total Dissolved Solids	43600	--	1000	10	*17000*	*21000*	*42000*
EPA 300.0- Chloride	19600	--	250	26	*7200*	*8200*	***20000***
EPA 300.0- Sulfate	7470	--	600	5.0	*3400*	*4600*	*7100*
EPA 340.2- Fluoride	4.7	4	1.6	0.10	*1.7*	*3.2*	*1.8*
EPA 353.1- Nitrate-Nitrite	98	--	--	0.022	1.2	8.6	5.7
EPA 365.2- Total Phosphorous	0.75	--	--	0.020	0.26	0.5	0.18
SW6010- Metals (μg/L)							
Antimony	89.6	6	--	100	*140*	***140***	*100*
Cadmium	8.3	5	10	5	*6.3*	*5.4*	***11***
Chromium	234	100	50	10	12	17	ND
Nickel	43.6	--	200^	20	32	33	29
Zinc	253.4	--	10000	20	33	41	< 0.020
SW7421- Lead (μg/L)	19.9	15	50	3	< 0.0030		***21***
Organic Results							
SW8240 - Volatile Organics (μg/L)							
Methylene Chloride	--	--	100	5.0	3.8 J	< 5.0	22

Note: Table presents only constituents detected in ground water at this site.
-- = No value or standard was found
J = Detected below the detection limit.

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels
^ NMGWQ Standard for Irrigation Use
[1] Source for Inorganics Values is: Radian (1992c). Source for Metals is Radian (1993b).

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Table 2.6
LF-19 Analytical Groundwater Results, 2003 Long-Term Monitoring

	Background^	EPA MCL (µg/L)	NMGWQ Standard (µg/L)	Well MW-19-01[4]					Well MW-19-02				
				Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
1,2,3- Trichlorobenzene[6]	--	--	--	NA	ND	NA	NA	NA	NA	1.7 J	NA	NA	NA
1,2,4- Trichlorobenzene[6]	--	70	--	NA	ND	NA	NA	NA	NA	0.9 J	NA	NA	NA
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	< 3	NA	NA	ND	ND	3.9 B (J)	NA	NA
Barium	85.2	2000	1000	ND	19	14.5 B (J)	11.3	7.18 J	ND	ND	21.6 B (J)	15.2	11.9
Cadmium	7.4	5	10	ND	ND	.03 B	NA	NA	ND	ND	0.5 B	NA	NA
Iron	--	--	1000	ND	ND	< 21	89.3	< 200	ND	ND	132	< 1000	146 J
Lead	5.6	15	50	***54***	ND	< 1.5	< 10 (UJ)	NA	***540***	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	*230*	*284 (J)*	*597 (J)*	*514*	ND	ND	*246 (J)*	77.5 (J)	79.6
Mercury	0.03	2	2	ND	ND	< 0.2	< 0.5	NA	ND	ND	0.56 (J)	< 0.5	NA
Selenium	85.3	50	50	ND	ND	2.9 B (J)	NA	NA	ND	ND	2.7 B (J)	NA	NA
Silver	6.7	--	50	ND	ND	< 0.5	NA	NA	ND	ND	< 0.5	NA	NA
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
Chlorinated Herbicides[4] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
-- no value or standard was found
VOCs - volatile organic compounds
µg/L - micrograms per liter

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

^ Radian (1993b)

Table 2.6
LF-19 Analytical Groundwater Results, 2003 Long-Term Monitoring

Well Number	Background^	EPA MCL (μg/L)	NMGWQ Standard (μg/L)	Well MW-19-03				
Sampling Data				Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (μg/L)								
1,2,3- Trichlorobenzene[6]	--	--	--	NA	ND	NA	NA	NA
1,2,4- Trichlorobenzene[6]	--	70	--	NA	ND	NA	NA	NA
Metals[2] (μg/L)								
Arsenic	35.4	10	100	ND	ND	< 3	NA	NA
Barium	85.2	2000	1000	ND	ND	17.8 B (J)	18.8 B	10.6 J
Cadmium	7.4	5	10	ND	ND	< 0.3	NA	NA
Iron	--	--	1000	ND	ND	< 110	***< 10,000***	< 200
Lead	5.6	15	50	***420***	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	ND	1.1 B (J)	1.5 B (J)	< 100
Mercury	0.03	2	2	ND	ND	< 0.2	< 0.5	NA
Selenium	85.3	50	50	ND	ND	4.1 B (J)	NA	NA
Silver	6.7	--	50	ND	ND	1.3 B (J)	NA	NA
Organochlorine Pesticides[3] (μg/L)								
all	--	--	--	ND	ND	NA	NA	NA
Chlorinated Herbicides[4] (μg/L)								
all	--	--	--	ND	ND	NA	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
4 Upgradient monitoring well
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
-- no value or standard was found
VOCs - volatile organic compounds
μg/L - micrograms per liter

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.
Bold values indicate analytes above the New Mexico Groundwater Quality Standards.

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

^ Radian (1993)

Table 2.7
LF-21 Analytical Groundwater Results, 1991 Remedial Investigation

Location:	Background[1]	EPA MCL	NMGWQ Standard	Detection Limit	MW-21-01 (upgradient)	MW-21-02	MW-21-03	MW21-04
Analyses								
EPA 160.1 - Total Dissolved Solids (mg/L)	43600	--	1000	10	*12000*	*26000*	*27000*	*27000*
EPA 300.0 - Chloride (mg/L)	19600	--	250	26	*1900*	*4700*	*7400*	*2500*
EPA 300.0 - Sulfate (mg/L)	7470	--	600	5.0	*3000*	*2500*	*2600*	*2400*
EPA 340.2 - Flouride (mg/L)	4.7	4	1.6	0.10	*2.8*	*1.7*	1.5	1.6
EPA 353.1 - Nitrate-Nitrite (mg/L)	98	--	--	0.22	18	18	14	10
EPA 365.2 - Total Phosphorus (mg/L)	0.75	--	--	0.020	0.13	0.24	0.15	0.2
SW6010 - Metals (μg/L)								
Cadmium	8.3	5	10	20	< 20	***24***	*< 20*	*< 20*
SW7060 - Arsenic (μg/L)	72.3	10	100	8	***110***	< 8	< 8	< 8
SW7421 - Lead (μg/L)	19.9	15	50	6	< 6	6.8	7.2	13
SW8240 - Volatile Organics (μg/L)								
Benzene	--	5	10	5.0	< 5.0	< 5.0	1.4 J	< 5.0
Ethyl benzene	--	700	750	5.0	< 5.0	< 5.0	1.5 J	< 5.0
Methlyene chloride	--	--	100	5.0	4.2 JB	11 B	3.7 JB	1.7 JB
Styrene	--	100	--	5.0	< 5.0	< 5.0	2.4 J	< 5.0
Toulene	--	1000	750	5.0	< 5.0	< 5.0	4.4 J	< 5.0
Xylenes	--	10000	620	5.0	< 5.0	< 5.0	2.9 J	< 5.0

NOTE: Table presents only constituents detected in groundwater at this site.
J = Detected below the detection limit.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
-- = No value or standard was found

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

1 Source for metals background values: Radian (1993b). Source for all other background values: Radian(1992c)

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Table 2.8
LF-21 Analytical Groundwater Results, 2003 Long-Term Monitoring

	Background[5]	EPA MCL	NMGWQ Standards	Well MW-21-01[4]					Well MW-21-02				
		(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Chloroform	--	--	100	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA
cis-1,2-dichloroethene	--	70	--	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA
Methylene chloride	--	--	100	ND	5.1 UB	< 3	NA	NA	ND	5 UB	< 3	NA	NA
Trichlorethylene	--	5	100	ND	*5.4*	*11*	*13*	*15*	ND	ND	< 3	< 5	< 1
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	*16.2 B (J)*	*11.8 (J)*	*21.2*	ND	ND	*13.0 B (J)*	7.2 B (J)	***< 100***
Barium	85.2	2000	1000	ND	17	18.6 B (J)	NA	15.7	ND	40	32.1 B (J)	NA	19.5 J
Cadmium	7.4	5	10	ND	ND	< 0.3	NA	NA	ND	ND	0.3 B	NA	NA
Chromium	7.2	100	50	ND	ND	9.3 B (J)	< 20	NA	ND	ND	< 0.6	< 20	NA
Iron	--	--	1000	ND	ND	< 21	< 1000	< 200	ND	ND	< 21	< 1000	< 200
Manganese	--	--	200	ND	ND	2.1 B (J)	139 (J)	12.3	ND	ND	0.6 B (J)	< 10 (UJ)	< 100
Selenium	85.3	50	50	ND	ND	6.2 B (J)	NA	<10	ND	ND	11.3 B (J)	NA	***<100***
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
Chlorinated Herbicides[4] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA

Notes:

[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)

[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)

[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)

[4] Upgradient monitoring well

[5] Radian (1993)b

CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - volatile organic compounds
µg/L - micrograms per liter
-- No value or standard was found

Results in BOLD and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit
U - Compound was analyzed for but not detected. Analyte result was below the CRDL
UJ - Estimated as a non-detect at the detection limit.

Table 2.8
LF-21 Analytical Groundwater Results, 2003 Long-Term Monitoring

	Background[5]	EPA MCL	NMGWQ	Well MW-21-03					Well MW-21-04				
		(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Chloroform	--	--	100	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA
cis-1,2-dichloroethene	--	70	--	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA
Methylene chloride	--	--	100	ND	5.4 UB	< 3	NA	NA	ND	4.7 UB	< 3	NA	NA
Trichlorethylene	--	5	--	ND	ND	< 3	< 5	< 1	ND	ND	< 3	< 5	< 1
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	*11.6 B (J)*	*12 (J)*	*16.1*	ND	ND	4.6 B (J)	6.7 B (J)	*11.8*
Barium	85.2	2000	1000	ND	36	36.1 B (J)	NA	26.8	ND	38	37.1 B (J)	NA	24.7
Cadmium	7.4	5	10	ND	ND	0.6 B	NA	NA	ND	ND	0.7 B	NA	NA
Chromium	7.2	100	50	ND	ND	< 0.6	< 20	NA	ND	ND	< 0.6	***< 200***	NA
Iron	--	--	1000	ND	ND	< 21	< 1000	67.4 J	ND	600	936	***3440 B***	89.2 J
Manganese	--	--	200	ND	50	34.8 (J)	42.1 (J)	19.2	ND	ND	78.5 (J)	62.5 (J)	18.6
Selenium	85.3	50	50	ND	ND	12.4 B (J)	NA	13.4 J	ND	ND	11.5 B (J)	NA	12.6 J
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
Chlorinated Herbicides[4] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
[5] Radian (1993)
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - colatile organic compounds
µg/L - micrograms per liter
-- No value or standard was found

Results in BOLD and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Laboratory qualifiers–
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers–assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Table 2.9
LF-22 Analytical Groundwater Results, 1991 Remedial Investigation

Location:	Background[1]	EPA MCL	NMGWQ Standard	Detection Limit	MW-22-01 (upgradient)	MW-22-02	MW-22-03	MW-22-04
Analyses								
EPA 160.1- Total Dissolved Solids (mg/L)	43600	--	1000	10	*18000*	*27000*	*18000*	*10000*
EPA 300.0- Chloride (mg/L)	19600	--	250	26	*6200*	*11000*	*8200*	*3900*
EPA 300.0- Sulfate (mg/L)	7470	--	600	5.0	*3500*	*3300*	*2800*	*2900*
EPA 340.2- Fluoride (mg/L)	4.7	4	1.6	0.10	*2.4*	*1.9*	*2.5*	*3*
EPA 353.1- Nitrate-Nitrite (mg/L)	98	--	--	0.11	4.3	7.7	7.1	4.3
EPA 365.2- Total Phosphorous (mg/L)	0.75	--	--	0.0020	0.057	0.13	0.22	0.18
SW6010- Metals (μg/L)								
Cadmium	8.3	5	10	5	*7.7*	*11*	< 5	< 5
Chromium	234	100	10	10	< 10	< 10	< 10	*13*
Nickel	43.6	--	200^	20	23	44	ND	29
Zinc	253.4	--	10000	20	< 20	< 20	< 20	28
SW7421- Lead (μg/L)	19.9	15	50	3	< 3	< 3	7.9	4.9
SW8080 - Organochlorine Pesticides and PCBs (μg/L)								
4,4'- DDE	--	--	--	0.0094	< 0.0094	< 0.0094	< 0.0094	0.010 C
alpha - BHC	--	--	--	0.0094	< 0.0094	< 0.0094	< 0.0094	0.015 C
SW8240 - Volatile Organics (μg/L)								
1,1,2,2- Tetrachloroethane	--	--	10	5.0	0.098 J	< 5.0	< 5.0	< 5.0
1,1- Dichloroethane	--	--	25	5.0	1.9 J	< 5.0	< 5.0	< 5.0
Acetone	--	--	--	100	< 100	16 J	< 100	< 100
Benzene	--	5	10	5.0	< 5.0	0.14 J	< 5.0	< 5.0
Carbon disulfide	--	--	--	5.0	4.4 J	< 5.0	< 5.0	< 5.0
Chlorobenzene	--	100	--	5.0	< 5.0	0.33 J	< 5.0	< 5.0
Methylene chloride	--	--	100	5.0	0.76 JB	10 B	3.9 J	26 B
Tetrachloroethene	--	5	20	5.0	1.5 J	< 5.0	< 5.0	< 5.0
Toluene	--	1000	750	5.0	< 5.0	0.23 J	< 5.0	< 5.0
Trichloroethene	--	5	100	5.0	1.2 J	< 5.0	< 5.0	< 5.0

Note: Table presents only constituents detected in groundwater at this site.
C = Presence and quantitation of analyte confirmed by second column analysis.
J = Detected below the detection limit.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
ND = Not Detected, at the reported detection limit.
-- No value or standard was found

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

^ NMGWQ Ground Water Standard for Irrigation Use
1 Source for metals background values: Radian (1993b). Source for all other background values: Radian (1992c)

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Table 2.10
LF-22 Analytical Groundwater Results, 2003 Long-Term Monitoring

	Background[5]	EPA MCL	NMGWQ Standard	MW-22-01[4]					MW-22-02				
		(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Chloroform	--	--	100	ND	ND	< 3	NA	NA	ND	ND	1 J	NA	NA
Methylene chloride	--	--	100	ND	4.1 UB	< 3	NA	NA	ND	ND	< 3	NA	NA
Tetrachloroethylene	--	5	20	ND	2.6 J	< 3	NA	NA	ND	ND	< 3	NA	NA
Trichlorethylene	--	5	100	ND	1.7 J	1 J	NA	NA	ND	ND	< 3	NA	NA
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	*11.8 B (J)*	*11.5 (J)*	*23.7*	ND	ND	*12 B (J)*	6.8 B (J)	*16.1*
Barium	85.2	2000	1000	ND	27	23.6 B (J)	20.7	14.2	ND	29	29.5 B (J)	17.6	19.8
Chromium	7.2	100	50	ND	ND	< 0.6	NA	NA	ND	ND	< 0.6	NA	NA
Iron	--	--	1000	ND	ND	< 21	< 1000	< 200	ND	ND	< 21	< 1000	123 J
Lead	5.6	15	50	ND	ND	< 1.5	< 10 (UJ)	NA	ND	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	ND	54	8.9 B (J)	65.7	ND	ND	0.7 B	< 10 (UJ)	< 10
Selenium	85.3	50	50	ND	ND	4.1 B (J)	< 10 (UJ)	<10	ND	ND	13.7 B (J)	3.3 B (J)	17.2
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	ND	NA	NA	ND	ND	NA	NA	NA
Polychlorinated Biphenyls (µg/L)													
all	--	--	--	ND	ND	ND	NA	NA	ND	ND	NA	NA	NA
Chlorinated Herbicides[5] (µg/L)													
2,4-D	--	--	--	ND	ND	< 0.08	NA	NA	ND	ND	< 0.8	NA	NA
MCPP	--	--	--	ND	ND	34 P (J)	< 0.5	NA	ND	ND	< 20	NA	NA
Picloram	--	500	--	ND	ND	0.046 P (J)	< 0.5	NA	ND	ND	< 0.04	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
[5] Radian (1993)
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - colatile organic compounds
µg/L - micrograms per liter
-- No value or standard was found

Results in BOLD and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and *italics* exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Table 2.10
LF-22 Analytical Groundwater Results, 2003 Long-Term Monitoring

Well Number	Background[5]	EPA MCL	NMED	MW-22-03					MW-22-04				
Sampling Data		(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Chloroform	--	--	100	ND	ND	< 3	NA	NA	ND	ND	< 3	NA	NA
Methylen chloride	--	--	100	ND	ND	< 3	NA	NA	ND	ND	< 3	NA	NA
Tetrachloroethylene	--	5	20	ND	ND	< 3	NA	NA	ND	ND	< 3	NA	NA
TCE	--	5	100	ND	ND	< 3	NA	NA	ND	ND	< 3	NA	NA
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	6.4 B (J)	8.8 B (J)	*14.2*	ND	ND	5.3 B (J)	5.2 B (J)	*18.6*
Barium	85.2	2000	1000	ND	27	30.2 B (J)	47.8 B	17.5	ND	10	16.8 B (J)	16.1	12.7
Chromium	7.2	100	50	ND	ND	< 0.6	NA	NA	ND	ND	1.6 B	NA	NA
Iron	--	--	1000	ND	ND	< 21	***< 10,000***	33.8 J	ND	86	51.2 B	< 1000	123 J
Lead	5.6	15		ND	ND	< 1.5	< 10 (UJ)	NA	ND	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	ND	38.7	44.4 (J)	39.8	ND	29	52.1	38.6 (J)	62.2
Selenium	85.3	50	50	ND	ND	17.2 B (J)	10.2 (J)	12.3	ND	ND	4.6 B (J)	< 10 (UJ)	< 10
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA
Polychlorinated Biphenyls (µg/L)													
all	--	--	--	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)													
2,4-D	--	--	--	ND	ND	< 0.08	NA	NA	ND	ND	0.51 P (J)	NA	NA
MCPP	--	--	--	ND	ND	< 20	NA	NA	ND	ND	< 20	NA	NA
Picloram	--	500	--	ND	ND	< 0.04	NA	NA	ND	ND	< 0.04	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
[5] Radian (1993)
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - colatile organic compounds
µg/L - micrograms per liter
-- No value or standard was found

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
two
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Table 2.11
LF-23 Analytical Groundwater Results, 1991 Remedial Investigation

Location:	Background[1]	EPA MCL	NMGWQ Standard	Detection Limit	MW-23-01 (upgradient)	MW-23-02	MW-23-03	MW-23-04
Analyses								
Inorganic Results								
EPA 160.1- Total Dissolved Solids (mg/L)	43600	--	1000	(10)	*37000*	*40000*	*31000*	*23000*
EPA 300.0- Chloride (mg/L)	19600	--	250	(26)	*13000*	***20000***	*16000*	*11000*
EPA 300.0- Sulfate (mg/L)	7470	--	600	(10)	*5900*	*5800*	*4600*	*3700*
EPA 340.2- Fluoride (mg/L)	4.7	4	1.6	(0.10)	1.5	1.0	1.1	1.4
EPA 353.1- Nitrate-Nitrite (mg/L)	98	--	--	(0.022)	0.74	13	9.8	13
EPA 365.2- Total Phosphorous (mg/L)	0.75	--	--	(0.020)	0.091	0.73	0.16	0.16
SW6010- Metals (μg/L)								
Cadmium	8.3	5	10	(5)	< 5	*5.9*	< 5	< 5
Chromium	234	100	10	(10)	< 10	10	< 10	< 10
Copper	38.6	--	1000	(20)	< 20	31	< 20	< 20
Nickel	43.6	--	200^	(20)	< 20	36	22	< 20
SW7421- Lead (μg/L)	19.9	15	50	(6)	< 6	15	< 6	< 6
Organic Results								
SW8080 - Organochlorine Pesticides and PCBs (μg/L)								
delta - BHC	--	--	--	(0.0095)	< 0.0095	0.17 X	< 0.0095	0.014 X
SW8240 - Volatile Organics (μg/L)								
Methylene Chloride	--	--	100	(5)	< 5.0	9.6	4.6 J	9.3

Note: Table presents only constituents detected in ground water at this site.
X = SW8080-- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed.
J = Detected below the detection limit.
Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels
-- = No value or standard was found
^ NMGWQ Standard for Irrigation Use
[1] Source for metals background values: Radian (1993b). Source for all other background values: Radian (1992c)

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Table 2.12
LF-23 Analytical Groundwater Reaults, 2003 Long-Term Monitoring

Well Number	Background[A]	EPA MCL	NMGWQ Standard	MW-23-01[6]					MW-23-02				
Sampling Data		(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Acetone	--	--	--	ND	ND	1 J	NA	NA	ND	ND	< 5	NA	NA
Bromoform	--	--	--	ND	ND	< 3	NA	NA	ND	ND	< 3	NA	NA
Methylene chloride	--	--	100	ND	20	< 3	NA	NA	ND	ND	< 3	NA	NA
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	7.9 B (J)	NA	NA	ND	ND	6.2 B (J)	NA	NA
Barium	85.2	2000	1000	ND	ND	21.5 B (J)	22.9	< 10	ND	21	29.1 B (J)	32.3 B	10.1 J
Cadmium	7.4	5	10	ND	ND	< 0.3	NA	NA	ND	ND	0.7 B	NA	NA
Iron	--	--	1000	ND	ND	646	*< 10,000*	*< 2000*	ND	ND	< 110	*< 10000*	*< 2000*
Manganese	--	--	200	ND	ND	*348*	*223 (J)*	13.6 J	ND	ND	12.6 B	9.9 B (J)	< 100
Selenium	85.3	50	50	ND	ND	16.4 B (J)	9.5 B (J)	44 J	ND	13	*57.4 B (J)*	24.2 (J)	*< 100*
Silver	6.7	--	50	ND	ND	< 0.5	NA	NA	ND	ND	5.2 B (J)	NA	NA
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA
Polychlorinated Biphenyls[4] (µg/L)													
all	--	0.5	1	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)													
4-Nitrophenol	--	--	--	ND	ND	0.085 P (J)	< 0.5	NA	ND	ND	< 0.08	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1996 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1996 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1996 and 1997 programs.)
[6] Upgradient monitoring well
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - volatile organic compounds
µg/L - micrograms per liter
-- No value or standard found
[A] Source: Radian, 1993b.

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Table 2.12
LF-23 Analytical Groundwater Results, 2003 Long-Term Monitoring

Well Number	Background^	EPA MCL	NMGWQ Standard	MW-23-03					MW-23-04				
Sampling Data		(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Acetone	--	--	--	ND	ND	< 5	NA	NA	ND	ND	1 J	NA	NA
Bromoform	--	--	--	ND	ND	< 3	NA	NA	ND	ND	< 3	NA	NA
Methylene chloride	--	--	100	ND	18 UB	< 3	NA	NA	ND	ND	< 3	NA	NA
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	< 3	NA	NA	ND	ND	3.8 B (J)	< 10	NA
Barium	85.2	2000	1000	ND	20	25.3 B (J)	35.0 B	15 J	ND	ND	33.3 B (J)	41.1 B	10.6 J
Cadmium	7.4	5	10	ND	ND	< 0.3	NA	NA	ND	ND	< 0.3	NA	NA
Iron	--	--	1000	ND	ND	< 110	*< 10,000*	*< 2000*	ND	ND	91.1 B	*< 10000*	*< 2000*
Manganese	--	--	200	ND	ND	80.3	13.9 (J)	43.6 J	ND	ND	98.5	55.4 (J)	< 100
Selenium	85.3	50	50	ND	11 JS	42.7 B (J)	13.6 (J)	***96.9***	ND	ND	13.0 B (J)	6.9 B (J)	***< 100***
Silver	6.7	--	50	ND	ND	< 0.5	NA	NA	ND	ND	< 0.5	NA	NA
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA
Polychlorinated Biphenyls[4] (µg/L)													
all	--	0.5	1	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)													
4-Nitrophenol	--	--	--	ND	ND	< 0.08	NA	NA	ND	ND	< 0.08	NA	NA

Notes:

[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - volatile organic compounds
µg/L - micrograms per liter
-- No value or standard found

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value, less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Table 2.13
Analytical Groundwater Results, 1991 Remedial Investigation
LF-29

				Location:			
Analyses	**Background[1]**	**EPA MCL**	**NMGWQ Standard**	**MW-29-03[2]**	**MW-29-04[2]**	**MW-29-01[2]**	**MW-29-02**
EPA 160.1- Total Dissolved Solids (mg/L)	43600	--	1000	*7100*	*6000*	*21000*	*21000*
EPA 300.0- Chloride (mg/L)	19600	--	250	*1100*	*1000*	*7800*	*6900*
EPA 300.0- Sulfate (mg/L)	7470	--	600	*3200*	*2800*	*4900*	*5800*
EPA 340.2- Fluoride (mg/L)	4.7	4	1.6	1.1	< 0.10	1.4	1.1
EPA 353.1- Nitrate-Nitrite (mg/L)	98	--	--	6.4	11	11	9.0
EPA 365.2- Total Phosphorous (mg/L)	0.75	--	--	0.07	0.063	0.77	0.49
SW6010- Metals (µg/L)							
Antimony	89.6	6	--	*< 100*	*< 100*	*230*	*(20)*
Beryllium	3.8	4	--	< 2	< 2	***4.9***	***4.5***
Chromium	234	100	50	*< 100*	*< 100*	*66*	(20)
Copper	38.6	1300	1000	< 20	< 20	110	73
Nickel	43.6	--	200^	< 20	< 20	97	61
Zinc	253.4	--	10000	< 20	< 20	180	130
SW7421- Lead (µg/L)	19.9	15	50	< 3	< 3	10 Z	15
SW7740 - Selenium (µg/L)	79.3	50	50	< 6.9	6.2	18	25
SW8080 - Organochlorine Pesticides and PCBs (µg/L)							
4,4'- DDD	--	--	--	0.028 C	< 0.0094	< 0.0096	< 0.010
SW8240 - Volatile Organics (µg/L)							
Chloroform	--	--	--	22	6.2	< 5.0	< 5.0
Methylene chloride	--	--	--	1.5 J	5.4	9.3 B	11

Note: Table presents only constituents detected in ground water at this site.
C = Presence and quantitation of analyte confirmed by second column analysis.
J = Detected below the reported detection limit.
B = Analyte detected in labratory blank analysis, no blank subtraction performed.
Z = SW6010, SW7421 - Analyte detected in method blank.
-- = No value or standard was found
[2] = Upgradient monitoring wells
[1] Source for Inorganic Results: Radian (1992). Source for Metals Radian (1993).
^ NMGWQ Standard for Irrigation Use

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

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Table 2.14
LF-29 Analytical Groundwater Results, 1997 Phase II RCRA Facility Investigation

Location ID	Background[1]	EPA MCL	NMGWQ Standard	Detection Limit	MW 29-03[2]	MW 29-04[2]	MW 29-05[2]	MW-29-02	MW 29-06	MW 29-07	MW 29-08
SW6010 (µg/L)											
Aluminum	--	--	5000 ^	(500)	32	1700	*10300*	1200	***12400***	3100	***12400***
Barium	930	2000	1000	(50)	<DL	<DL	98	<DL	190	<DL	140
Calcium	--	--	--	(100)	540000	659000	1,010,000	690000	191190000	637000	985000
Iron	--	--	1000	(500)	240	*1400*	*9600*	*1600*	***12300***	*3400*	***17400***
Magnesium	--	--	--	(100)	310000	539000	1,100,000	1,070,000	931000	806000	829000
Magnanese	--	--	200	(50)	ND	<DL	*8900*	ND	*430*	72	*280*
Nickel	43.6	--	200 ^	(200)	ND	ND	ND	ND	<DL	ND	<DL
Potassium	--	--	--	(25000)	<DL	26200	<DL	<DL	<DL	<DL	<DL
Sodium	--	--	--	(25000)	725000	1,590,000	4,380,000	4460000	4270000	3550000	3890000
Thallium	94.3	2	--	(10)	ND	ND	ND	ND	ND	<DL	<DL
Vanadium	434.4	--	--	(50)	26	29	ND	<DL	<DL	<DL	<DL
Zinc	253.4	--	10000	(100)	<DL	ND	ND	ND	ND	ND	ND
SW7060 (µg/L)											
Arsenic	72.3	10	100	(10)	<DL	<DL	*15*	<DL	<DL	<DL	9
SW7421 (µg/L)											
Lead	19.9	15	50	(20)	ND	<DL	<DL	<DL	<DL	<DL	<DL
SW7740 (µg/L)											
Selenium	79.3	50	50	(25)	<DL	<DL	<DL	<DL	<DL	<DL	<DL
SW8080 (µg/L)											
4,4'-DDE	--	--	--	(0.052)	ND	ND	0.0015 J	ND	ND	ND	ND
Endosulfan II	--	--	--	(0.01)	ND	ND	0.002	ND	ND	ND	ND
beta-BHC	--	--	--	(0.011)	ND	ND	0.024	ND	ND	ND	ND
delta-BHC	--	--	--	(0.023)	0.0046 J	0.0043 J	0.0091 J	0.0050 J	ND	ND	0.0048 Jb
SW8150 (µg/L)											
2,4,5-TP (Silvex)	--	--	--	(0.5)	ND	ND	0.0086 J	ND	ND	NA	ND
Dicamba	--	--	--	(0.5)	ND	ND	0.073 J	ND	ND	NA	ND
SW8240 (µg/L)											
1,2 Dichloroethane	--	--	10	(5)	ND	ND	*350*	9.3	9.6	.82 J	8.7
2-Chloroethyl vinyl ether	--	--	--	(5)	ND	ND	ND	0.64 J	ND	ND	ND
Acetone	--	--	--	(10)	ND	ND	ND	ND	ND	ND	5.6 Jb
Benzene	--	--	10	(5)	0.18 Jb	0.19 Jb	*3,100*	0.20 Jb	ND	0.13 Jb	0.14 Jb
Bromodichloromethane	--	--	--	(5)	ND	ND	ND	ND	ND	0.41 J	ND
Chloroform	--	--	100	(5)	11	2.0 J	ND	1.4 J	ND	4.4 J	0.22 J
Methylene chloride	--	--	100	(5)	0.82 JB	1.0 JB	23 J	0.98JB	1.1 JB	1.4 JB	1.2 Jb
Toluene	--	--	750	(5)	0.29 Jb	0.38 Jb	ND	0.37 Jb	ND	ND	0.20 Jb
Total xylenes	--	--	620	(5)	0.49 Jb	1.3 Jb	35 J	0.61 Jb	0.75 JB	0.45 Jb	1.3 Jb
SW8330 (µg/L)											
1,3,5-Trinitrobenzene	--	--	--	(0.26)	ND	ND	2.6	ND	ND	ND	ND
2,4,6-Trinitrotolune	--	--	--	(0.11)	ND	ND	0.23	ND	ND	ND	ND

b = Reported analyte concentration cannot be distinguished from field blank concentrations.
B = Reported analyte concentration may be due to analytical background (or noise) from the laboratory.
J = Estimated concentration, analyte measured below the detection limit.
NA = Not applicable.
ND = Not detected. No instrument response for analyte or result less then zero.
( ) = Detection limit.
<DL = Analyte measured below the dectection limit and below the background UTL.

1 Source: Radian (1993b).
2 = Upgradient monitoring wells
^ NMGWQ Ground Water Standard for Irrigation Use

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

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Table 2.15
LF-29 Analytical Groundwater Results, 2003 Long-Term Monitoring

	Background[5]	EPA MCL	NMGWQ	Well MW-29-07				Well MW-29-08			
		(µg/L)	(µg/L)	Sep-97	Sep-99	Sep-01	Apr-03	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)											
Benzene	--	5	10	ND	< 3	< 5	NA	ND	< 3	< 5	NA
Bromoform	--	--	--	ND	< 3	< 5	NA	ND	< 3	< 5	NA
Chloroform	--	--	100	3.6	4	2.7 J	1.9	ND	< 3	< 5	0.25 (J)
1,2-Dichloroethane	--	5.00	10	ND	***11***	***18***	***15***	ND	***15***	***18***	***16***
Methylene chloride	--	--	100	ND	< 3	< 5	NA	ND	< 3	< 5	NA
Napthalene	--	--	--	ND	< 5	< 5	NA	ND	< 5	< 5	NA
SVOCs[2] (µg/L)											
Butylbenzyl phthalate	--	--	--	ND	1 J	NA	NA	ND	< 5	NA	NA
Di-n-butyl phthalate	--	--	--	ND	< 5	NA	NA	ND	< 5	NA	NA
bis(2-Ethylhexyl) phthalate	--	6	--	ND	1 J	NA	NA	ND	1 J	NA	NA
Phenol	--	--	--	ND	< 5	NA	NA	ND	< 5	NA	NA

Notes:
detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
detected using EPA Methods 6010B Trace &
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
pesticides were detected prior to '99 using EPA
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
[5] No bckground values were available
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - colatile organic compounds
µg/L - micrograms per liter
-- No value or standard was found
Results in italics exceed USEPA or NMGWQ standards but are below upgradient levels
Results in Bold and italics exceed USEPA Primary Drinking Water mCLs and one greater than the background and upgradient values

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Table 2.15
LF-29 Analytical Groundwater Results, 2003 Long-Term Monitoring

	Background[5]	EPA MCL	NMGWQ Standard	Well MW-29-01[4]				Well MW-29-06			
	(µg/L)	(µg/L)	(µg/L)	Sep-97	Sep-99	Sep-01	Apr-03	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)											
Benzene	--	5	10	0.54 J	< 3	< 5	NA	ND	< 3	< 5	NA
Bromoform	--	--	--	0.64 J	< 3	< 5	NA	ND	< 3	< 5	NA
Chloroform	--	--	100	ND	< 3	< 5	< 1	ND	< 3	< 5	< 1
1,2-Dichloroethane	--	5	10	ND	< 3	< 5	< 1	ND	*6*	3.4 J	3
Methylene chloride	--	--	100	2.5 UB	< 3	< 5	NA	ND	< 3	< 5	NA
Napthalene	--	--	--	ND	< 5	< 5	NA	ND	< 5	< 5	NA
SVOCs[2] (µg/L)											
Butylbenzyl phthalate	--	--	--	ND	< 5	NA	NA	ND	< 5	NA	NA
Di-n-butyl phthalate	--	--	--	ND	< 5	NA	NA	1.6 UB	< 5	NA	NA
bis(2-Ethylhexyl) phthalate	--	6	--	ND	1 J	NA	NA	ND	1 J	NA	NA
Phenol	--	--	--	ND	2 J	NA	NA	ND	< 5	NA	NA

Notes:
detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
detected using EPA Methods 6010B Trace &
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
pesticides were detected prior to '99 using EPA
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
[5] No bckground values were available
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - colatile organic compounds
µg/L - micrograms per liter
-- No value or standard was found
Results in italics exceed USEPA or NMGWQ standards but are below upgradient levels
Results in Bold and italics exceed USEPA Primary Drinking Water mCLs and one greater than the background and upgradient values

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Table 2.16
DP30/SD33 Boring Logs

Boring Location	Geology beneath the waste	Sample Interval	Comments
MW-30&22-01			No waste found, low PID hits
MW-30&22-02			No waste found, no PID hits
MW-30&22-03			No waste found, no PID hits
MW-30&22-04			No waste found, low PID hits
SB-30&33-01	4.6-10 feet: sand: very pale orange, soft, moist, fine to very fine grained, poorly graded (SP)	2, 8	No pid hits where waste was found
SB-30&33-02	8-12 feet: silty sand: very pale orange, sand very fine to fine grained, poorly graded (SM)	4, 8	PID of 238ppm where waste was found
SB-30&33-03	5.4 to 8 feet: sand: greyish-orange, soft, moist, very poorly graded, fine sand (SP)	3, 6	PID of 21.2ppm where waste was found
SB-30&33-04	7.4 to 10 feet: sand: very light grey, hard, fine grained, black zones/mottling. Sand, as above: moist, hard	3, 8	PID of 19.4ppm where waste was found
SB-30&33-05		0.5, 8	No waste found, low PID hits
SB-30&33-06	4-5 feet: silty sand: light brown grading into waste: black (N1), moderate yellowish-brown	2.5, 6	No pid's taken
SB-30&33-07	4-8 feet: Clayey silt, same as above w/o waste	2, 4	No pid's taken
SB-30&33-08	3.2-6 feet: silt: very pale orange, hard, dry, non-plastic, crumbly	2-2.5, 4	No pid's taken
SB-30&33-09	silt: very pale orange, hard, dry, drumbly, non-plastic	1, 3	No pid's taken
SB-30&33-10	Silt: medium light grey, hard, dry, crumbly	3, 10	PID of 67ppm at 8 feet (where waste was found)
SB-30&33-11			No waste body encountered

Table 2.16
DP30/SD33 Boring Logs

Boring Location	Total Depth of Boring (ft)	DT Top of Waste (ft)	DT Bottom of Waste (ft)	Description of Waste
MW-30&22-01	31			
MW-30&22-02	32			
MW-30&22-03	27			
MW-30&22-04	30.5			
SB-30&33-01	10	1.3	4.6	Waste, sand & silt; black (N1) some woody material.
SB-30&33-02	12	3	8	3 feet: dark yellowish-orange (10YR 6/6) 4 feet: pale yellowish-brown (10YR 6/2) 5 feet: black (N1) 7 feet: moderate yellowish-brown
SB-30&33-03	8	2.6	5.4	Waste: black (N1) composed of Silty Clay(?), wet, unidentifiable tape or plastic
SB-30&33-04	12	2.6	7.2	Waste: dark yellow brown to dusky yellow brown, rusty sand, small tinsel type plastic. At 4 feet: waste: soft black (N1) saturated waste colloidal to sludgy, grey, hairy layers, medium grey to greyish-black
SB-30&33-05	12			
SB-30&33-06	10	2.5-4	5-6	2.5-4 feet: waste: pale yellowish-brown, bluish-white, dusky yellow
SB-30&33-07	8	2	4	At 2 feet: Clayey silt: moderate brown, low plasticity, gypsum crystals, small waste body at top, olive grey
SB-30&33-08	6	1.4	3.2	Waste: moderate brown with minor black zones composed of stained sand
SB-30&33-09	6	0.9	2.6	waste: dusky yellow brown to dark yellow brown, moist, sandy, plastic material common
SB-30&33-10	14	2.6	8.8	waste: dark yellowish-brown, dry, silty and sandy, paper fragments; At 4 feet, waste same as above, sandy:dry. At 8 feet Waste: as above: with black soft sludge and plant material, to 8.9 feet grading to silt.
SB-30&33-11	8			

Table 2.17
Inorganic Soil Analytical Results, 1991 Remedial Investigation
DP-30/SD-33

Location:						SB-30&33-09		SB-30&33-10	
Sample ID: Depth:						91JULHO30&33-017 1.7-2.7 ft	91JULHO30&33-018 2.7-6 ft	91JULHO30&33-019 2.6-8.9 ft	91JULHO30&33-020 8.9-14 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)	(WASTE)	(SOIL)
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)	Result	Result	Result	Result
SW6010 - Metals (mg/kg)									
Antimony	7.3	31.3	454	124	5.42	*<21*	*<21*	*<18*	***<76***
Beryllium	1.3	156	2250	56.2	63.2	0.65	<0.42	0.70	<1.5
Cadmium	1.0	74.1	8600	0.00474	7.52	***9.6***	*<1.0*	***8.4***	***<3.8***
Chromium	24.6	234	3400	180	19.2	*59*	4.4	*61*	15
Copper	21.2	3130	45400	12400	703	49	<4.2	200	<15
Nickel	18.1	1560	22500	561	261	17	<4.2	16	<15
Silver	0.73	391	5680	1550	8.47	<2.1	<2.1	3.1	<7.6
Zinc	48.7	23500	100000	92900	12400	180	9.4	790	28
SW7060 - Arsenic (mg/kg)	6.9	3.9	17.7	85.2	58.3	3.9	1.1	***8.1***	2.0
SW7421 - Lead (mg/kg)	12.3	400	750	750	9.17	*240*	0.78	***790***	1.9
SW7471 - Mercury (mg/kg)	--	23.5	341	84.4	--	0.26	<0.050	0.70	<0.056
SW7740 - Selenium (mg/kg)	10.5	391	5680	1550	5.17	<0.53	<0.51	<0.57	<0.49
SW9310 - Gross Alpha and Gross Beta (pCi/g)									
Gross Alpha	--	--	--	--	--	12	3.8	9.2	11
Gross Beta	--	--	--	--	--	20	6.3	15	10

Note: Table presents only constituents detected in soil at this site
ND = Not Detected, at the reported detection limit.
@ Measured result is less than five times the detection limit

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Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB- 30&33- 01	
Sample ID: Depth:						91JULHO30&33-001 1.5-4.6 ft	91JULHO30&33-002 8 - 10 ft
	NMED Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	2800	35
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
4,4'-DDE	--	17200	78100	585000	26800	39 X	< 0.68
Dieldrin	--	304	1200	10200	2.7	***4.6 J***	< 0.68
Endrin Aldehyde	--	--	--	--	--	4.3 J	< 1.4
Endrin Ketone	--	--	--	--	--	11 J	< 3.4
delta - BHC	--	--	--	--	--	1600 X	< 0.68
SW8150 - Chlorinated Herbicides (µg/kg)							
MCPA	--	--	--	--	--	27000	< 17000
MCPP	--	--	--	--	--	23000	< 13000
SW8240 - Volatile Organics (µg/kg)							
Ethyl benzene	--	10600000	25400000	571000000	10500	330	< 140
Methylene chloride	--	165000	440000	2550000	16.9	***1100 B***	***150 B***
Tetrachloroethene	--	9830	24600	97600	6.44	***130 J***	***< 140***
Toluene	--	248000	248000	248000	6800	240	< 140
Xylenes	--	132000	132000	132000	10100	2400	< 140

NOTE: Table presents only constituents detected in soil at this site.

ND = Not detected, at the reported detection limit
X = SW8080 -- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed.
J = Detected below the detection limit.
Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits
Samples were reanalyzed for this compound if detected in primary or secondary analyses.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
C = Presence and quantitation of analyte confirmed by second column analysis.
D = Secondary dilution required for this analyte.
TIC = Tentatively identified compound.
< = Analyte not detected at or above reported detection limit

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background value:
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background level

[1] Source: Radian (1992c) and Radian (1993b)

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB- 30&33- 02	
Sample ID:						91JULHO30&33-003	91JULHO30&33-004
Depth:						2- 8 ft	8- 12 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	13000	47
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
PCB-1254	--	1110	8260	4280	--	*2400 C*	210 C
delta- BHC	--	--	--	--	--	220 X	< 0.58
SW8150 - Chlorinated Herbicides (µg/kg)							
2,4- DB	--	--	--	--	--	410	< 53
Dicamba	--	--	--	--	--	49	< 16
Dichloroprop	--	--	--	--	--	640	< 38
SW8240 - Volatile Organics (µg/kg)							
Benzene	--	27000	73600	157000	28.3	***47 J***	***< 120***
Chlorobenzene	--	176000	242000	242000	1030	15 J	< 120
Ethyl benzene	--	10600000	25400000	571000000	10500	***35000***	< 120
Methylene chloride	--	165000	440000	2550000	16.9	***300 B***	***170***
Tetrachloroethene	--	9830	24600	97600	6.44	***200***	***< 120***
Toluene	--	248000	248000	248000	6800	***8900 B***	6.7 JB
Trichloroethene	--	648	1590	34100	46.6	***140 J***	***< 120***
Xylenes	--	132000	132000	132000	10100	***110000***	< 120
SW8270- Semivolatile Organics (µg/kg)							
4- Methylphenol (p- cresol)	--	--	--	--	--	27000	590 J
Naphthalene	--	71900	98300	98300	393	***1300 J***	***< 11000***
Phenol	--	18000000	100000000	69900000	21.1	***3000 J***	***< 11000***

NOTE: Table presents only constituents detected in soil at this site.

ND = Not detected, at the reported detection limit.
X = SW8080 -- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed.
J = Detected below the detection limit.
Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits. Samples were reanalyzed for this compound if detected in primary or secondary analyses.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
C = Presence and quantitation of analyte confirmed by second column analysis.
D = Secondary dilution required for this analyte.
TIC = Tentatively identified compound.
< = Analyte not detected at or above reported detection limit

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background value
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB-30&33-03	
Sample ID:						91JULHO30&33-005	91JULHO30&33-006
Depth:						2.5- 5.5 ft	6- 8 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	20000	< 16
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
4,4'- DDD	--	24400	111000	829000	8400	68 C	< 0.67
4,4'- DDE	--	17200	78100	585000	26800	37 C	< 0.67
4,4'- DDT	--	17200	78100	138000	15800	39 X	< 1.3
Aldrin	--	284	1120	6990	294	28 C	< 0.67
Dieldrin	--	304	1200	10200	2.7	***29 C***	< 0.67
Endosulfan Sulfate*	--	360000	4100000	1400000	1490000	340 XY	< 3.4 Y
Endrin	--	18000	205000	69900	745	13 X	< 0.67
alpha- BHC	--	902	3990	30000	0.443	***5.9 J***	***< 0.67***
delta- BHC	--	--	--	--	--	1500 X	2.2 X
SW8150 - Chlorinated Herbicides (µg/kg)							
2,4,5- T	--	--	--	--	--	150	< 14
2,4- DB	--	--	--	--	--	61 J	< 62
Dicamba	--	--	--	--	--	44	< 18
Dichloroprop	--	--	--	--	--	640	< 44
MCPA	--	--	--	--	--	12000 J	< 7000
SW8240 - Volatile Organics (µg/kg)							
Ethyl benzene	--	10600000	25400000	571000000	10500	< 1700	68 J
Methylene chloride	--	165000	440000	2550000	16.9	***1900 B***	***110 JB***
Tetrachloroethene	--	9830	24600	97600	6.44	***510 J***	***< 140***
Xylenes	--	132000	132000	132000	10100	780 JB	180
SW8240 - Volatile Organics, TIC List (µg/kg)							
C4- Benzene	--	27000	73600	157000	28.3	***9100***	ND

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *Italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992c) and Radian (1993b)
* Endosulfan screening value was used; a value for Endosulfan Sulfate was not available
< = Analyte not detected at or above reported detection limit

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB-30&33-03	
Sample ID: Depth:						91JULHO30&33-005 2.5-5.5 ft	91JULHO30&33-006 6 8 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
SW8270 - Semivolatile Organics (µg/kg)							
2- Methylnaphthalene	--	--	--	--	--	7800 J	< 1300
4- Methylphenol (p-cresol)	--	--	--	--	--	100000	< 1300
Naphthalene	--	71900	98300	98300	393	***1300 J***	***< 1300***
Phenol	--	18000000	100000000	69900000	21100	16000	< 1300
bis(2-Ethylhexyl)phthalate	--	347000	1370000	4660000	2170000	41000	940 JB

NOTE: Table presents only constituents detected in soil at this site.

ND = Not detected, at the reported detection limit.
X = SW8080 -- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed.
J = Detected below the detection limit
Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits. Samples were reanalyzed for this compound if detected in primary or secondary analyses.
B = Analyte detected in laboratory blank analysis, no blank subtraction performec
C = Presence and quantitation of analyte confirmed by second column analysis.
D = Secondary dilution required for this analyte.
TIC = Tentatively identified compound.
< = Analyte not detected at or above reported detection lim

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background value
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background level

[1] Source: Radian (1992c) and Radian (1993b)

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB-30&33-04	
Sample ID: Depth:						91JULHO30&33-007 2.5-7.5 ft	91JULHO30&33-008 8-12 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	61000	< 15
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
4,4'- DDT	--	17200	78100	138000	15800	82 J	< 1.2
Endosulfan Sulfate*	--	360000	4100000	1400000	1490000	250 J	.095 J
SW8240 - Volatile Organics (µg/kg)							
Methylene chloride	--	165000	440000	2550000	16.9	***2900 B***	***130 J***
SW8270 - Semivolatile Organics (µg/kg)							
2- Methylnaphthalene	--	--	--	--	--	80 J	< 1300
4- Methylphenol (p-cresol)	--	--	--	--	--	850 J	< 1300
Benzoic Acid	--	--	--	--	--	1300 J	< 6300
Dibutylphthalate	--	--	--	--	--	52 J	< 1300
Naphthalene	--	71900	98300	98300	393	110 J	< 1300
bis(2-Ethylhexyl)phthalate	--	347000	1370000	4660000	2170000	1300 JB	850 JB

NOTE: Table presents only constituents detected in soil at this site.

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X = SW8080 -- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed.
J = Detected below the detection limit.
Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits
Samples were reanalyzed for this compound if detected in primary or secondary analyses.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
C = Presence and quantitation of analyte confirmed by second column analysis.
D = Secondary dilution required for this analyte
TIC = Tentatively identified compound.
< = Analyte not detected at or above reported detection limit

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
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[1] Source: Radian (1992c) and Radian (1993b)
* Endosulfan screening value was used; a value for Endosulfan Sulfate was not available

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB- 30&33-05	
Sample ID:						91JULHO30&33-009	91JULHO30&33-010
Depth:						1.5- 8 ft	8- 12 ft
	NMGWQ Soil Screening Levels					(SOIL)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	1800	< 14
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
4,4'- DDD	--	24400	111000	829000	8400	< 5.4	0.020 J
4,4'- DDT	--	17200	78100	138000	15800	< 11	17 C
Dieldrin	--	304	1200	10200	2.7	< 5.4	0.95 X
Endosulfan Sulfate*	--	360000	4100000	1400000	1490000	< 16	10 X
Endrin	--	18000	205000	69900	745	< 5.4	0.17 J
PCB- 1254	--	1110	8260	4280	--	*19000 CD*	130 C
SW8240 - Volatile Organics (µg/kg)							
Chlorobenzene	--	176000	242000	242000	1030	38 J	< 140
Ethyl benzene	--	10600000	25400000	571000000	10500	< 140	25 J
Methyl ethyl ketone	--	573000	2100000	1880000	6630	< 2700	2100 J
Methylene chloride	--	165000	440000	2550000	16.9	***120 JB***	***170 B***
Toluene	--	248000	248000	248000	6800	13 J	< 140
Xylenes	--	132000	132000	132000	10100	43 J	120 JB
SW8270 - Semivolatile Organics (µg/kg)							
Benzo(b)fluoranthene	--	6210	23400	214000	3400	550 J	< 1200
Benzo(k)fluoranthene	--	62100	234000	2140000	34000	550 J	< 1200
Pyrene	--	2300000	31300000	9050000	568000	360 J	< 1200
bis(2-Ethylhexyl)phthalate	--	347000	1370000	4660000	2170000	1800 JB	81 JB

NOTE: Table presents only constituents detected in soil at this site.

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X = SW8080 -- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed.
J = Detected below the detection limit.
Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits.
Samples were reanalyzed for this compound if detected in primary or secondary analyses.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
C = Presence and quantitation of analyte confirmed by second column analysis.
D = Secondary dilution required for this analyte.
TIC = Tentatively identified compound.
< = Analyte not detected at or above reported detection limit

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background level
[1] Source: Radian (1992c) and Radian (1993b)
* Endosulfan screening value was used; a value for Endosulfan Sulfate was not available

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB- 30&33- 06	
Sample ID:						91JULHO30&33-011	91JULHO30&33-012
Depth:						3- 6 ft	6- 10 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	82000	< 14
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
4,4'- DDD	--	24400	111000	829000	8400	5.8 X	< 0.6
4,4'- DDE	--	17200	78100	585000	26800	5.7 X	< 0.6
Aldrin	--	284	1120	6990	294	19 X	< 0.6
delta-BHC	--	--	--	--	--	250 X	< 0.6
gamma-BHC	--	4370	19300	80900	7.09	1.2 C	< 0.6
SW8150 - Chlorinated Herbicides (µg/kg)							
Dichloroprop	--	--	--	--	--	310	< 39
SW8240 - Volatile Organics (µg/kg)							
Methylene chloride	--	165000	440000	2550000	16.9	***200 B***	***640 B***
Toluene	--	248000	248000	248000	6800	15 JB	9.5 JB
Xylenes	--	132000	132000	132000	10100	50 J	< 120
SW8240 - Volatile Organics, TIC List (µg/kg)							
C1-Naphthalene	--	71900	98300	98300	393	***5800***	ND
SW8270 - Semivolatile Organics (µg/kg)							
4-Methylphenol (p-cresol)	--	--	--	--	--	49000	< 12000

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X = SW8080 -- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed.
J = Detected below the detection limit.
Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits
Samples were reanalyzed for this compound if detected in primary or secondary analyses.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
C = Presence and quantitation of analyte confirmed by second column analysis.
D = Secondary dilution required for this analyte.
TIC = Tentatively identified compound.
< = Analyte not detected at or above reported detection limit

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *Italics* exceed Human Health Standard and are greater than the background value:
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background level
[1] Source: Radian (1992c) and Radian (1993b)

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB-30&33-07	
Sample ID:						91JULHO30&33-013	91JULHO30&33-014
Depth:						2-4 ft	4-8 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	3400	180
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
4,4'- DDD	--	24400	111000	829000	8400	5.0 C	< 0.55
4,4'- DDE	--	17200	78100	585000	26800	2.9 C	1.9 C
4,4'- DDT	--	17200	78100	138000	15800	0.48 J	< 1.1
Aldrin	--	284	1120	6990	294	1.2 X	0.98 C
Dieldrin	--	304	1200	10200	2.7	***4.7 X***	0.19 J
Endrin	--	18000	205000	69900	745	0.65 X	0.25 J
Endrin Aldehyde	--	--	--	--	--	3.0 X	1.7 X
Endrin Ketone	--	--	--	--	--	1.1 J	0.75 J
alpha-BHC	--	902	3990	30000	0.443	***0.50 J***	***< 0.55***
delta-BHC	--	--	--	--	--	20 X	1.5 C
gamma-BHC	--	4370	19300	80900	7.09	< 0.54	0.75 C
SW8150 - Chlorinated Herbicides (µg/kg)							
Dinoseb	--	--	--	--	--	32	< 8.2
SW8240 - Volatile Organics (µg/kg)							
Benzene	--	27000	73600	157000	28.3	***130 J***	***< 110***
Chloromethane	--	19500	47700	253000	10	***11000***	***< 220***
Ethyl benzene	--	10600000	25400000	571000000	10500	87 J	< 110
Methylene chloride	--	165000	440000	2550000	16.9	***26000 B***	***86 JB***
Tetrachloroethene	--	9830	24600	97600	6.44	***180 J***	***< 110***
Toluene	--	248000	248000	248000	6800	230 JB	7.1 JB
Trichloroethene	--	648	1590	34100	46.6	***200 J***	***< 110***
Xylenes	--	132000	132000	132000	10100	1300 J	< 110

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992c) and Radian (1993b)
< = Analyte not detected at or above reported detection limit

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB- 30&33- 07	
Sample ID:						91JULHO30&33-013	91JULHO30&33-014
Depth:						2- 4 ft	4- 8 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
SW8270- Semivolatile Organics (µg/kg)							
bis(2-Ethylhexyl)phthalate	--	347000	1370000	4660000	2170000	1700 B	6800 B

NOTE: Table presents only constituents detected in soil at this site.

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X = SW8080 -- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed.
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Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits.
Samples were reanalyzed for this compound if detected in primary or secondary analyses.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
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D = Secondary dilution required for this analyte.
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[1] Source: Radian (1992c) and Radian (1993b)

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB- 30&33- 08	
Sample ID:						91JULHO30&33-015	91JULHO30&33-016
Depth:						1.5- 2.5 ft	2.5- 4 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	2000	< 13
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
PCB-1254	--	1110	8260	4280	--	*1200 C*	< 11
delta-BHC	--	--	--	--	--	90 X	< 0.56
SW8150 - Chlorinated Herbicides (µg/kg)							
2,4-D	--	--	--	--	--	250	< 67
Dinoseb	--	--	--	--	--	110	< 8.3
SW8240 - Volatile Organics (µg/kg)							
1,1,1-Trichloroethane	--	551000	551000	551000	498	450	< 110
1,1-Dichloroethane	--	820000	1220000	1220000	121	32 J	< 110
Benzene	--	27000	73600	157000	28.3	***< 110***	3.4 J
Chlorobenzene	--	176000	242000	242000	1030	< 110	9.7 J
Ethyl benzene	--	10600000	25400000	571000000	10500	3.7 J	3.6 J
Methylene chloride	--	165000	440000	2550000	16.9	***250 B***	***850 B***
Tetrachloroethene	--	9830	24600	97600	6.44	***90 J***	***< 110***
Toluene	--	248000	248000	248000	6800	11 JB	19 JB
Trichloroethene	--	648	1590	34100	46.6	*7600*	***97 J***
Xylenes	--	132000	132000	132000	10100	12 J	12 J
SW8240 - Volatile Organics, TIC List (µg/kg)							
1,2-Dichlorobenzene	--	116000	116000	116000	8930	140	ND
Chlorofluoromethane	--	--	--	--	--	ND	240
Heptanoic acid, methyl ester	--	--	--	--	--	300	ND

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background value

Results shaded and *italics* exceed Human Health Standard and are greater than the background values

Results in *Italics* exceed a Human Health standard or DAF20 standard, but are below background levels

[1] Source: Radian (1992c) and Radian (1993b)

< = Analyte not detected at or above reported detection limit

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB- 30&33- 08	
Sample ID:						91JULHO30&33-015	91JULHO30&33-016
Depth:						1.5- 2.5 ft	2.5- 4 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
SW8270- Semivolatile Organics (µg/kg)							
bis(2-Ethylhexyl)phthalate	--	347000	1370000	4660000	2170000	< 11000	1400 B

NOTE: Table presents only constituents detected in soil at this site.

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Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits. Samples were reanalyzed for this compound if detected in primary or secondary analyses.
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C = Presence and quantitation of analyte confirmed by second column analysis
D = Secondary dilution required for this analyte.
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[1] Source: Radian (1992c) and Radian (1993b)

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB- 30&33- 09	
Sample ID: Depth:						91JULHO30&33-017 1.7-2.7 ft	91JULHO30&33-018 2.7-6 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	11000	3800
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
4,4'-DDE	--	17200	78100	585000	26800	< 6.0	1.3 X
4,4'-DDT	--	17200	78100	138000	15800	< 12	2.1 X
Aldrin	--	284	1120	6990	294	< 6.0	2.9 C
Dieldrin	--	304	1200	10200	2.7	***< 6.0***	1.8 X
Endrin Aldehyde	--	--	--	--	--	< 12	0.45 J
Heptachlor epoxide	--	--	--	--	--	< 6.0	2.3 X
PCB-1254	--	1110	8260	4280	--	*1900 C*	< 11
alpha-BHC	--	902	3990	30000	0.443	***7.5 C***	***3.6 X***
delta-BHC	--	--	--	--	--	43 X	7.8 C
gamma-BHC	--	4370	19300	80900	7.09	< 6.0	2.0 X
SW8150 - Chlorinated Herbicides (µg/kg)							
Dichloroprop	--	--	--	--	--	160	< 35
SW8240 - Volatile Organics (µg/kg)							
1,1,1-Trichloroethane	--	551000	551000	551000	498	***2500***	< 110
Ethyl benzene	--	10600000	25400000	571000000	10500	< 680	3.8 J
Methylene chloride	--	165000	440000	2550000	16.9	***590 JB***	***630 B***
Tetrachloroethene	--	9830	24600	97600	6.44	***170 J***	***< 110***
Toluene	--	248000	248000	248000	6800	< 680	13 JB
Trichloroethene	--	648	1590	34100	46.6	***19000***	***< 110***

NOTE: Table presents only constituents detected in soil at this site.

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X = SW8080 -- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed.
J = Detected below the detection limit.
Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits. Samples were reanalyzed for this compound if detected in primary or secondary analyses.
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Results shaded and *italics* exceed Human Health Standard and are greater than the background values
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[1] Source: Radian (1992c) and Radian (1993b)

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB-30&33-10	
Sample ID:						91JULHO30&33-019	91JULHO30&33-020
Depth:						2.6-8.9 ft	8.9-14 ft
	NMGWQ Soil Screening Levels					(WASTE)	(SOIL)
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	Result	Result
EPA 413.2- Oil and Grease (mg/kg)	--	--	--	--	--	14000	1100
SW8080 - Organochlorine Pesticides and PCBs (µg/kg)							
4,4'-DDD	--	24400	111000	829000	8400	180 X	< 0.62
4,4'-DDE	--	17200	78100	585000	26800	240 C	< 0.62
Aldrin	--	284	1120	6990	294	37 J	< 0.62
Chlordane	--	16200	71900	130000	7210	< 300 Z	59 C
Dieldrin	--	304	1200	10200	2.7	***140 X***	< 0.62
Heptachlor epoxide	--	--	--	--	--	940 X	< 0.62
delta-BHC	--	--	--	--	--	1200 X	< 0.62
gamma-BHC	--	4370	19300	80900	7.09	< 59	0.75 C
SW8150 - Chlorinated Herbicides (µg/kg)							
2,4-DB	--	--	--	--	--	< 54	22 J
MCPA	--	--	--	--	--	29000	< 15000
SW8240 - Volatile Organics (µg/kg)							
1,1,2-Trichloroethane		10700	27000	175000	24.7	***190***	***< 120***
Benzene	--	27000	73600	157000	28.3	***220***	2.4 J
Ethyl benzene	--	10600000	25400000	571000000	10500	***31000***	< 120
Methylene chloride	--	165000	440000	2550000	16.9	***890 B***	***500 B***
Toluene	--	248000	248000	248000	6800	2400 B	6.4 JB
Trichloroethene	--	648	1590	34100	46.6	***950***	***< 120***
Xylenes	--	132000	132000	132000	10100	***37000***	6.4 J
SW8240 - Volatile Organics, TIC List (µg/kg)							
C1-Naphthalene	--	71900	98300	98300	393	ND	***5100***
C1-Naphthalene2	--	71900	98300	98300	393	ND	***3600***
C2-Naphthalene	--	71900	98300	98300	393	ND	***520***
C2-Naphthalene2	--	71900	98300	98300	393	ND	***1900***
C2-Naphthalene3	--	71900	98300	98300	393	ND	***590***

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background value
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992c) and Radian (1993b)
< = Analyte not detected at or above reported detection limit

Table 2.18
DP-30/SD-33 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						SB- 30&33- 10	
Sample ID:						91JULHO30&33-019	91JULHO30&33-020
Depth:						2.6- 8.9 ft	8.9- 14 ft
	NMGWQ Soil Screening Levels						
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)	(WASTE)	(SOIL)
SW8270 - Semivolatile Organics (µg/kg)							
2-Methylnaphthalene	--	--	--	--	--	10000 J	1400
4-Methylphenol(p-cresol)	--	--	--	--	--	2800 J	< 1200
Anthracene	--	23500000	264000000	85300000	1600000	< 12000	550 J
Fluorene	--	3130000	29400000	10600000	100000	< 12000	210 J
Naphthalene	--	71900	98300	98300	393	***4300 J***	***< 1200***
Phenanthrene	--	1800000	20500000	6990000	76200	< 12000	470 J

NOTE: Table presents only constituents detected in soil at this site.

ND = Not detected, at the reported detection limit.
X = SW8080 -- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed
J = Detected below the detection limit.
Y= SW8080-- Endosulfan Sulfate calibration check standard outside accpetance limits. Samples were reanalyzed for this compound if detected in primary or secondary analyses
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
C = Presence and quantitation of analyte confirmed by second column analysis.
D = Secondary dilution required for this analyte.
TIC = Tentatively identified compound.
< = Analyte not detected at or above reported detection limit

Results in **BOLD** and *Italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background value:
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992c) and Radian (1993b)

Table 2.19
DP-30/SD-33 Summary of Constituents Exceeding Human Health-Based SSLs
Holloman AFB, New Mexico

Boring:	1		2		3		4		5	
Sample Type:	Waste	Soil	Waste	Soil	Waste	Soil	Waste	Soil	1.5-8 ft	8-12 ft
Receptor										
Residential	PCB-1254	--	ethylbenzene	--	--	--	--	--	PCB-1254	--
Industrial Worker	--	--	ethylbenzene	--	--	--	--	--	PCB-1254	--
Construction Worker	cadmium	cadmium	cadmium	cadmium	cadmium	cadmium	cadmium	cadmium	PCB-1254, cadmium	cadmium

Boring:	6		7		8		9		10	
Sample Type:	Waste	Soil	Waste	Soil	Waste	Soil	Waste	Soil	Waste	Soil
Receptor										
Residential	--	--	chromium, lead	--	PCB-1254, TCE	--	PCB-1254, TCE	--	TCE, ethylbenzene, lead	--
Industrial Worker	--	--	lead	--	TCE	--	TCE	--	ethylbenzene, lead	--
Construction Worker	--	cadmium	cadmium, chromium, lead	--	cadmium	--	cadmium	--	cadmium, lead	cadmium

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Table 2.20
DP-30/SD-33 Analytical Groundwater Results, 1991 Remedial Investigation

Location:	Background[1]	EPA MCL	NMGWQ Standard	MW-30&33-01 (upgradient)	MW-30&33-02	MW-30&33-03	MW-30&33-04
Analyses							
EPA 160.1 - Total Dissolved Solids (mg/L)	43600	--	1000	*19000*	*28000*	*31000*	*40000*
EPA 300.0 - Chloride (mg/L)	19600	--	250	*6800*	*12000*	*13000*	*15000*
EPA 300.0 - Sulfate (mg/L)	7470	--	600	*4200*	*4700*	*5200*	***8200***
EPA 340.2 - Fluoride (mg/L)	4.7	4	1.6	*1.9*	1.5	1.4	1.3
EPA 353.1 - Nitrate-Nitrite (mg/L)	98	--	--	12	7.5	41	120
EPA 365.2 - Total Phosphorus (mg/L)	0.75	--	--	0.28	0.15	0.28	0.50
SW6010 - Metals (µg/L)							
Antimony	89.6	6	--	140	<100	***<200***	<100
Beryllium	3.8	4	--	<2	<2	<4	***5.4***
Cadmium	8.3	5	10	<5	<5	***<10***	*6.5*
Chromium	234	100	10	<10	<10	*<20*	*50*
Copper	38.6	--	1000	<20	<20	<40	60
Nickel	43.6	--	200^	21	28	<40	65
Zinc	253.4	--	10000	<20	<20	<40	110
SW7421 - Lead (µg/L)	19.9	15	50	<6 Z	<6 Z	8.4 Z	***24 Z***
SW7740 - Selenium (µg/L)	79.3	50	50	12	27	29	*59*
SW9310 - Gross Alpha and Gross Beta (pCi/L)							
Gross Alpha	--	--	--	39	- 8.2	42	50
Gross Beta	--	--	--	-5.5	74	6.4	110

Note: Table presents only constituents detected in groundwater at this site.

Z = SW6010, SW7421-- Analyte detected in method blank.
Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels
-- = No value or standard was found

[1] Source for metals background values: Radian (1993b). Source for all other background values: Radian (1992c)

Table 2.20
DP-30/SD-33 Analytical Groundwater Results, 1991 Remedial Investigation

Location: Sample ID:	Background[1]	EPA MCL	NMGWQ GW	MW-30&33-01 (upgradient)	MW-30&33-02	MW-30&33-03	MW-30&33-04
Analyses							
SW8150 - Chlorinated Herbicides (µg/L)							
2,4- DB	--	--	--	<0.87	0.010 J	<0.87	<0.87
SW8240 - Volatile Organics (µg/L)							
1,1,1 - Trichloroethane	--	200	60	<5.0	<5.0	<5.0	0.59 J
Ethyl benzene	--	700	750	<5.0	<5.0	<5.0	0.74 J
Methylene chloride	--	--	100	5.3 B	0.72 JB	5.0 B	2.8 JB
Tetrachloroethene	--	5	20	<5.0	<5.0	<5.0	0.56 J
Toluene	--	1000	750	0.16 J	0.28 J	0.19 J	6.4
Trichloroethene	--	5	100	<5.0	<5.0	<5.0	1.6 J
Xylenes	--	10000	620	<5.0	<5.0	<5.0	2.0 J
SW8240 - Volatile Organics, TIC List (µg/L)							
Hexane	--	--	--	8	ND	ND	ND
SW8270 - Semivolatile Organics (µg/L)							
bis(2-Ethylhexyl)phthalate	--	6	--	*<9.6*	***37 B***	1.7 JB	*<9.6*

NOTE: Table presents only constituents detected in groundwater at this site.

J = Detected below the detection limit.
ND = Not Detected, at the reported detection limit.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
TIC = Tentatively identified compound
Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

-- = No value or standard was found

Table 2.21
DP-30 & SD-33 Analytical Groundwater Results, 2003 Long-Term Monitoring

Well Number				MW-30/33-01 (upgradient)					MW-30/33-02				
Sampling Data	Background[5] (µg/L)	EPA MCL (µg/L)	NMGWQ Standard (µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Acetone	--	--	--	ND	ND	< 5	< 5	NA	ND	3.1 J	< 5	< 5	NA
Bromodichloromethane	--	--	--	ND	ND	< 3	< 5	NA	ND	ND	<3	< 5	NA
Bromoform	--	--	--	ND	ND	< 3	< 5	NA	ND	0.73 J	< 3	< 5	NA
Chloroform	--	--	100	ND	ND	< 3	< 5	< 1	ND	0.76 J	< 3	< 5	.32 (J)
1,1-Dichloroethane	--	--	25	ND	ND	< 3	< 5	< 1	ND	ND	< 3	< 5	< 1
1,1-Dichloroethylene	--	7	5	ND	ND	< 3	< 5	NA	ND	ND	< 3	< 5	NA
cis-1,2-Dichloroethylene	--	70	--	ND	ND	< 3	< 5	NA	ND	ND	< 3	< 5	NA
Methylene chloride	--	--	100	ND	19 UB	< 3	< 5	NA	ND	3.8 UB	< 3	< 5	NA
1,1,1-Trichloroethane	--	200	60	ND	ND	< 3	< 5	NA	ND	ND	< 3	< 5	NA
Trichloroethylene	--	5	100	ND	ND	< 3	< 5	< 1	ND	ND	< 3	< 5	< 1
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	*12.4 B (J)*	9.0 B	*18.3*	ND	ND	*11.7 B (J)*	6.4 B	*12.4*
Barium	85.2	2000	1000	ND	ND	12.4 B (J)	9.7 B	7.92 J	ND	22	22.4 B (J)	16.3	15.9
Iron	--	--	1000	ND	ND	< 21	< 1000	< 200	ND	ND	< 21	< 1000	74.7 UJ
Manganese	--	--	200	ND	ND	0.5 B	NA	NA	ND	ND	< 0.2	NA	NA
Selenium	85.3	50	50	ND	10	21.8 B (J)	17.6	17.6	ND	23	27 B (J)	14.5	33.7
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
Chlorinated Herbicides[4] (µg/L)													
all	--	--	--	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
[5] Radian, 1993b
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - volatile organic compounds
µg/L - micrograms per liter
-- - no value or standard was found

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.

Table 2.21
DP-30 & SD-33 Analytical Groundwater Results, 2003 Long-Term Monitoring

Well Number				MW-30/33-03					MW-30/33-04				
Sampling Data	BACKGROUND[5] (µg/L)	EPA MCL (µg/L)	NMGWQ (mg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)													
Acetone	--	--	--	ND	ND	< 5	< 5	NA	ND	ND	< 5	< 5	NA
Bromodichloromethane	--	--	--	ND	ND	< 3	< 5	NA	ND	ND	1 J	< 5	NA
Bromoform	--	--	--	ND	ND	< 3	< 5	NA	ND	ND	< 3	< 5	NA
Chloroform	--	--	100	ND	ND	< 3	< 5	0.43 (J)	ND	4.7	5	2.8 J	2.6
1,1-Dichloroethane	--	--	25	ND	ND	< 3	< 5	0.42 (J)	22	25	***27***	13	9.3
1,1-Dichloroethylene	--	7	5	ND	ND	< 3	< 5	NA	ND	ND	2 J	< 5	NA
cis-1,2-Dichloroethylene	--	70	--	ND	ND	< 3	< 5	NA	ND	2.9 J	2 J	< 5	NA
Methylene chloride	--	--	100	ND	3.7 UB	< 3	< 5	NA	ND	ND	< 3	< 5	NA
1,1,1-Trichloroethane	--	200	60	ND	ND	< 3	< 5	NA	ND	ND	1 J	< 5	NA
Trichloroethylene	--	5	100	ND	ND	< 3	< 5	2.8	***110***	***100***	***150***	***52***	***44***
Metals[2] (µg/L)													
Arsenic	35.4	10	100	ND	ND	4.3 B (J)	2.0 B	< 10	ND	ND	*14 B (J)*	9.3 B	*23.3*
Barium	85.2	2000	1000	ND	24	26.3 B (J)	19.5	15.4	ND	ND	15.8 B (J)	14	10.9
Iron	--	--	1000	ND	ND	< 110	< 1000	21.7 UJ	ND	300	< 110	< 1000	200
Manganese	--	--	200	ND	ND	0.2 B	NA	NA	ND	ND	1.7 B	NA	NA
Selenium	85.3	50	50	ND	35	24.4 B (J)	15.7	25.9	ND	14	21.3 B (J)	13.2	17.9
Organochlorine Pesticides[3] (µg/L)													
all	--	--	--	ND	ND	NA	NA	NA	ND	ND	NA	NA	NA
Chlorinated Herbicides[4] (µg/L)													
all	--	--	--	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to '99 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
[5] Radian, 1993
CRDL - Contract-required Detection Limit
IDL - Instrument Detection Limit
NA - not analyzed
ND - not detected at or above method reporting limit
VOCs - colatile organic compounds
µg/L - micrograms per liter
-- no value or standard was found

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Laboratory qualifiers–
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detct due to presence of analyte in associated laboratory blank
EPA Qualifiers–assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.
Bold values indicate analytes above the New Mexico Groundwater Quality Standards.

Table 2.22
SS-39 Inorganic Analytical Soil Results, 1991 Remedial Investigation

Location:						SB-39-01		SB-39-02	
Sample ID:						91JULHO39-001	91JULHO39-002	91JULHO39-003	91JULHO39-004
Depth:						7.5- 9.5 ft	10- 12 ft	10- 12 ft	15- 17 ft
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW6010 - Metals (mg/kg)									
Beryllium	1.3	156	2250	56.2	63.2	< 0.36	< 0.49	< 0.45	0.58
Cadmium	1.0	74.1	8600	0.00474	7.52	0.98	< 1.2	***30***	4.3
Chromium	24.6	234	3400	180	19.2	5.6	3.2	***78***	***25***
Copper	21.2	3130	45400	12400	703	6	< 4.9	82	5.1
Nickel	18.1	1560	22500	561	261	< 3.6	< 4.9	14	8.6
Silver	0.73	391	5680	1550	8.47	< 1.8	< 2.4	< 2.3	< 2.4
Zinc	48.7	23500	100000	92900	12400	52	8.4	380	60
SW7060 - Arsenic (mg/kg)	6.9	3.9	17.7	85.2	58.3	2.6	0.66	2	2
SW7421 - Lead (mg/kg)	12.3	400	750	750	9.17	16	1	***77***	*9.2*
SW7471 - Mercury (mg/kg)	--	23.5	341	84.4	--	< 0.056	< 0.064	< 0.068	< 0.060

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992b) and Radian (1993c)

< = Analyte not detected at the reported detection limit
-- = No value available

Table 2.22
SS-39 Inorganic Analytical Soil Results, 1991 Remedial Investigation

Location:						HA-39-01	HA-39-02	HA-39-03
Sample ID:						91JULHO39-007	91JULHO39-008	91JULHO39-009
Depth:						0- 2 ft	0-2 ft	0-2 ft
	NMGWQ Soil Screening Levels					Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)			
SW6010 - Metals (mg/kg)								
Beryllium	1.3	156	2250	56.2	63.2	< 0.46	0.57	0.58
Cadmium	1.0	74.1	8600	0.00474	7.52	< 1.2	*7.3*	***7.8***
Chromium	24.6	234	3400	180	19.2	8.6	***26***	***47***
Copper	21.2	3130	45400	12400	703	14	91	140
Nickel	18.1	1560	22500	561	261	6.5	23	21
Silver	0.73	391	5680	1550	8.47	< 2.3	< 1.8	***12***
Zinc	48.7	23500	100000	92900	12400	30	250	180
SW7060 - Arsenic (mg/kg)	6.9	3.9	17.7	85.2	58.3	1.6	*28*	*34*
SW7421 - Lead (mg/kg)	12.3	400	750	750	9.17	***180***	***1300***	***1100***
SW7471 - Mercury (mg/kg)	--	23.5	341	84.4	--	< 0.064	0.063	< 0.069

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992b) and Radian (1993c)
< = Analyte not detected at the reported detection limit
-- = No value available

Table 2.22
SS-39 Inorganic Analytical Soil Results, 1991 Remedial Investigation

Location:						**HA-39-04**	**HA-39-05**
Sample ID:						**91JULHO39-005**	**91JULHO39-006**
Depth:						**0- 2 ft**	**0-2 ft**
	NMGWQ Soil Screening Levels					**Result**	**Result**
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)		
SW6010 - Metals (mg/kg)							
Beryllium	1.3	156	2250	56.2	63.2	< 0.48	< 0.47
Cadmium	1.0	74.1	8600	0.00474	7.52	***38***	*4*
Chromium	24.6	234	3400	180	19.2	***190***	***130***
Copper	21.2	3130	45400	12400	703	110	19
Nickel	18.1	1560	22500	561	261	31	58
Silver	0.73	391	5680	1550	8.47	< 2.4	< 2.4
Zinc	48.7	23500	100000	92900	12400	540	130
SW7060 - Arsenic (mg/kg)	6.9	3.9	17.7	85.2	58.3	3.7	0.99
SW7421 - Lead (mg/kg)	12.3	400	750	750	9.17	***210***	*10*
SW7471 - Mercury (mg/kg)	--	23.5	341	84.4	--	0.074	< 0.060

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992b) and Radian (1993c)

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Table 2.23
SS-39 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						**SB-39-01**		**SB-39-02**	
Sample ID:						**91JULHO39-001**	**91JULHO39-002**	**91JULHO39-003**	**91JULHO39-004**
Depth:						**7.5- 9.5 ft**	**10- 12 ft**	**10- 12 ft**	**15- 17 ft**
	NMGWQ Soil Screening Levels					**Result**	**Result**	**Result**	**Result**
Analyses	Background (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)				
EPA 418.1 - TRPH (mg/kg)	--	--	--	--	--	678	26.3	2620	543
SW820 - Volatile Organics (µg/kg)									
1,1,1- Trichloroethane	--	551000	551000	551000	498	< 130	***430000 D***	***87000 D***	***900***
1,1,2- Trichloroethane	--	10700	27000	175000	24.7	***< 130***	***95 J***	***< 140***	***< 140***
1,1 - Dichloroethane	--	820000	1220000	1220000	121	***< 130***	***260***	***170***	69 J
1,1 - Dichloroethene	--	182000	686000	601000	38.4	***< 130***	***< 130***	***< 140***	***44 J***
1,2 - Dichloroethane	--	5070	12600	53300	19.8	***< 130***	***140***	***< 140***	***< 140***
Chloromethane	--	19500	47700	253000	10	***44 J***	***< 270***	***< 280***	***< 270***
Ethyl benzene	--	10600000	25400000	571000000	10500	2.9 J	4.3 J	81 J	< 140
Methylene chloride	--	165000	440000	2550000	16.9	***510 B***	***630 B***	***1400 B***	***530 B***
Tetrachloroethene	--	9830	24600	97600	6.44	***< 130***	***430***	***95000 D***	***300***
Toluene	--	248000	248000	248000	6800	12 JB	3400 B	82 JB	12 JB
Trichloroethene	--	648	1590	34100	46.6	***< 130***	***40000 D***	***11000 D***	***47 J***
Xylenes	--	132000	132000	132000	10100	8.1 J	23 J	290	< 140

NOTE: Table presents only constituents detected in soil at this site.
ND = Not Detected, at the reported detection limit.
D = secondary dilution required for this analyte.
J = Detected below the detection limit.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels

Table 2.23
SS-39 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						HA-39-01	HA-39-02	HA-39-03
Sample ID:						91JULHO39-007	91JULHO39-008	91JULHO39-009
Depth:						0- 2 ft	0-2 ft	0-2 ft
	NMGWQ Soil Screening Levels					Result	Result	Result
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)			
EPA 418.1 - TRHP (mg/kg)	--	--	--	--	--	50.2	660	811
SW820 - Volatile Organics (µg/kg)								
1,1,1- Trichloroethane	--	551000	551000	551000	498	< 140	< 110	< 150
1,1,2- Trichloroethane	--	10700	27000	175000	24.7	***< 140***	***< 110***	***< 150***
1,1 - Dichloroethane	--	820000	1220000	1220000	121	***< 140***	< 110	***< 150***
1,1 - Dichloroethene	--	182000	686000	601000	38.4	***< 140***	18 J	***< 150***
1,2 - Dichloroethane	--	5070	12600	53300	19.8	***< 140***	***< 110***	***< 150***
Chloromethane	--	19500	47700	25300	10	***< 280***	***< 230***	***< 300***
Ethyl benzene	--	10600	25400	571000	10.5	< 140	< 110	< 150
Methylene chloride	--	165000	440000	2550000	16.9	***720***	***350***	***36 J***
Tetrachloroethene	--	9830	24600	97600	6.44	***< 140***	***< 110***	***< 150***
Toluene	--	248000	248000	248000	6800	91.1 J	8.0 J	9.1 J
Trichloroethene	--	648	1590	34100	46.6	***< 140***	***< 110***	***< 150***
Xylenes	--	132000	132000	132000	10100	< 140	< 110	< 150

NOTE: Table presents only constituents detected in soil at this site.
ND = Not Detected, at the reported detection limit.
D = secondary dilution required for this analyte.
J = Detected below the detection limit.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)

Table 2.23
SS-39 Organic Soil Analytical Results, 1991 Remedial Investigation

Location:						**HA-39-04**	**HA-39-05**
Sample ID:						**91JULHO39-005**	**91JULHO39-006**
Depth:						**0- 2 ft**	**0-2 ft**
	NMGWQ Soil Screening Levels					**Result**	**Result**
Analyses	Background[1] (µg/kg)	Residential (µg/kg)	Industrial/ Occupational (µg/kg)	Construction Worker (µg/kg)	DAF 20 (µg/kg)		
EPA 418.1 - TRHP (mg/kg)	--	--	--	--	--	20700	95.6
SW820 - Volatile Organics (µg/kg)							
1,1,1- Trichloroethane	--	551000	551000	551000	498	< 120	< 130
1,1,2- Trichloroethane	--	10700	27000	175000	24.7	***< 120***	***< 130***
1,1 - Dichloroethane	--	820000	1220000	1220000	121	< 120	***< 130***
1,1 - Dichloroethene	--	182000	686000	601000	38.4	***< 120***	22 J
1,2 - Dichloroethane	--	5070	12600	53300	19.8	***< 120***	***< 130***
Chloromethane	--	19500	47700	25300	10	***< 240***	***< 260***
Ethyl benzene	--	10600	25400	571000	10.5	< 120	5.9 J
Methylene chloride	--	165000	440000	2550000	16.9	***54 J***	***260***
Tetrachloroethene	--	9830	24600	97600	6.44	***< 120***	***28 J***
Toluene	--	248000	248000	248000	6800	8.9 J	9.3 J
Trichloroethene	--	648	1590	34100	46.6	***< 120***	***< 130***
Xylenes	--	132000	132000	132000	10100	38 J	13 J

NOTE: Table presents only constituents detected in soil at this site.
ND = Not Detected, at the reported detection limit.
D = secondary dilution required for this analyte.
J = Detected below the detection limit.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)

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Table 2.24
SS-39 Analytical Groundwater Results, 1991 Remedial Investigation

Location: **Sample ID:**				**MW-39-01** **39-01-01** **(upgradient)**	**MW-39-02** **39-02-01**	**MW-39-03** **39-03-01**	**MW-39-04** **39-04-01**
Analyses	Background[1]	EPA MCL	NMGWQ Standards	**Result**	**Result**	**Result**	**Result**
EPA 160.1 - Total Dissolved Solids (mg/L)	43600	--	1000	*11000*	*13000*	*14000*	*2600*
EPA 300.0 - Chloride (mg/L)	19600	--	250	*2200*	*4200*	*4500*	39
EPA 300.0 - Sulfate (mg/L)	7470	--	600	*4300*	*4400*	*3500*	< 0.050
EPA 340.2 - Fluoride (mg/L)	4.7	4	1.6	*1.8*	1.5	*1.9*	0.77
EPA 353.1 - Nitrate-Nitrite (mg/L)*	98	--	10	*48*	*87*	*49*	0.52
EPA 365.2 - Total Phosphorus (mg/L)	0.75	--	--	0.22	0.18	0.21	0.093
SW6010 - Metals (µg/L)							
Berylium	3.8	4	1300	< 0.2	2.9	2.5	< 2.0
Cadmium	8.3	5	10	< 0.5	*5.9*	< 5.0	< 5.0
Chromium	234	100	50	< 10	20	21	< 10
Copper	38.6	1300	1000	< 20	< 20	120	< 20
Nickel	43.6	NV	200^	< 20	30	38	< 20
Zinc	253.4	NV	10000	< 20	71	58	24
SW7421 - Lead (µg/L)	19.9	15	50	< *30*	7.8	11	*19*
SW7740 - Selenium (µg/L)	79.3	50	50	< 5	15	13	< 5.0

NOTE: Tables presents only constituents detected in groundwater at this site.
< = Analyte not detected at the reported detection limit.

[1] Source for metals background values: Radian (1993b). Source for all other background values: Radian(1992c)
* NMGWQ human health standard for Nitrate was used; a value for Nitrite was not listed
Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed USEPA or NMGWQ standards but are below background and/or upgradient levels
^ NMGWQ standard for Irrigation Use

Table 2.24
SS-39 Analytical Groundwater Results, 1991 Remedial Investigation

Location: Sample ID:				MW-39-01 39-01-01 (upgradient)	MW-39-02 39-02-01	MW-39-03 39-03-01	MW-39-04 39-04-01
Analyses	Background[1]	EPA MCL (µg/L)	NMGWQ (mg/L	**Result**	**Result**	**Result**	**Result**
SW8240 - Volatile Organics (µg/L)							
1,1,1- Trichloroethane	--	200	60	< 5.0	***240 D***	< 5.0	1.8 J
1,1 - Dichloroethane	--	--	25	< 5.0	0.59 J	< 5.0	< 5.0
1,1 - Dichloroethene	--	7	5	< 5.0	***9.6***	< 5.0	< 5.0
Acetone	--	--	--	24 J	< 100	3.5 J	< 100
Carbon tetrachloride	--	5	10	< 5.0	***5.8***	< 5.0	< 5.0
Chloroform	--	--	100	0.35 J	2.1 J	0.81 J	< 5.0
Chloromethane	--	--	--	< 10	0.72 J	< 10	< 10
Methylene chloride	--	--	100	14 B	10 B	15 B	15 B
Tetrachloroethene	--	5	20	0.19 J	1.1 J	0.37 J	< 5.0
Trichloroethene	--	5	100	0.25 J	***59***	2.7 J	< 5.0

NOTE: Table presents only constituents detected in groundwater at this site.
ND = Not Detected, at the reported detection limit.
D = Secondary dilution required for this analyte.
J = Detected below the detectoin limit.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
-- = No value available
< = Analyte not detected at the reported detection limit

[1] Source for metals background values: Radian (1993c). Source for all other background values: Radian (1992b)
Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-A01	179-A01	179-A01	179-A02
Sample ID						179A01-01-01	179-A01-02-01	179-A01-03-01	179-A02-01-01
Beg. Depth-End Depth (ft)						0-2	2-4	8-10	2-4
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	84	80	143	41.7
Cadmium	1.0	74.1	8600	0.00474	7.52	***11.3***	***22.4***	***6.3***	***2.33***
Chromium	24.6	234	3400	180	19.2	***47.8***	***188***	***38.6***	12.8
Silver	0.73	391	5680	1550	8.47	<0.159	1.5	0.282	<0.169
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	***109 S***	***94.2 S***	***22.6 SB***	5.84 S

Location ID						179-A02	179-A02	179-A03	179-A03
Sample ID						179A02-02-01	179-A02-03-01	179-A03-01-01	179-A03-02-01
Beg. Depth-End Depth (ft)						4-6	8-10	2-4	4-6
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	32	48	36.6	30.7
Cadmium	1.0	74.1	8600	0.00474	7.52	*<0.314*	*<0.28*	*0.296*	*<0.288*
Chromium	24.6	234	3400	180	19.2	4.05 B	8.71	8.14	4.59
Silver	0.73	391	5680	1550	8.47	<0.2	<0.179	<0.18	<0.183
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	0.592 S	0.11 SB	6.77 S	1.1 S

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992c) and Radian (1993b)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-A03	179-A04	179-A04	179-A04
Sample ID						179A03-03-01	179-A04-01-01	179-A04-02-01	179-A04-03-01
Beg. Depth-End Depth (ft)						8-10	2-4	4-6	8-10
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	25.2	33.1	22.9	57.5
Cadmium	1.0	74.1	8600	0.00474	7.52	*<0.267*	***1.09***	*0.582*	*<0.253*
Chromium	24.6	234	3400	180	19.2	3.67	4.84	4.61	11.1
Silver	0.73	391	5680	1550	8.47	<0.171	<0.153	<0.169	<0.161
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	0.535 SB	***43.8 S***	***44.4 S***	***13.6 S***

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-A05	179-A05	179-A05	179-B01
Sample ID						179A05-01-01	179-A05-02-01	179-A05-03-01	179-B01-01-01
Beg. Depth-End Depth (ft)						0-2	4-6	8-10	0-2
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW8270-Semivolatile Organics (mg/kg)									
Acetophenone	--	--	--	--	--	NA	NA	NA	ND
Anthracene	--	23500	264000	85300	1600	NA	NA	NA	ND
Benzo(a)anthracene	--	6.21	23.4	214	1.1	NA	NA	NA	ND
Benzo(a)pyrene	--	0.621	2.34	21.4	6.12	NA	NA	NA	ND
Benzo(b)fluoranthene	--	6.21	23.4	214	3.4	NA	NA	NA	ND
Benzo(g,h,i)perylene	--	--	--	--	--	NA	NA	NA	ND
Benzo(k)fluoranthene	--	62.1	234	2140	34	NA	NA	NA	ND
Chrysene	--	621	2340	21400	110	NA	NA	NA	ND
Di-n-octylphthalate	--	--	--	--	--	NA	NA	NA	ND
bis(2-Ethylhexyl)phthalate	--	347	1370	4660	2170	NA	NA	NA	ND
Fluoranthene	--	2250	24400	8730	4820	NA	NA	NA	ND
Indeno(1,2,3-cd)pyrene	--	6.21	23.4	214	9.58	NA	NA	NA	ND
Phenanthrene	--	1800	20500	6990	76.2	NA	NA	NA	ND
Pyrene	--	2300	31300	9050	568	NA	NA	NA	ND
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	52.9	38.8	62	44
Cadmium	1.0	74.1	8600	0.00474	7.52	*0.364 B*	*0.332 B*	*0.796 B*	*<0.29*
Chromium	24.6	234	3400	180	19.2	10.6	15.8	7.74	7.18
Silver	0.73	391	5680	1550	8.47	<0.139	<0.151	<0.122	0.239
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	***275***	***59.2***	***46.3***	***14.4 S***

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-B01	179-B01	179-B01	179-B02
Sample ID						179B01-02-01	179-B01-03-01	179-B01-04-01	179-B02-01-01
Beg. Depth-End Depth (ft)						2-4	4-6	6-8	0-2
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW8270-Semivolatile Organics (mg/kg)									
Acetophenone	--	--	--	--	--	NA	NA	NA	ND
Anthracene	--	23500	264000	85300	1600	NA	NA	NA	ND
Benzo(a)anthracene	--	6.21	23.4	214	1.1	NA	NA	NA	ND
Benzo(a)pyrene	--	0.621	2.34	21.4	6.12	NA	NA	NA	ND
Benzo(b)fluoranthene	--	6.21	23.4	214	3.4	NA	NA	NA	ND
Benzo(g,h,i)perylene	--	--	--	--	--	NA	NA	NA	ND
Benzo(k)fluoranthene	--	62.1	234	2140	34	NA	NA	NA	ND
Chrysene	--	621	2340	21400	110	NA	NA	NA	ND
Di-n-octylphthalate	--	--	--	--	--	NA	NA	NA	ND
bis(2-Ethylhexyl)phthalate	--	347	1370	4660	2170	NA	NA	NA	ND
Fluoranthene	--	2250	24400	8730	4820	NA	NA	NA	ND
Indeno(1,2,3-cd)pyrene	--	6.21	23.4	214	9.58	NA	NA	NA	ND
Phenanthrene	--	1800	20500	6990	76.2	NA	NA	NA	ND
Pyrene	--	2300	31300	9050	568	NA	NA	NA	ND
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	60.8	77.1	37.4	41.2
Cadmium	1.0	74.1	8600	0.00474	7.52	*<0.279*	*<0.266*	*<0.273*	*<0.282*
Chromium	24.6	234	3400	180	19.2	6.43	7.09	5.97	6.68
Silver	0.73	391	5680	1550	8.47	0.282	<0.17	0.207	<0.18
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	2.29 S	2.28 S	1.84 S	5.38

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-B02	179-B02	179-B02	179-B03
Sample ID						179B02-02-01	179-B02-03-01	179-B02-04-01	179-B03-01-01
Beg. Depth-End Depth (ft)						2-4	4-6	6-8	0-2
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW8270-Semivolatile Organics (mg/kg)									
Acetophenone	--	--	--	--	--	NA	NA	NA	ND
Anthracene	--	23500	264000	85300	1600	NA	NA	NA	ND
Benzo(a)anthracene	--	6.21	23.4	214	1.1	NA	NA	NA	ND
Benzo(a)pyrene	--	0.621	2.34	21.4	6.12	NA	NA	NA	ND
Benzo(b)fluoranthene	--	6.21	23.4	214	3.4	NA	NA	NA	ND
Benzo(g,h,i)perylene	--	--	--	--	--	NA	NA	NA	ND
Benzo(k)fluoranthene	--	62.1	234	2140	34	NA	NA	NA	ND
Chrysene	--	621	2340	21400	110	NA	NA	NA	0.0167 J
Di-n-octylphthalate	--	--	--	--	--	NA	NA	NA	ND
bis(2-Ethylhexyl)phthalate	--	347	1370	4660	2170	NA	NA	NA	ND
Fluoranthene	--	2250	24400	8730	4820	NA	NA	NA	0.0169 J
Indeno(1,2,3-cd)pyrene	--	6.21	23.4	214	9.58	NA	NA	NA	ND
Phenanthrene	--	1800	20500	6990	76.2	NA	NA	NA	ND
Pyrene	--	2300	31300	9050	568	NA	NA	NA	0.0159 J
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	38.5	67.8	34.7	50.6
Cadmium	1.0	74.1	8600	0.00474	7.52	*<0.232*	*<0.254*	*<0.27*	*0.499 B*
Chromium	24.6	234	3400	180	19.2	7.18	8.96	5.61	8.36
Silver	0.73	391	5680	1550	8.47	0.183 B	<0.162	<0.172	0.178 B
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	1.57	1.46	0.43	0.256

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-B03	179-B03	179-B03	179-B04
Sample ID						179B03-02-01	179-B03-03-01	179-B03-04-01	179-B04-01-01
Beg. Depth-End Depth (ft)						2-4	4-6	6-8	0-2
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW8270-Semivolatile Organics (mg/kg)									
Acetophenone	--	--	--	--	--	NA	NA	NA	ND
Anthracene	--	23500	264000	85300	1600	NA	NA	NA	ND
Benzo(a)anthracene	--	6.21	23.4	214	1.1	NA	NA	NA	ND
Benzo(a)pyrene	--	0.621	2.34	21.4	6.12	NA	NA	NA	ND
Benzo(b)fluoranthene	--	6.21	23.4	214	3.4	NA	NA	NA	ND
Benzo(g,h,i)perylene	--	--	--	--	--	NA	NA	NA	ND
Benzo(k)fluoranthene	--	62.1	234	2140	34	NA	NA	NA	ND
Chrysene	--	621	2340	21400	110	NA	NA	NA	ND
Di-n-octylphthalate	--	--	--	--	--	NA	NA	NA	ND
bis(2-Ethylhexyl)phthalate	--	347	1370	4660	2170	NA	NA	NA	ND
Fluoranthene	--	2250	24400	8730	4820	NA	NA	NA	ND
Indeno(1,2,3-cd)pyrene	--	6.21	23.4	214	9.58	NA	NA	NA	ND
Phenanthrene	--	1800	20500	6990	76.2	NA	NA	NA	ND
Pyrene	--	2300	31300	9050	568	NA	NA	NA	ND
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	44.5	37.7	73.1	38.9
Cadmium	1.0	74.1	8600	0.00474	7.52	*<0.291*	*<0.272*	*<0.263*	*<0.304*
Chromium	24.6	234	3400	180	19.2	6.73	5.82	8.79	7.84
Silver	0.73	391	5680	1550	8.47	0.238 B	<0.173	0.392 B	0.55 B
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	4.91	0.494	1.62	5.22

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-B04	179-B05	179-B05	179-B05
Sample ID						179B04-02-01	179-B05-01-01	179-B05-02-01	179-B05-03-01
Beg. Depth-End Depth (ft)						2-4	0-2	2-4	4-6
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW8270-Semivolatile Organics (mg/kg)									
Acetophenone	--	--	--	--	--	NA	ND	NA	NA
Anthracene	--	23500	264000	85300	1600	NA	ND	NA	NA
Benzo(a)anthracene	--	6.21	23.4	214	1.1	NA	ND	NA	NA
Benzo(a)pyrene	--	0.621	2.34	21.4	6.12	NA	ND	NA	NA
Benzo(b)fluoranthene	--	6.21	23.4	214	3.4	NA	ND	NA	NA
Benzo(g,h,i)perylene	--	--	--	--	--	NA	ND	NA	NA
Benzo(k)fluoranthene	--	62.1	234	2140	34	NA	ND	NA	NA
Chrysene	--	621	2340	21400	110	NA	ND	NA	NA
Di-n-octylphthalate	--	--	--	--	--	NA	ND	NA	NA
bis(2-Ethylhexyl)phthalate	--	347	1370	4660	2170	NA	ND	NA	NA
Fluoranthene	--	2250	24400	8730	4820	NA	ND	NA	NA
Indeno(1,2,3-cd)pyrene	--	6.21	23.4	214	9.58	NA	ND	NA	NA
Phenanthrene	--	1800	20500	6990	76.2	NA	ND	NA	NA
Pyrene	--	2300	31300	9050	568	NA	ND	NA	NA
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	54.6	39.9	56	22.9
Cadmium	1.0	74.1	8600	0.00474	7.52	*<0.236*	*<0.262*	*<0.287*	*<0.247*
Chromium	24.6	234	3400	180	19.2	4.93	5.73	8.95	4.11
Silver	0.73	391	5680	1550	8.47	<0.15	<0.167	0.286	<0.158
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	0.531	6.07 S	4.44 S	2.48 S

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-B05	179-B06	179-B06	179-B06
Sample ID						179B05-04-01	179-B06-01-01	179-B06-02-01	179-B06-03-01
Beg. Depth-End Depth (ft)						12-14	0-2	2-4	4-6
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW8270-Semivolatile Organics (mg/kg)									
Acetophenone	--	--	--	--	--	NA	0.0234	NA	NA
Anthracene	--	23500	264000	85300	1600	NA	0.024	NA	NA
Benzo(a)anthracene	--	6.21	23.4	214	1.1	NA	0.119	NA	NA
Benzo(a)pyrene	--	0.621	2.34	21.4	6.12	NA	0.0985	NA	NA
Benzo(b)fluoranthene	--	6.21	23.4	214	3.4	NA	0.17 F	NA	NA
Benzo(g,h,i)perylene	--	--	--	--	--	NA	0.0232 J	NA	NA
Benzo(k)fluoranthene	--	62.1	234	2140	34	NA	0.17 F	NA	NA
Chrysene	--	621	2340	21400	110	NA	0.152	NA	NA
Di-n-octylphthalate	--	--	--	--	--	NA	1.02	NA	NA
bis(2-Ethylhexyl)phthalate	--	347	1370	4660	2170	NA	0.281	NA	NA
Fluoranthene	--	2250	24400	8730	4820	NA	0.23	NA	NA
Indeno(1,2,3-cd)pyrene	--	6.21	23.4	214	9.58	NA	0.0351	NA	NA
Phenanthrene	--	1800	20500	6990	76.2	NA	0.124	NA	NA
Pyrene	--	2300	31300	9050	568	NA	0.206	NA	NA
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	114	50.1	55	19.1
Cadmium	1.0	74.1	8600	0.00474	7.52	*<0.219*	*0.57 B*	*0.578 B*	*<0.245*
Chromium	24.6	234	3400	180	19.2	14.3	10.7	8.71	3.88
Silver	0.73	391	5680	1550	8.47	<0.14	0.233	0.382	0.156
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	5.98 S	***288 S***	***28.6 S***	0.782 S

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-B06	179-B07	179-B07	179-B07
Sample ID						179B06-04-01	179-B07-01-01	179-B07-02-01	179-B07-03-01
Beg. Depth-End Depth (ft)						12-14	4-6	6-8	8-10
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW8270-Semivolatile Organics (mg/kg)									
Acetophenone	--	--	--	--	--	NA	ND	NA	NA
Anthracene	--	23500	264000	85300	1600	NA	ND	NA	NA
Benzo(a)anthracene	--	6.21	23.4	214	1.1	NA	ND	NA	NA
Benzo(a)pyrene	--	0.621	2.34	21.4	6.12	NA	ND	NA	NA
Benzo(b)fluoranthene	--	6.21	23.4	214	3.4	NA	ND	NA	NA
Benzo(g,h,i)perylene	--	--	--	--	--	NA	ND	NA	NA
Benzo(k)fluoranthene	--	62.1	234	2140	34	NA	ND	NA	NA
Chrysene	--	621	2340	21400	110	NA	ND	NA	NA
Di-n-octylphthalate	--	--	--	--	--	NA	ND	NA	NA
bis(2-Ethylhexyl)phthalate	--	347	1370	4660	2170	NA	ND	NA	NA
Fluoranthene	--	2250	24400	8730	4820	NA	ND	NA	NA
Indeno(1,2,3-cd)pyrene	--	6.21	23.4	214	9.58	NA	ND	NA	NA
Phenanthrene	--	1800	20500	6990	76.2	NA	ND	NA	NA
Pyrene	--	2300	31300	9050	568	NA	ND	NA	NA
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	18.8	47	35	19.2
Cadmium	1.0	74.1	8600	0.00474	7.52	*0.29 B*	*<0.288*	*<0.252*	*<0.252*
Chromium	24.6	234	3400	180	19.2	4.41	5.75	5.96	3.9
Silver	0.73	391	5680	1550	8.47	<0.175	<0.183	<0.161	<0.161
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	0.56 S	0.933 SB	1.42 SB	0.616 SB

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-B07	179-B08	179-B08	179-B08
Sample ID						179B07-04-01	179-B08-01-01	179-B08-02-01	179-B08-03-01
Beg. Depth-End Depth (ft)						14-16	0-2	2-4	4-6
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW8270-Semivolatile Organics (mg/kg)									
Acetophenone	--	--	--	--	--	NA	ND	NA	NA
Anthracene	--	23500	264000	85300	1600	NA	ND	NA	NA
Benzo(a)anthracene	--	6.21	23.4	214	1.1	NA	ND	NA	NA
Benzo(a)pyrene	--	0.621	2.34	21.4	6.12	NA	ND	NA	NA
Benzo(b)fluoranthene	--	6.21	23.4	214	3.4	NA	ND	NA	NA
Benzo(g,h,i)perylene	--	--	--	--	--	NA	ND	NA	NA
Benzo(k)fluoranthene	--	62.1	234	2140	34	NA	ND	NA	NA
Chrysene	--	621	2340	21400	110	NA	ND	NA	NA
Di-n-octylphthalate	--	--	--	--	--	NA	ND	NA	NA
bis(2-Ethylhexyl)phthalate	--	347	1370	4660	2170	NA	ND	NA	NA
Fluoranthene	--	2250	24400	8730	4820	NA	ND	NA	NA
Indeno(1,2,3-cd)pyrene	--	6.21	23.4	214	9.58	NA	ND	NA	NA
Phenanthrene	--	1800	20500	6990	76.2	NA	ND	NA	NA
Pyrene	--	2300	31300	9050	568	NA	ND	NA	NA
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	21.2	38.1	46.4	46.7
Cadmium	1.0	74.1	8600	0.00474	7.52	*<0.267*	*<0.276*	*<0.249*	*<0.21*
Chromium	24.6	234	3400	180	19.2	5.39	5.3	5.97	6.35
Silver	0.73	391	5680	1550	8.47	<0.17	0.6	<0.159	0.178
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	1.36 SB	***12.5 S***	1.56 SB	2.05 S

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

Table 2.25
SS-39 Analytical Soil Results, Phase II RCRA Facility Investigation

Location ID						179-B08	179-BPH01	179-BPH02	179-BPH03
Sample ID						179B08-04-01	179-BPH-01	179-BPH-02	179-BPH-03
Beg. Depth-End Depth (ft)						10-12	0-1	0-1	0-1
	NMGWQ Soil Screening Levels					Result	Result	Result	Result
Analyses	Background[1] (mg/kg)	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)				
SW6010-Metals (mg/kg)									
Barium	84.4	5450	78300	1440	823	33.4	NA	NA	NA
Cadmium	1.0	74.1	8600	0.00474	7.52	*<0.277*	NA	NA	NA
Chromium	24.6	234	3400	180	19.2	6.13	NA	NA	NA
Silver	0.73	391	5680	1550	8.47	0.555 B	NA	NA	NA
SW7421-Lead (mg/kg)									
Lead	12.3	400	750	750	9.17	3.54 S	NA	NA	NA

Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results shaded in **BOLD** and *italics* exceed a DAF 20 standard and a Human Health standard and are greater than the background values.
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
[1] Source: Radian (1992) and Radian (1993)
< = Analyte not detected at reported detection limit
ND = Analyte not detected
NA = Not Analyzed

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Table 2.26
Soil Analytical Results, 1994 RCRA Facility Investigation
SS39

Location ID					181-B01	181-B02
Sample ID					181-B01-01-01	181-B02-01-01
Beg. Depth-End Depth (ft)					6-8	8-10
	NMGWQ Soil Screening Levels				Result	Result
Analyses	Residential (mg/kg)	Industrial/ Occupational (mg/kg)	Construction Worker (mg/kg)	DAF 20 (mg/kg)		
SW8270-Semivolatile Organics (mg/kg)						
4-Chloro-3-methylphenol	--	--	--	--	ND	4.25
p-Chloroaniline	--	--	--	--	ND	1.69
bis(2-Ethylhexyl)phthalate	347	1370	4660	2170	ND	19.7 B
2-Methylnapthalene	--	--	--	--	ND	6.05
Naphthalene	71.9	98.3	98.3	0.393	ND	***1.91***
SW8270-Semivolatile Organics TICs (mg/kg)						
Ethylmethylbenzene	--	--	--	--	ND	50
Trimethylbenzene*	22.3	68.9	68.9	0.344	ND	*20*

NA= Not Analyzed
ND= Not Detected
B= Analyte detected in associated blank analyses
-- = No value available
Results in **BOLD** and *italics* exceed a DAF20 standard and are greater than the background values
Results shaded and *italics* exceed Human Health Standard and are greater than the background values
Results in *italics* exceed a Human Health standard or DAF20 standard, but are below background levels
* Screening levels for 1, 3, 5 - Trimethylbenzene used

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Table 2.27
SS-39 Analytical Groundwater Results, Phase II RCRA Facility Investigation

Location ID			177-H01	177-H02	177-H03	177-H04
Sample ID			177-H01-01-01	177-H02-01-01	177-H03-01-01	177-H04-01-01
	EPA MCL	NMGWQ	Result	Result	Result	Result
SW8010-Halogenated Volatile Organics (µg/L)						
1,1,1-Trichloroethane	200	60	3.73 KBJ	0.842 KBJ	***418***	1.76 KBJ
1,1-Dichloroethane	--	25	<1.11	<1.11	***65.4***	<1.11
Chloroethane	--	--	<4	<4	<20	0.442 KJ
Chloromethane	--	--	2.38 KJ	<7.55	<37.8	0.761 KJ
Tetrachloroethene	5	20	<3.75	<3.75	2.19 KJ	0.353 KJ
Trichloroethene	5	100	***245***	***597***	***2730***	***324***
Vinyl chloride	2	1	***<7.55***	***3.83 KJ***	***<37.8***	***<7.55***
trans-1,3-Dichloropropene	--	--	0.492 KJ	<3.6	<18	<3.6

Table 2.37 Analytical Results for Groundwater Samples from Phase II RI for SS39 AT SWMU 179

Location ID			179-H01	179-H02	179-H03	179-H04
Sample ID			179-H01-01-01	179-H02-01-01	179-H03-01-01	179-H04-01-01
	EPA MCL	NMGWQ				
SW8010-Halogenated Volatile Organics (µg/L)						
Trichloroethene	5	100	***38.8***	***27.6***	<3	4.5

NA= Not Analyzed
ND= Not Detected
B= Analyte detected in associated blank analyses
J= Analyte detected at concentration below the detection limit
K= Peak did not meet method identification criteria. Analyte not detected on other GC column
--= No value available

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels
< - Analyte not detected at the reported detection limit.

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Table 2.28
SS-39 Analytical Groundwater Results, 1998 Additional Fieldwork

Sample ID: Depth to Water:	EPA MCL (µg/L)	NMGWQ Standards (µg/L)	SS39-01 5	SS39-02 1	SS39-03 2	SS39-04 3	SS39-05 4	SS39-06 4	SS39-07 4	SS39-08 8
VOCs-EPA SW-846 Method 8260A (µg/L)										
Acetone	--	--	<50	<20	<10	<10	<10	<10	<71	<36
Benzene	5	10	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	***<7.1***	<3.6
Carbon disulfide	--	--	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<7.1	<3.6
Carbon tetrachloride	5	10	1.4 J	<2.0	<1.0	<1.0	<1.0	<1.0	***<7.1***	2.1 J
Chloroform	--	100	1.3J	<2.0	<1.0	<1.0	<1.0	0.17 J	1.9 J	1.4 J
Chloromethane	--	--	<10	<4.0	<2.0	0.11 J	<2.0	<2.0	<14	<7.1
1,1-Dichloroethene	7	5	1.5J	<2.0	<1.0	<1.0	<1.0	<1.0	2.1 J	1.3 J
Ethylbenzene	700	750	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<7.1	<3.6
Methylene chloride	--	100	0.98 JB	0.27 JB	<1.0	<1.0	0.10 JB	<1.0	1.1 JB	0.53 J,B
Tetrachloroethene	5	20	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<7.1	<3.6
Toluene	1000	750	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<7.1	<3.6
1,1,1-Trichloroethane	200	60	<5.0	<2.0	<1.0	<1.0	<1.0	<1.0	<7.1	<3.6
Trichloroethene	5	100	***230***	***66***	0.63 J	***27***	<1.0	0.32 J	***280***	***130***
2-butanone (MEK)	--	--	<25	<10	<5.0	<5.0	<5.0	<5.0	<36	<18

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values

Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values

Note Compounds detected at or above the RL are shown in bold

< Indicates compound not detected at or above the RL

B Method blank contamination, the associated method blank contains the target analyte at a reportable level

J Estimated result, result is less than RL

ND Not detected

RL Reporting Limit

µg/L Micrograms per liter

VOCs Volatile organic compounds

Table 2.28
SS-39 Analytical Groundwater Results, 1998 A

Sample ID: Depth to Water:	EPA MCL (µg/L)	NMGWQ Standards (µg/L)	SS39-09 18	SS39-10 17	SS39-11 8	SS39-12 3	SS39-13 11	SS39-14 5	SS39-15	SS39-16
VOCs-EPA SW-846 Method 8260A (µg/L)										
Acetone	--	--	5.9 J	5.1 J	<10	<10	<50	<17	<10	<10
Benzene	5	10	1	0.42 J	<1.0	<1.0	<5.0	<1.7	<1.0	<1.0
Carbon disulfide	--	--	0.22 J	<1.0	0.37 J	<1.0	<5.0	<1.7	<1.0	<1.0
Carbon tetrachloride	5	10	<1.0	<1.0	<1.0	<1.0	0.86 J	<1.7	<1.0	<1.0
Chloroform	--	100	<1.0	0.29 J	<1.0	<1.0	1.3 J	0.22 J	<1.0	<1.0
Chloromethane	--	--	<2.0	<2.0	<2.0	<2.0	<1.0	<3.3	<2.0	<2.0
1,1-Dichloroethene	7	5	<1.0	<1.0	<1.0	<1.0	1.2 J	<1.7	<1.0	<1.0
Ethylbenzene	700	750	0.15 J	0.12 J	<1.0	<1.0	<5.0	<1.7	<1.0	<1.0
Methylene chloride	--	100	0.19 JB	<1.0	<1.0	<1.0	<5.0	<1.7	<1.0	<1.0
Tetrachloroethene	5	20	<1.0	0.14 J	<1.0	<1.0	<5.0	<1.7	<1.0	<1.0
Toluene	1000	750	0.79 J	0.50 J	<1.0	<1.0	<5.0	<1.7	<1.0	<1.0
1,1,1-Trichloroethane	200	60	<1.0	0.18 J	<1.0	<1.0	<5.0	<1.7	<1.0	<1.0
Trichloroethene	5	100	0.18 J	0.29 J	<1.0	1.1	***210***	***70***	<1.0	<1.0
2-butanone (MEK)	--	--	3.8 J	<5.0	1.2 J	<5.0	<25	<8.3	<5.0	<5.0

Results in **BOLD** and *italics* exceed USEPA Primary Drin
Results shaded in BOLD and italics exceed NMGWQ Gro
Note Compounds detected at or above the RL
< Indicates compound not detected at or abov
B Method blank contamination, the associated
J Estimated result, result is less than RL
ND Not detected
RL Reporting Limit
µg/L Micrograms per liter
VOCs Volatile organic compounds

Table 2.29
SS-39 Groundwater Analytical Results, Long-Term Monitoring

	Background	EPA MCL	NMGWQ Standard	MW-39-01[2]				MW-39-02			
		(µg/L)	(µg/L)	Sep-97	Sep-99	Sep-01	Apr-03	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)											
Acetone	--	--	--	ND	< 5	< 5	< 10	ND	< 5	< 5	< 10
Carbon disulfide	--	--	--	ND	< 3	< 5	< 1	ND	< 3	< 5	< 1
Carbon tetrachloride	--	5	10	ND	< 3	< 5	< 1	***8.3 J***	4	3.1 J	2.2
Chloroform	--	--	100	1.1 J	< 3	< 5	< 1	3.8	2 J	1.9 J	0.8 (J)
1,1-Dichloroethene	--	7	5	ND	< 3	< 5	< 1	ND	1 J	< 5	< 1
Methylethyl ketone	--	--	--	ND	< 5	< 5	NA	ND	< 5	< 5	NA
Trichloroethylene	--	5	100	ND	< 3	< 5	< 1	***38***	***45***	***39***	3.4

NOTES:
[1]Unless otherwise reported, no VOCs were detected using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1997 program.)
[2]Upgradient monitoring well
CRDL- Contract-required Detection Limit
IDL- Instrument Detection Limit
ND- Not Detected or above method reporting limit
NA - Not analyzed
VOCs- volatile organic compounds
µg/L- micrograms per liter
-- = no value or standard was found
< - Analyte not detected at the reported detection limit

Laboratory Qualifiers– assigned as a result of laboratory data assessment procedures
J - estimated value; less than CRDL but greater than or equal to IDL

EPA Qualifiers–assigned as a result of independent data validation
None

2003 Validation Qualifiers
J- Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

Table 2.29
SS-39 Groundwater Analytical Results, Long-Term Monitoring

	Background	EPA MCL	NMGWQ Standard	MW-39-03				MW-39-04			
		(µg/L)	(µg/L)	Sep-97	Sep-99	Sep-01	Apr-03	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)											
Acetone	--	--	--	ND	< 5	< 5	< 10	ND	< 5	57	< 10
Carbon disulfide	--	--	--	14	< 3	< 5	< 1	ND	< 3	< 5	< 1
Carbon tetrachloride	--	5	10	ND	< 3	< 5	< 1	ND	< 3	< 5	< 1
Chloroform	--	--	100	ND	1 J	1.1 J	1.1	ND	< 3	< 5	< 1
1,1-Dichloroethene	--	7	5	ND	< 3	< 5	< 1	ND	< 3	< 5	< 1
Methylethyl ketone	--	--	--	ND	< 5	< 5	NA	ND	< 5	17	NA
Trichloroethylene	--	5	100	ND	1 J	< 5	0.71 (J)	ND	ND	< 5	< 1

NOTES:
[1]Unless otherwise reported, no VOCs were detected using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1997 program.)
[2]Upgradient monitoring well
CRDL- Contract-required Detection Limit
IDL- Instrument Detection Limit
ND- Not Detected or above method reporting limit
NA - Not analyzed
VOCs- volatile organic compounds
µg/L- micrograms per liter
-- - no value or standard was found
< - Analyte not detected at the reported detection limit

Laboratory Qualifiers– assigned as a result of laboratory data assessment procedures
J - estimated value; less than CRDL but greater than or equal to IDL

EPA Qualifiers--assigned as a result of independent data validation
None

2003 Validation Qualifiers
J- Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Results in **BOLD** and *italics* exceed USEPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed USEPA or NMGWQ standards but are below background and/or upgradient levels

3.0 INVESTIGATIVE APPROACH

3.1 INTRODUCTION

The subject sites have been characterized in previous investigations and are in the LTM phase, as described in Section 2. All sites, with the exception of LF-29 and SS-39, have completed at least five rounds of sampling and analysis (equivalent of ten years), satisfying the conditional closure requirements described in their respective Decision Documents. Sites that met the conditional closure requirements were therefore recommended for closure in the 2003 LTM report. NMED responded that these sites cannot be closed and removed from the active corrective action portion of the RCRA permit without additional investigation. Shortly after this, a meeting was conducted at Holloman AFB on April 21, 2004. Additional characterization requirements for these sites were discussed at the meeting, and summarized in Air Force correspondence of May 21, 2004, and NMED correspondence of August 10, 2004. This correspondence is provided in Appendix E. NMED concurred that LTM could be suspended at LF-10, LF-19, LF-22, and LF-23; future groundwater monitoring requirements, if any, would be established following the results of the investigations. NMED required that LTM continue at LF-21 (to monitor an upgradient plume) and DP-30/SD-33.

LF-29 has been included for additional characterization because of its similarity to many of the other landfill sites; following review of the 2003 LTM report and original site investigation reports, NMED determined that additional investigation is required at SS-39. These requirements are described in NMED correspondence of February 9, 2005, also provided in Appendix E.

Appendix 4-B, Section III of Holloman's RCRA permit describes the specific criteria for closure of SWMUs and AOCs. The purpose and intent of this RFI is to comply with NMED's recommendations for additional characterization of these sites in order to satisfy NMED Criterion 5, namely that the site has been adequately characterized and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use. If this criterion cannot be satisfied, the RFI report will recommend future actions as appropriate.

As noted previously, TDS concentrations average over 17,000 mg/L at HAFB. Therefore, pursuant to NMAC 20.6.2.3101, the groundwater standards do not apply, but are provided for reference purposes. Pursuant to NMED correspondence dated January 25, 1993 and reiterated in NMED correspondence dated May 15, 1995, remediation of existing groundwater contamination will not be required by NMED unless a receptor is exposed to unacceptable risk from contact with contaminated water, since direct ingestion is not a plausible exposure scenario. Groundwater monitoring is performed to establish whether or not continuing sources of contamination exist by examining if contaminant concentrations increase over time. Comparison to standards provides the basis for this evaluation.

The following sections describe the investigation approach and field methodologies that will be used to further characterize the sites. Because of their similarity and the consistency in the investigation approach, sites LF-19, LF-21, LF-22, LF-23, and LF-29 are discussed

collectively in Section 3.2. LF-10, DP-30/SD-33, and SS-39 are discussed in Sections 3.3, 3.4, and 3.5, respectively. Field methodologies are described in Section 3.6. Data evaluation and reporting are discussed in Section 4.

3.2 INVESTIGATION APPROACH: LF-19, LF-21, LF-22, LF-23, AND LF-29

3.2.1 Introduction

The original approved RFI workplan for these sites did not propose soil sampling for LF-19, LF-21, LF-22, LF-23, and LF-29 because the inherent lack of homogeneity in landfills prevents representative sampling to adequately characterize the waste area. This approach is consistent with US EPA guidance on landfill characterization. Likewise, the approved Phase II RFI workplan did not propose soil sampling at LF-29 because of the potential presence of UXO. Groundwater monitoring in such cases is a more appropriate measure to establish whether or not a release has occurred. Groundwater data has been collected at these sites periodically since the RI conducted in 1991; the RI and subsequent LTM data show no evidence of a release from any of these units. LF-19 was active beginning in 1968 and LF-29 became active in the 1950s; the other sites were active in the mid -1970s. Disposal at all of these sites ceased by 1979; therefore it is likely that a release from these sites would have been detected in groundwater by now. This rationale has been satisfactory as USEPA and/or NMED have approved of this approach. In spite of approved Decision Documents conditionally approving NFA with groundwater monitoring for ten years to document that no release has occurred, NMED has required additional characterization as a condition of closure. NMED correspondence of August 10, 2004, suggested that geophysics be performed at LF-21 and LF-23, and that trenching be performed at LF-19, LF-21, LF-22, and LF-23 to characterize the contents of the landfills before closeout would be considered.

Characterization efforts for these sites will focus on defining the boundaries of the landfills using geophysics; landfill boundaries were not definitively established during the RI. The geophysical surveys will be followed up with trenching in anomaly areas, if they exist, to observe the representative contents of the landfills. Trenching may be appropriate and is proposed for relatively small units that are assumed to lack a large degree of heterogeneity (i.e., that contain discrete anomalies). Trenching is not recommended at LF-29 because it is expected to be heterogeneous, and more importantly, because uncertainty with respect to the potential presence of munitions at the site.

3.2.2 Approach

Fieldwork will be performed on an iterative basis using traditional characterization techniques for landfills described in EPA guidance. Fieldwork will commence with a geophysical survey that encompasses the entire landfill areas providing 100% coverage, barring any physical barriers or obstructions. The survey will establish landfill boundaries by extending beyond the implied limits of waste based on historical data and current field observations, and identify geophysical anomalies. The geophysical survey will be performed using a Geonics EM-31 terrain conductivity meter in the conductivity and in-phase modes. The conductivity mode can be used to determine if leachate is present beneath the landfill, if leachate (which is typically

highly conductive) can be discerned from background conductivity, which is also expected to be high due to the local geology). Given the arid environment at Holloman and the nature of the wastes disposed at these locations, the potential for leachate generation at these disposal areas is low. The conductivity and in-phase modes identify areas of buried metals as well as materials of greater magnetic susceptibility (such as bricks and in some cases ash). Discrete drum/container disposal areas will be detected if gross areas of surface and subsurface metallic debris are absent. Both the conductivity and in-phase modes will be used to establish landfill boundaries.

Materials contained within LF-19 are reportedly limited to grass clippings, although cans of unused rodenticides were reported disposed in the area. At LF-21 and LF-22, paper bags, food, plastic sheets, boxes, empty cans, boards, and tree limbs were the materials reported disposed. Although an interviewee reported some 55 gallon drums observed in these areas, this was not confirmed by other interviewees. Because hazardous liquid substances such as waste fuels and solvents were typically burned in fire training areas, their disposal in areas such as these in drums is unlikely. At LF-23, the VSI concluded that the purpose of the MOBSS Landfill Disposal Trench was the disposal of cans and drums of outdated pesticides. During the RI, asphalt, construction debris, a concrete vault, a trailer, two to three empty 55-gallon drums, and four to five 1-gallon metal buckets with roofing tar were observed at the dump site. The RI concluded that the VSI may have been in error based on the lack of these constituents in groundwater samples. The geophysical survey will discern items such as metallic buckets, cans and drums, the typical vessels for pesticides, if they are present within items such as grass clippings, boxes, boards, etc.

It is unlikely that these materials would have been disposed in such a manner. As early as 1965, the Military Entymology Handbook specified that unused or obsolete pesticides be disposed in a safe manner, as follows:

- Obsolete Items. Any pesticide which the Armed Forces have determined to be obsolete must be disposed of in accordance with the directive declaring the obsolescence. Some containers, such as the 1-pound cylinders of methyl bromide, will rust or corrode to the extent that prolonged storage is hazardous. Such containers should be removed from stocks and destroyed in a safe location. Dispose of empty containers so that they can't be reused as containers for food or water. All unlabeled materials must be disposed of in a safe manner. Care must be exercised in discarding unused pesticide materials. Drainage into watering ponds or into streams may poison animals, including valuable wildlife. If the proper disposal of an item is uncertain, the problem must be referred to the major command concerned for direction. Obsolete or unsatisfactory equipment must be reported to the appropriate supply agency for direction (Department of the Army, 1965).

Contour maps of conductivity and in-phase data will be produced at the conclusion of the geophysical surveys. If no metallic anomalies are identified, trenching will not be performed. Test pits should only be used as a biased sampling approach when attempting to locate specific hot spots of contamination or to locate specific buried waste (NJDEP, 1992). Including the RI

data, over ten years of groundwater data at these sites shows that a release has not occurred at these units, strongly implying that hot spots do not exist. If anomalies suggestive of buried metallic material are evident, trenching will be performed. If discrete anomalies are identified, a trench will target the discrete anomaly. If anomalies are close together and spread over a wide area, a trench will be dug to the center of the anomalous area at the rate of 2 per acre in a perpendicular fashion to demonstrate the representative contents of the area. The dimensions and orientation of the anomalies will determine the locations of trenches. The purpose of the trenching will not be excavation of landfill contents, but to characterize the material within them. Trenches will be dug to the vertical limit of waste, the water table, or the limit of the excavator, whichever occurs first. Potentially hazardous materials identified in the trenches will be segregated; other materials that are not hazardous such as construction debris, boxes, empty containers, will be backfilled within the trench. If potentially hazardous materials are encountered, soil samples will be obtained and analyzed from the trench beneath this material once it is removed to assess whether or not soils have been contaminated by materials in the landfill. Soil analyses will be dependent on the materials identified in the trench, since the groundwater data do not suggest specific analyses due to a lack of contamination. However, it is assumed that metals, pesticides, and herbicides will be analyzed in areas where disposal of pesticides and herbicides were suspected if this disposal is confirmed (LF-19, LF-23). If the trench depth exceeds three feet, personnel will obtain soil samples for analysis from soils contained in the bucket of the excavator that are not in contact with the bucket. Soil samples will not be obtained if potentially hazardous materials are not discovered in the trenches. In this case, the groundwater data is sufficient to demonstrate that hotspots within these landfills do not exist.

It is unlikely, because of DoD ordnance disposal practices, that LF-29 contains any live munitions. However, trenching will not be performed at LF-29 because this cannot be stated with 100% uncertainty. Instead, soil borings will be advanced using DPT techniques adjacent to geophysical anomalies indicative of buried metals, if they are present. A UXO technician will screen the borehole as it is advanced with a borehole magnetometer for health and safety purposes. Soil samples selected for laboratory analysis will be biased to elevated PID readings or visibly contaminated soil as evidenced by staining if these conditions are encountered. Borings will terminate at the water table. At a minimum, a sample will be obtained at the water table interface if there is no evidence of contamination throughout the soil column. If geophysical anomalies are not evident, random soil samples will be obtained at a rate of one per acre (LF-29 is approximately 4.7 acres in size based on the berm around the site for a total of five samples) for characterization. If geophysical anomalies are broad and widespread, soil sampling and analysis is not the preferred approach because of the inherent heterogeneity of the fill area. In this case, groundwater monitoring is viewed as a more appropriate assessment approach. The site has been inactive since 1975; groundwater data since 1991 show no evidence of a release from the site. In spite of this, if the unit is heterogenous with respect to geophysical anomalies, five random soil samples will be obtained adjacent to anomalies at a location relatively free of buried metal to support site closure. Soil samples will be analyzed for VOCs, SVOCs, RCRA metals, TPH, and explosives.

Field methodologies for these techniques are described in Section 3.6.

LTM at LF-21 will be conducted during this fieldwork, pursuant to NMED's August correspondence, to support the investigation of the source of TCE upgradient of LF-21. All wells will be sampled for VOCs, not just TCE as in the current program, to observe whether degradation compounds are present in the groundwater. Sampling for inorganic parameters will not be performed, as the LTM data does not warrant continued sampling of these constituents. Sampling methodologies will be consistent with the current LTM program and are not described further in Section 3.6. The fifth round of LTM at LF-29, which will represent over 10 years of data upon completion, will be performed during this fieldwork. Upgradient wells MW-29-03, -04, and -05, not part of the LTM program, will be included in this event to more fully assess the relationship of upgradient concentrations to concentrations observed downgradient of the landfill to support decisions regarding LF-29. Sampling methodologies and analyses will be for 1,2-DCA and chloroform, consistent with the current LTM program.

3.3 INVESTIGATION APPROACH: LF-10

3.3.1 Introduction

With the initiation of groundwater sampling LF-10 in 1988 and LTM in 1995, groundwater sampling data indicate that the landfill contents at this site have had no adverse effect on groundwater quality. Based on these data, it appears that the landfill mass is stable and not posing a risk to human health and the environment.

The site has been inactive since 1958, when operations at LF-01 commenced. Typical practices of sanitary landfills at military installations prior to 1958 are defined with respect to the types of waste that can be placed in a sanitary landfill in Department of the Army Technical Manuals (TMs), Engineering Manuals (EMs), Army Field Manuals (AFMs), Technical Bulletins (TBs), and Army Regulations (ARs) released during that timeframe. According to these documents, source segregation was a common practice of separating materials that were classified as "refuse" and "salvage". "Refuse" was further characterized into "garbage" and "rubbish or trash." "Garbage" is the solid or semi-solid waste resulting from the preparation, cooking, and serving of food, and might include discarded waste food not segregated for salvage as suitable animal food, food wrappings, and containers. "Trash" consisted of discarded unsalvaged materials such as metal, glass, crockery, floor sweepings, paper, wrappings, containers, cartons, and similar articles not used in preparing or dispensing food (TM 5-634, 1946, and FM-21-10 / AFM 160-46, 1957). The 1946 version of TM 5-634 stated that sanitary landfills could accept "garbage", "trash", and ash (unmixed with combustible trash in areas that would remain unused for three days to allow cooling). Large items that would disrupt normal fill operations, such as stumps, logs, concrete blocks, or other large items of debris, were not to be accepted; the 1958 version of TM 5-634 stated that these materials were to be disposed in a separate controlled location. Salvageable materials were not typically disposed in landfills due to conservation efforts, especially during World War II. Salvage included critical materials such as metals, rubber, leather, etc. TM 38-505 (1945) included a standard salvage classification list; among the materials in the list are non-ferrous

metals, ferrous metals, rubber, cotton and woolen textiles, rope, paper, bags, burlap, leather, containers, and lumber. Among the items not acceptable as salvage were explosives and ammunition (which were disposed by the Ordnance Department according to a 1943 bulletin), incendiary, poisonous, and irritant products, and drugs and biologicals.

In summary, the contents of a sanitary landfill operated during this timeframe would predominantly be composed of garbage and trash as defined in the Technical Manuals, and ash from the incinerator. Large items that would disrupt sanitary fill operations or salvageable materials would not be expected. The majority of materials expected in the landfill would therefore not be inherently hazardous or toxic. The LF-10 groundwater data support this conclusion.

Although NMED has stated that trenching must be performed to characterize the landfill contents, trenching in LF-10 prior to identification of potential hotspots and/or contamination suggestive of a release is premature, especially given what is known of practices during the active period of the landfill, the likely heterogeneity of sanitary landfill contents even among those items typically accepted for disposal, and the groundwater data, which do not show evidence of a release. As stated earlier, consistent with USEPA guidance and guidance documents from other states, test pits should only be used as a biased sampling approach when attempting to confirm specific hot spots of contamination or to locate specific buried waste.

The decision process for a landfill can be simplified with two basic questions: Is remediation warranted or required at the landfill, and if so, is the presumptive remedy (containment) appropriate? Several key directives have been issued by US EPA with regard to presumptive remedies for landfill investigation and closure. They include, but are not limited to:

- U.S. Environmental Protection Agency, OSWER Directive 9355.0-49FS *Presumptive Remedy for CERCLA Municipal Landfill Sites,* September 1993
- U.S. Environmental Protection Agency, OSWER Directive 9355.0-67FS *Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills*, December 1996

EPA has established source containment (landfill caps) and/or institutional controls as the presumptive remedy for municipal landfill sites regulated under CERCLA and RCRA Corrective Action sites, and has determined that the municipal landfill presumptive remedy should be applied to appropriate military landfills. Guidance defines "Municipal landfills" as those facilities in which a combination of household, commercial, and to a lesser extent, industrial wastes have been co-disposed. Military landfill wastes are usually similar to municipal landfills. Based on what is currently known of LF-10, the landfill contents likely contain municipal-landfill-type wastes in large quantity, with potentially smaller quantities of military-specific wastes. Guidance notes that low-hazard military-specific wastes are generally no more hazardous than some industrial wastes in municipal landfills. According to the CERCLA presumptive remedy guidance for military landfills, the presence of military-specific wastes, or hot spots of hazardous wastes, does not preclude the landfill contents from meeting the definition of municipal-landfill-type wastes and applying a presumptive remedy.

The presumptive remedy process relies on experience drawn from previous investigation of municipal and military landfills and existing site-specific historic data. The presumptive remedy process proposes limited or no additional source investigation and allows for proceeding to the FS, CMS, or EE/CA in which remedial alternative analysis will be limited to a landfill cap, groundwater monitoring/control system, leachate and landfill gas collection and treatment systems, and institutional controls, and includes an explanation of how the application of the presumptive remedy satisfies the NCP's three site-specific remedy selection criteria. This approach is reinforced by the earlier 1991 USEPA publication *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites),* which states that characterization of landfill contents is not necessary because containment of the landfill contents as a remedy does not require such information. The Guidance further states that landfill contents are generally only sampled where hot spots are suspected and it has been determined that the landfill poses an actual or potential risk to human health and the environment, since under other circumstances it is assumed that landfill contents are heterogeneous.

Soil data collected at LF-10 during the RI did not reveal any significant contamination. More than ten years of groundwater monitoring results also indicate that the landfill contents have had no adverse effect on groundwater quality. In spite of this, it is recognized that additional characterization with respect to more definitively establishing LF-10 boundaries and assessing if hot spots exist within LF-10 is necessary so that the final disposition of this site can be determined.

Fieldwork at LF-10 will be performed on an iterative basis, using additional characterization techniques for landfills described in EPA guidance. As described in the next section, additional characterization will include a geophysical survey, a passive soil gas survey, and soil sampling at potential hot spots if suggested by the geophysical and passive soil gas survey results or random soil sampling if potential hot spots are not evident. Field methodologies for these techniques are described in Section 3.6.

3.3.2 Approach

LF-10 boundaries will be established by a geophysical survey. Similar to the other sites, the survey will establish landfill boundaries by extending beyond the implied limits of waste based on historical data and current field observations, and identify geophysical anomalies. The geophysical survey will be performed using a Geonics EM-31 terrain conductivity meter in the conductivity and in-phase modes to determine the presence of leachate if it can be discerned from background conductivity, and the presence of subsurface debris and materials of greater magnetic susceptibility. Given the arid environment at Holloman and the age of the landfill, the potential for leachate generation at LF-10 is considered to be low. Discrete drum/container disposal areas will be detected if gross areas of surface and subsurface metallic debris are absent. Both the conductivity and in-phase modes will be used to establish landfill boundaries.

Once landfill boundaries have been established, a passive soil gas survey encompassing the entire landfill area will be performed. Soil gas samples will be obtained using EMFLUX® samplers, which require a minimum of three days in the ground at shallow depths. Soil gas samples will be obtained at 100-foot intervals at LF-10. These samples will be analyzed for VOCs. Additional details describing soil gas survey methods are provided in Section 3.6.

Once these data become available, borings will be advanced adjacent to discrete geophysical anomalies (areas indicative of buried metal such as drums or containers), and at the locations of potential hotspots identified by elevated VOC concentrations during the soil gas survey. If waste is identified during borehole advancement, borings will be advanced until waste is no longer encountered and a sample will be obtained immediately below the waste. A sample from within the waste material, biased to elevated PID readings or visibly contaminated soil as evidenced by staining, will also be obtained. If waste is not encountered, borings will terminate at the water table. In these borings, one sample will be obtained at the water table interface if there is no evidence of contamination. If elevated VOCs are not found during the soil gas survey, and if geophysical anomalies analogous to buried containers are not evident, random soil samples at LF-10 will be obtained at a rate of one per acre for characterization. Methane screening will also be performed during soil boring advancement to assess methane generation at the landfill, per NMED's August 2004 correspondence. All soil samples will be analyzed for VOCs, SVOCs, RCRA metals, and TPH.

The geophysical and soil gas surveys afford full coverage of LF-10 to establish landfill boundaries and to identify potential hot spots; soil sampling targeted to these areas will be used to characterize the landfill contents and to quantify contamination. If hot spots are not identified, random soil sampling will be performed to satisfy this objective. These data will be evaluated quantitatively to determine if remediation is warranted or required at the landfill based on the presence or absence of unacceptable risk.

3.4 INVESTIGATION APPROACH: DP-30/SD-33

3.4.1 Introduction

The intent of the investigation at DP-30/SD-33 is to determine whether or not the waste material within the trenches is characteristically hazardous, and to determine if soils adjacent to the trenches exceed human health-based SSLs by analyzing them for total levels of constituents. Human health SSLs and not soil to groundwater media transfer SSLs are the focus, since groundwater is not potable.

3.4.2 Approach

Fieldwork will commence at DP-30/SD-33 with a geophysical survey using an EM-31 terrain conductivity meter. Although this was not suggested by NMED, a geophysical survey at this site would be prudent to more accurately define the boundaries of the disposal trenches. Although it is assumed that the EM-31 will be capable of locating the trenches based on the conductivity differences between the waste material and the surrounding soil, ground

penetrating radar (GPR) may also be used at this location if the EM-31 results are inconclusive.

Once the locations of the pits are confirmed, waste and soil sampling will be conducted. A sample of the waste from each pit will be composited and submitted for waste characterization purposes. The samples will be analyzed for RCRA characteristics and analytes using the Toxicity Characteristic Leaching Procedure (TCLP) to determine if the material is characteristically hazardous. These analyses, coupled with the total constituent analyses performed on the waste material during the RI, will support the final disposition of this material.

The RI vertically delineated the limits of contamination beneath the pits; soils beneath the waste have already been characterized and were not contaminated at levels above human health-based SSLs. The RI determined that waste contained metals, VOCs, and one PCB above human health-based SSLs. Therefore, soils adjacent to (approximately five feet from) the pits will be tested for these constituents, as well as TPH. Once the pit locations are identified, soil samples will be obtained from the center of each side of each pit using DPT methods for a total of four borings per pit. One boring may suffice between pits if pits are in close proximity to each other. In these borings, soil samples will be obtained from the depth interval corresponding to the midpoint of the waste in each pit (interval of 4 to 6 feet bgs), and at a depth interval corresponding to immediately below the waste at the bottom of each pit (interval 10 to 12 feet bgs). Soil analyses will include VOCs, metals, PCBs, and TPH.

The results of this investigation will be used to approximate with reasonable certainty the area and volume of material subject to remediation at this site, and determine appropriate disposition of the waste material.

The August 2004 correspondence directed that groundwater monitoring is required to continue at this site, with an increase in frequency from biennial to quarterly. While it is agreed that groundwater monitoring is warranted at the site in order to monitor the effect of the waste material on groundwater until remedial action is conducted, quarterly monitoring is not meaningful for several reasons. The primary reason is the slow rate of groundwater flow, which has been consistent throughout the history of the program. Flow velocity estimates determined during the RI were 0.2 to 1.0 ft/year, based on a very low hydraulic gradient of 0.0006 ft/ft, and during the most recent round of LTM, 2.6 ft/year, based on a gradient of 0.0014 ft/ft. Using the maximum groundwater flow rate of 2.6 ft/year, groundwater under the current biennial frequency would travel 5.2 feet between events. Under a quarterly frequency, groundwater in theory would only travel 8 inches between events. A margin of error of 500% would still result in groundwater traveling less than 3 ½ feet between quarterly events. Given this, the fact that decreasing concentrations have been observed over time and no constituents currently exceed NMGWQ standards, and the water is not potable (average TDS at the site was over 30,000 mg/L during 3 events from June 2002 to March 2003, as presented in the 2003 LTM report), biennial, not quarterly, monitoring remains appropriate for the site and will continue. Analytes will include TCE and 1,1-DCA to support a continued assessment of trends; analysis of metals and chloroform is not warranted based on the LTM data. The next event will be conducted concurrently with LTM at LF-21 and LF-29.

3.5 INVESTIGATION APPROACH: SS-39

3.5.1 Introduction

Requirements for this site were described in NMED correspondence of February 9, 2005 and included an in-depth review of previous investigations, which was presented in Section 2.2.9. Based on this review, it appears that a slug of TCE contamination has migrated approximately 350 feet south from the original source location, the Building 1176 sumps, to its current location. A significant source of TCE contamination may no longer exist, given that concentrations of TCE have decreased at MW-39-02, immediately adjacent to the sump. However, there are no permanent monitoring wells present where groundwater samples obtained using DPT methods show the maximum plume concentrations.

3.5.2 Approach

Additional soil sampling is not proposed. Concentrations of TCE in monitoring well MW-39-02 have decreased, indicating that source attenuation is occurring. Furthermore, contaminated soils are at depth, unavailable to receptors.

Five shallow monitoring wells are proposed to assess the TCE plume at SS-39. Proposed monitoring well locations are provided on Figure 3.1. Depth to water at proposed well locations MW-39-08 and MW-39-09 is expected to be shallow; these wells may be moved north if depth to water is less than 2 feet to allow for a proper surface completion above the screen of the monitoring well. The monitoring wells will be constructed using flush-threaded two-inch diameter Schedule 40 PVC casing and screen. Well screen lengths will be no more than ten feet long, and consist of 0.010-inch continuous slotted PVC screen with a PVC bottom plug. Screens will extend to one foot above the water table. The use of "pre-pack" wells may also be considered for this area.

A deep monitoring well will be installed as a couplet to MW-39-06, designated MW-39-06D, as directed by NMED. Due to the relative uniformity of the stratigraphy and absence of significant, continuous confining units observed at the site, the well will not be double-cased. The well will be drilled at the approximate location of SS3907, where groundwater was encountered at a depth of 3.5 feet below grade during the 1998 GTI investigation. The well will be installed to a depth of 20 feet and completed with five feet of 0.010-inch continuous slotted PVC screen with a PVC bottom plug.

The new wells and wells MW-39-02 and MW-39-03 are proposed for sampling; MW-39-01 and MW-39-04 are several hundred feet upgradient of the Building 1176 area and will not provide relevant information. The first round of samples at these wells will be analyzed for VOCs and perchlorate. VOCs are the contaminants of concern, and perchlorate analysis is warranted due the nature of operations at Building 1176. It is important to note that high TDS in the groundwater may provide matrix interference when perchlorate analysis is performed. Although NMED directed that SVOCs and metals be sampled and analyzed, soil sampling for SVOCs was performed as part of the Phase II RFI and the majority of samples contained no SVOCs. Where present, they were below all SSLs. Similarly, metals were not above

background or unusually elevated in the majority of soil samples, nor were they detected in groundwater during the RI at elevated levels.

Due to the slow rate of groundwater flow (estimated at 11 feet per year), the current biennial frequency of monitoring should be sufficient to establish trends in the data. The frequency, as well as proposed monitoring locations and analytes, will be refined after data from this supplemental RFI are available.

3.6 FIELD METHODOLGIES

Standard Operating Procedures (SOPs) that describe field methodologies for common tasks such as equipment decontamination, soil and groundwater sampling, IDW management, etc, have been previously presented in the Basewide QAPP (Bhate, 2003b). These SOPs are reproduced herein for ease of reference to the field team as Appendix I. Analytical methods are described in the QAPP Addendum for this project, provided as Appendix J. More specific methodologies for trenching, geophysical survey, and passive soil gas survey are presented in the following subsections.

3.6.1 Trenching

Test Pits will be excavated with backhoe equipment at LF-19, LF-21, LF-22, and LF-23 to provide detailed visual examination of soil and waste material, if the geophysical survey results indicate the need to do so. A procedure is outlined below:

Test Pit Sampling Procedure:

1) Mark the location of potential test pits based on geophysical survey results and site observations.
2) At the direction of the oversight staff on-site, the backhoe operator will excavate the test pit in increments.
3) Test pit excavations will cease if any of the following are encountered:
   a) Hazardous materials;
   b) Odors;
   c) Groundwater or fluid phase contaminants.
4) The requirements for collecting grab samples of soil are as follows:
   (a) Use a clean stainless steel trowel or spoon to collect sufficient material to fill the sample containers. Fill the sample containers directly from the sampling device, removing stones, twigs, grass, etc., from the sample.
   (b) Immediately secure the caps on the sample container.
   (c) Label container with the appropriate information. NOTE: Container may be labeled prior to sample collection.
   (d) Record samples (e.g., sample ID, location, depth, method, etc.) in the bound field logbook.
   (e) Pack sample in cooler with ice.

(f) Use decontaminated sampling equipment at each sample location to minimize cross-contamination.

At a minimum, field logs for test pit excavation will include the following documentation:

- Plan and profile sketches of the test pit showing materials encountered, the depth of material, and sample locations.
- Sketch of the test pit and distance and direction from permanent, identifiable location marks as appropriate.
- A description of the material removed from the excavation.
- A record of samples collected.
- The presence or absence of water in the test pit and the depth encountered.
- Other readings, or measurements taken during excavation, including field screening readings.

Unless otherwise specified, no personnel will enter a test pit greater than 3 feet in depth. In addition, all test pits will be backfilled on the day of excavation. In most cases, excavation materials will be used to fill the test pit. In the event that highly contaminated soil or hazardous material is excavated and it is expected that it will be more cost-effective to segregate the material at that time, excavated soils/waste may be stockpiled on and covered by plastic. In this instance, the excavation will be re-graded using surrounding soils, since these areas of HAFB are remote.

3.6.2 Geophysical Surveys

Utilizing a global positioning system, the EM-31 surveys will be performed at all sites by obtaining data continuously along straight-line traverses spaced ten feet apart. All traverses will be parallel to one another and referenced against a baseline, through the utilization of the Trimble Swathing Option – an established field surveying technique that has been accurately employed by farmers throughout the world. A light bar attached to the GPS backpack enables the EM-31 surveyor to maintain sufficiently straight and evenly spaced survey lines, ultimately creating a 10-foot grid over all sites. Though pre-survey gridding has been the primary method used in the past, this approach utilizes GPS navigational tools with equal or better locational accuracy. Because the GPS system acquires locational (XY) data simultaneously with the geophysical (Z) data, the resultant database consists of virtually continuous XYZ data that are readily plotted in UTM or Latitude-Longitude coordinates. Surveying in this manner has an accuracy of ± ½-meter. After the survey is completed and the final map identifies an anomaly at a specific location, re-acquisition of this target is also ± ½-meter. In those locations (LF 19, LF 21, LF 22 and LF 23) where high brush (i.e., Salt Cedars) may interfere with GPS signal acquisition, EM-31 readings will be recorded and referenced to the "before-after" readings that have GPS-derived coordinates in order to maintain locational accuracy.

A GPR survey will be performed at DP-30/SD-33 to supplement the EM-31 survey in the event that the EM-31 survey cannot reasonably establish trench boundaries. GPR is used for shallow, high-resolution subsurface investigations. GPR is particularly useful in determining trench boundaries based on its measurement of contrasting dielectric properties between the materials within the trench and the surrounding strata. The GPR survey, if conducted, will be performed as a series of traverses perpendicular to the presumed locations of the trenches in order to more definitively establish their boundaries.

After completion of the geophysical surveys, a report will be prepared that describes the geophysical methods and instruments used, methods of data collection, and interpretation of the geophysical data. Color contour maps of the EM-31 in-phase and conductivity data will be prepared for each site. GPR profiles will be provided if the GPR survey is performed.

3.6.3 Passive Soil Gas Surveys

A passive soil gas survey will be conducted at LF-10. Collection of soil-gas samples from the shallow subsurface will provide data on the identity and concentrations of targeted VOCs which may be present. This data will be used to identify potential hot spots and to delineate the lateral extent of the contaminants.

Soil gas samples will be collected using the EMFLUX® passive Soil Gas Method. This method is a verified EPA technology under the EPA Technology Verification Program. The method is described fully in EPA Publication EPA/600/R-98/096, which can be provided to NMED upon request. The EMFLUX system allows simultaneous sample collection by multiple field collectors, eliminating the movement of equipment. The EMFLUX® system consists of cartridges, insertion tools, and sample analysis and computer modeling. The EMFLUX® cartridge consists of a sorbent sealed in a fine mesh screen, which is placed in a glass vile for sample collection and shipped for analysis. The EMFLUX® system was first demonstrated for EPA in May and June 1997 at two sites: the Small Business Administration (SBA) site in Albert City, Iowa, and the Chemical Sales Company (CSC) site in Denver, Colorado. These sites were chosen because each has a wide range of VOC concentrations and because each site had a distinct soil type. The EMFLUX® system was compared to a reference method, active soil gas sampling, in terms of the following parameters: VOC detection and quantitation, sample retrieval time, and cost. The demonstration data indicated that the EMFLUX® system detected the same compounds as the reference method, as well as several VOCs that the reference method did not detect. Furthermore, detectable VOC concentrations measured by the EMFLUX® system were typically one to four orders of magnitude lower than those reported by the active soil gas sampling.

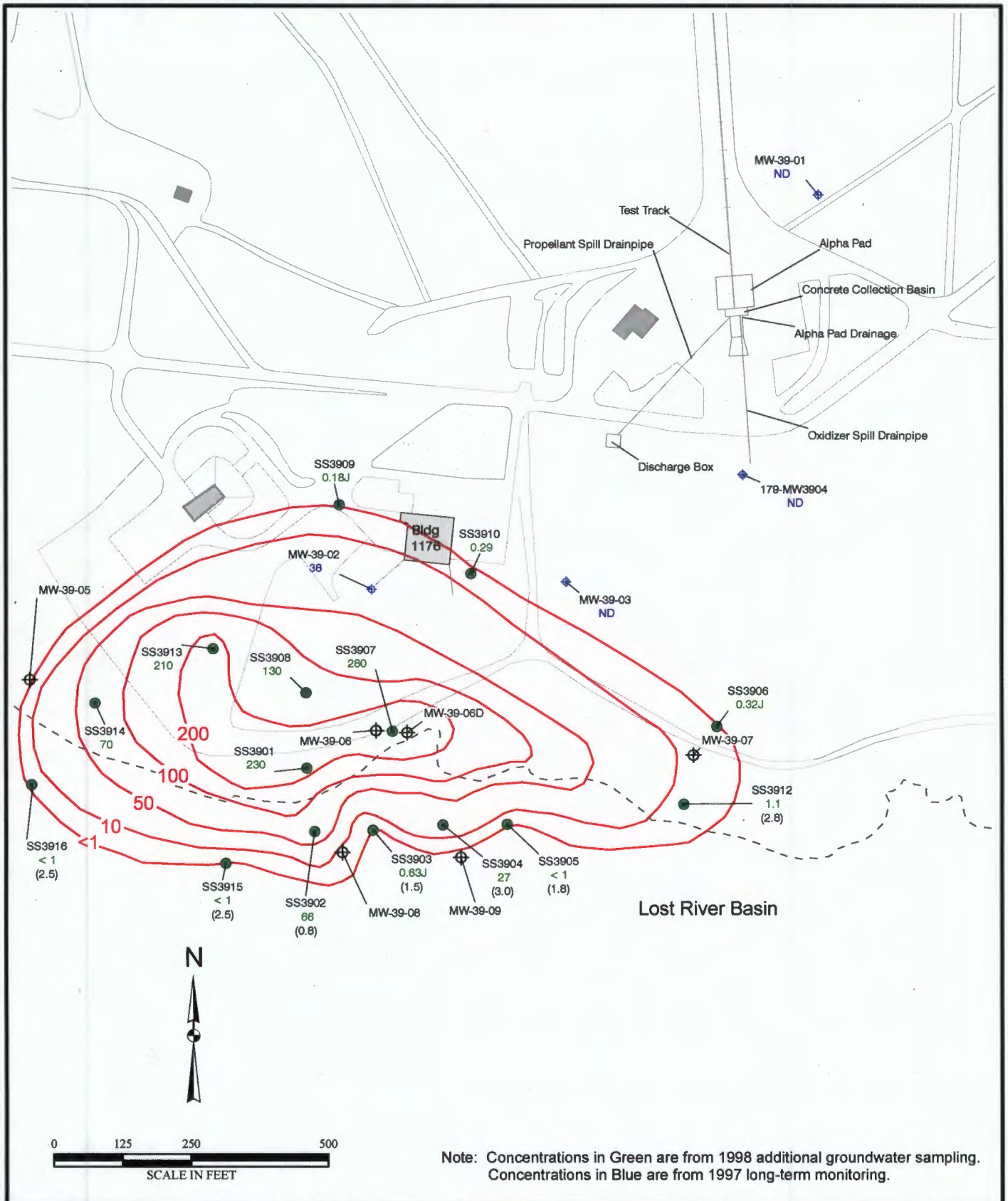
Soil gas samples will be obtained at 100-foot intervals at LF-10. Soil gas sampling locations will cover the extent of the landfill established by the geophysical survey. Small, easy-to-carry field kits containing sufficient equipment to collect the samples are provided by the vendor for collection of soil-gas samples following the protocols of the EMFLUX® passive method. To install an EMFLUX® Sampler, a 3/4" diameter hole is made to a depth of four inches using a hammer and a metal stake provided in the Kit. When applicable, a hammer

drill, slide hammer, or other comparable equipment can be used to create a 1/2" diameter hole to a two- to three-foot depth. In either case, the EMFLUX® Sampler (which contains two hydrophobic adsorbent cartridges) is installed in the top four inches of the hole. For locations covered by asphalt or concrete surfacing, a 1 1/4" to 1 1/2" diameter hole is drilled through the surfacing to the underlying soils, and the hole is sleeved with a sanitized metal pipe provided in the Kit. After the Sampler is installed inside the metal pipe, the hole is patched with an aluminum foil plug and a thin concrete patch to protect the sampler. The samplers are exposed to subsurface gas for a predetermined period to maximize the collection of soil gas. This period has been discussed with the vendor and is estimated to be three days. Following the exposure period, the Samplers are retrieved and shipped to the vendor's laboratory for analysis. A trip blank, which will remain with the other EMFLUX® samples during preparation, shipment, and storage, will be included with each batch of 25 field samples.

Soil gas samples will be analyzed for VOCs using gas chromatography/mass spectrometry (GC/MS) instrumentation, following modified EPA Method 8260B procedures. The laboratory will perform an initial five-point calibration. In addition, an instrument tune is performed daily and a method blank is analyzed following the daily calibration. Internal standards and surrogates are included with each sample analysis. The laboratory's reported quantitation level for each of the targeted compounds is 25 nanograms; however, the actual detection limit is even lower. Two adsorbent cartridges are included in each Sampler for duplicate or confirmatory analysis. A soil gas survey report with color isopleth maps of targeted VOC concentrations will be prepared.

Active methane screening will also be performed at LF-10 during soil boring advancement. Field measurements of landfill gas (methane and carbon dioxide) will be made using a landfill gas detector, using either a LandTech GM-500 or similar device. Based upon the age of the landfill and the arid environment, it is unlikely that the landfill is actively producing significant quantities of methane.

FIGURE



Note: Concentrations in Green are from 1998 additional groundwater sampling.
Concentrations in Blue are from 1997 long-term monitoring.

File X:\AFC002\Holloman_AFB\TO37\Maps\RCRA_Work_Plan\SS-39_Proposed_Samples.mxd
Project: AFC002-037-04-11-02
Revised: 7/28/05 TH
Map Source: Holloman AFB

Legend

- Monitoring Well (1997 Data)
- DPT Location (1998 Data)
- (2.5') Depth to Water (Ft.) (1998)
- Trichloroethene Contour
- Proposed Monitoring Well

Figure 3.1
Proposed Monitoring Well Locations
Site SS-39

4.0 DATA EVALUATION/REPORTING

This section presents an overview of the evaluation and reporting of the data to be collected based on the scope of work described in this work plan.

4.1 EVALUATION OF RESULTS

This supplemental RFI will be conducted for the most part in an iterative manner. The results of the geophysical survey will be used to determine trenching locations for some landfills, soil gas survey locations for LF-10, and soil and waste sampling locations for DP-30/SD-33. Observations during trenching, if performed based on the geophysical survey results, will determine if samples are collected and submitted for laboratory analyses, and what the analyses will be. Soil sampling locations at LF-10 will be biased to elevated VOCs determined by the soil gas survey; random sampling will be performed in the event that elevated VOCs are not detected during the survey.

All laboratory analytical data will be reviewed to ensure the data meet the data quality objectives (DQO) necessary to achieve the purpose and intent of the Supplemental RFI. Analytical data shall be collected and handled in accordance with the QAPP Addendum.

The project chemist will review all data received from the laboratory. This review consists of the following:

- Sample analysis completeness - Were all samples analyzed? Were samples analyzed for the parameters listed in the Work Plans?
- Evaluation of holding times - Were samples analyzed within the specified holding and extraction times?
- Evaluation of quality control - Were standard curves within method control limits? Were preparation and method blanks contaminated? Were continuing calibration standards in control? Were matrix spikes and matrix spike duplicates performed? How did field duplicates compare? Were corrective actions taken?
- Establishment of detection limits - Were detection limits met? If not, why?

Unless otherwise noted, the QAPP Addendum associated with this work plan is consistent with the Base-wide Quality Assurance Project Plan (Bhate, 2003b).

4.2 HUMAN HEALTH RISK ASSESSMENT

Sample results will be used to evaluate potential risks by screening results against NMED SSLs. In order to prevent misuse of SSLs, the following will be avoided:

- Applying SSLs to a site without adequately developing a conceptual site model that identifies relevant exposure pathways and exposure scenarios,
- Use of SSLs as cleanup levels without verifying numbers with a toxicologist or risk assessor, and
- Not considering the effects of additivity when screening multiple chemicals.

Generic NMED SSLs were developed assuming distinct soil horizons for each receptor. The soils of interest differ according to the exposure pathway being addressed. For direct ingestion, dermal, and fugitive dust pathways, the primary soil horizon of concern are surface soils. For inhalation of volatiles and migration to groundwater, subsurface soils are of primary concern. Both a residential receptor and a commercial/industrial worker are typically exposed only to surface soil, which may be defined as extending to a depth of approximately two feet below ground surface, depending on site-specific conditions and the amount of intrusive activity that may occur. Construction workers will typically have much greater exposures to subsurface soils. Therefore, when generic SSLs are applied for use as a screen, site-specific conditions will be evaluated for each receptor to determine if the assumptions associated with the generic SSLs are appropriate for comparison with the available site data.

For cumulative exposure via the ingestion, inhalation, and dermal pathways, toxicity criteria are used to calculate an acceptable level of contamination in soil. NMED SSLs are based on a carcinogenic risk level of one-in-one-hundred thousand (1E-05) and a non-carcinogenic hazard quotient (HQ) of 1. A carcinogenic risk level is defined as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The non-carcinogenic hazard quotient assumes that there is a level of exposure below which it is unlikely for even sensitive populations to experience adverse health effects.

A more site-specific risk assessment may be performed if screening against generic SSLs is inconclusive based on site conditions. Target risk and hazard levels for human health are risk management-based criteria for carcinogenic and non-carcinogenic responses, respectively. These criteria are used to determine (1) whether site-related contamination poses an unacceptable risk to human health and requires corrective action or (2) whether implemented corrective action(s) sufficiently protects human health. If an estimated risk or hazard falls within the target range, the risk manager may conclude that a site does not pose an unacceptable risk. This decision should take into account the degree of inherent conservatism or level of uncertainty associated with the site-specific estimates of risk and hazard. An estimated risk that exceeds these targets, however, does not necessarily indicate that the current conditions are not safe or that they present an unacceptable risk. Rather, a site risk calculation that exceeds a target value may simply indicate the need for further evaluation or refinement of the exposure model.

4.3 RFI REPORT

The requirements for an RFI Report are defined in Appendix 4-B of the RCRA Permit. At a minimum the RFI Report will contain the following elements: introduction, environmental setting, source characterization, sampling and analysis results, data quality assurance/data quality control review, conclusions, and recommendations. The evaluation of analytical data shall be sufficient to determine the applicability of each site for NFA under NMED Criterion 5, or identify the need for additional assessment and/or action.

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APPENDIX A

RECORDS SEARCH

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Old Main Base Landfill (Site No. 10)

LOCATION: Holloman AFB

DATE OF OPERATION OR OCCURRENCE: 1942-1958

OWNER/OPERATOR: Holloman AFB

COMMENTS/DESCRIPTION: Main base sanitary landfill from 1942 until late 1950s

SITE RATED BY: N. Hatch and T. Emenhiser

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	3	4	12	12
B.	Distance to nearest well	0	10	0	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	0	6	0	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	0	6	0	18
			Subtotals	33	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 18

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore --

B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface-water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	62	108

Subscore (100 x factor score subtotal/maximum score subtotal) 57

2. Flooding 1

Subscore (100 x factor score/3)

3. Ground-water migration

Depth to ground water	3	4[a]	12	--
Net precipitation	0	6	0	
Soil permeability	2	8	16	24
Subsurface flows	1	4[a]	4	12
Direct access to ground water	NA	8	--	--
		Subtotals	32	66

[a]Reduced multiplier due to brackish ground water.

Subscore (100 x factor score subtotal/maximum score subtotal) 48

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 57

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	18
Waste Characteristics	40
Pathways	57
Total 115 divided by 3 =	38
	Gross Total S

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

38 x 1.0 38

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Golf Course Landfill (Site No. 19)

LOCATION: Holloman AFB

DATE OF OPERATION OR OCCURRENCE: Late 1960's to 1978

OWNER/OPERATOR: Holloman AFB

COMMENTS/DESCRIPTION: Used mainly for grass clippings, etc.--known small quantity of rodenticides

SITE RATED BY: N. Hatch and T. Emenhiser

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	0	10	0	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	0	6	0	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	0	6	0	18
			Subtotals	27	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 15

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore --

B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface-water migration

Distance to nearest surface water	2	8	16	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108

Subscore (100 x factor score subtotal/maximum score subtotal) 50

2. Flooding 1

Subscore (100 x factor score/3)

3. Ground-water migration

Depth to ground water	3	4[a]	12	
Net precipitation	0	6	0	18
Soil permeability	2	8	16	24
Subsurface flows	1	4[a]	4	12
Direct access to ground water	NA	8	--	--
		Subtotals	32	66

[a]Reduced multiplier due to brackish ground water.

Subscore (100 x factor score subtotal/maximum score subtotal) 48

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	15
Waste Characteristics	60
Pathways	50
Total 110 divided by 3 =	37
	Gross Total S

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

37 x 1.0

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: West Area Landfill No. 2 (Site No. 21)

LOCATION: Holloman AFB

DATE OF OPERATION OR OCCURRENCE: Early 1970's (assumed) to 1977

OWNER/OPERATOR: Holloman AFB

COMMENTS/DESCRIPTION: Rubble and debris--convenient to west area maintenance facility

SITE RATED BY: N. Hatch and T. Emenhiser

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	0	10	0	30
C.	Land use/zoning within 1 mile radius	2	3	6	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	0	6	0	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	0	6	0	18
			Subtotals	22	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 12

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108
Subscore (100 x factor score subtotal/maximum score subtotal)				50
2. Flooding		1		
	Subscore (100 x factor score/3)			
3. Ground-water migration				
Depth to ground water	3	4[a]	12	
Net precipitation	0	6	0	[illegible]
Soil permeability	2	8	16	24
Subsurface flows	1	4[a]	4	12
Direct access to ground water	NA	8	--	--
[a]Reduced multiplier due to brackish ground water.		Subtotals	32	66
Subscore (100 x factor score subtotal/maximum score subtotal)				48
C. Highest pathway subscore				
Enter the highest subscore value from A, B-1, B-2, or B-3 above.				
		Pathways Subscore		50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	12
Waste Characteristics	40
Pathways	50
Total 102 divided by 3 =	34
Gross Total	

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

34 x 1.0 34

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: West Area Landfill No. 1 (Site No. 22)

LOCATION: Holloman AFB

DATE OF OPERATION OR OCCURRENCE: 1974-1978

OWNER/OPERATOR: Holloman AFB

COMMENTS/DESCRIPTION: Mostly rubble disposal; possibility of some POL waste

SITE RATED BY: N. Hatch and T. Emenhiser

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	0	10	0	30
C.	Land use/zoning within 1 mile radius	2	3	6	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	0	6	0	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	0	6	0	18
			Subtotals	28	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 16

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	62	108
Subscore (100 x factor score subtotal/maximum score subtotal)				57
2. Flooding		1		
	Subscore (100 x factor score/3)			
3. Ground-water migration				
Depth to ground water	3	4[a]	12	
Net precipitation	0	6	0	-
Soil permeability	2	8	16	24
Subsurface flows	1	4[a]	4	12
Direct access to ground water	NA	8	--	--
[a]Reduced multiplier due to brackish ground water.				
		Subtotals	32	66
Subscore (100 x factor score subtotal/maximum score subtotal)				48

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 57

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	16
Waste Characteristics	40
Pathways	57
Total 113 divided by 3 =	38
Gross Total S	

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

38 x 1.0 38

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: MOBSS Landfill (Site No. 23)

LOCATION: Holloman AFB

DATE OF OPERATION OR OCCURRENCE: 1976-1979

OWNER/OPERATOR: Holloman AFB

COMMENTS/DESCRIPTION: Cans of diazinon, dibromochloromethane, some unidentified drums

SITE RATED BY: N. Hatch and T. Emenhiser

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximu Possib Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	0	10	0	30
C.	Land use/zoning within 1 mile radius	2	3	6	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	0	6	0	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	0	6	0	18
			Subtotals	24	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 13

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore --

B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface-water migration

Distance to nearest surface water	2	8	16	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	54	108

Subscore (100 x factor score subtotal/maximum score subtotal) 50

2. Flooding 1

Subscore (100 x factor score/3)

3. Ground-water migration

Depth to ground water	3	4[a]	12	-
Net precipitation	0	6	0	-
Soil permeability	2	8	16	24
Subsurface flows	1	4[a]	4	12
Direct access to ground water	NA	8	--	--
		Subtotals	32	66

[a]Reduced multiplier due to brackish ground water.

Subscore (100 x factor score subtotal/maximum score subtotal) 48

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 50

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	13
Waste Characteristics	60
Pathways	50
Total 123 divided by 3 =	41
	Gross Total S

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

41 x 1.0 41

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Grease Trap Disposal Pits (Site No. 30)

LOCATION: Holloman AFB

DATE OF OPERATION OR OCCURRENCE: 1977-1979

OWNER/OPERATOR: Holloman AFB

COMMENTS/DESCRIPTION: Grease traps, oil/water separator skimmings, pesticides

SITE RATED BY: N. Hatch and T. Emenhiser

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	0	10	0	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	0	6	0	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	0	6	0	18
			Subtotals	21	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 12

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) L
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 70

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

70 x 1.0 = 70

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

70 x 1.0 = 70

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	1	8	8	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	46	108
Subscore (100 x factor score subtotal/maximum score subtotal)				43
2. Flooding		1		
	Subscore (100 x factor score/3)			
3. Ground-water migration				
Depth to ground water	3	4[a]	12	
Net precipitation	0	6	0	--
Soil permeability	2	8	16	24
Subsurface flows	1	4[a]	4	12
Direct access to ground water	NA	8	--	--
		Subtotals	32	66
Subscore (100 x factor score subtotal/maximum score subtotal)				48

[a]Reduced multiplier due to brackish ground water.

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 48

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	12
Waste Characteristics	70
Pathways	48
Total 130 divided by 3 =	43
Gross Total :	

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

43 x 1.0 43

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Missle Fuel Spill Site (Site No. 39)

LOCATION: Holloman AFB

DATE OF OPERATION OR OCCURRENCE: 1950-1975

OWNER/OPERATOR: Holloman AFB

COMMENTS/DESCRIPTION: Periodic missle fuel spills including fuming nitric acid, JP-4 and UDMH

SITE RATED BY: N. Hatch and T. Emenhiser

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	0	10	0	30
C.	Land use/zoning within 1 mile radius	2	3	6	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	0	10	0	30
F.	Water quality of nearest surface-water body	0	6	0	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	0	6	0	18
			Subtotals	22	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 12

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (C = confirmed, S = suspected) C
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore --

B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface-water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	62	108

Subscore (100 x factor score subtotal/maximum score subtotal) 57

2. Flooding 1

Subscore (100 x factor score/3)

3. Ground-water migration

Depth to ground water	3	4[a]	12	
Net precipitation	0	6	0	
Soil permeability	2	8	16	24
Subsurface flows	2	4[a]	8	12
Direct access to ground water	2	4[a]	8	12
		Subtotals	44	78

[a]Reduced multiplier due to brackish ground water.

Subscore (100 x factor score subtotal/maximum score subtotal) 56

C. Highest pathway subscore

Enter the highest subscore value from A, B-1, B-2, or B-3 above.

Pathways Subscore 57

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	12
Waste Characteristics	60
Pathways	57
Total 129 divided by 3 =	43
	Gross Total S

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

43 x 1.0 43

APPENDIX B

NOTIFICATION OF HAZARDOUS WASTE SITE

EPA Notification of Hazardous Waste Site

Environmental Protec
Agency
Washington DC 2046

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

Person Required to Notify:

Enter the name and address of the person or organization required to notify.

Name 833 CSG/DEEV

Street

City Holloman AFB State N.M. Zip Code 88330

Site Location:

Enter the common name (if known) and actual location of the site.

Name of Site Old Main Base Landfill

Street

City Holloman AFB County Otero State N.M. Zip Code 88330

Person to Contact:

Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title) Nowak, Lawrence Environmental Coordinator

Phone 505-479-6511 ext. 4491

Dates of Waste Handling:

Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year) 1942 To (Year) 1958

Waste Type: Choose the option you prefer to complete

Option I: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☐ Pesticides
5. ☐ Heavy metals
6. ☐ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☒ Mixed Municipal Waste
10. ☐ Unknown
11. ☐ Other (Specify)

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical; General
9. ☐ Plating/Polishing
10. ☐ Military/Ammunition
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☒ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☐ Other (Specify)

Option 2: This option is available to persons familiar with t Resource Conservation and Recovery Act (RCRA) Section 3(regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous w listed in the regulations under Section 3001 of RCRA. Ente appropriate four-digit number in the boxes provided. A copy the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the s located.

Form Approved

F Waste Quantity:

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☒ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☐ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☐ Other (Specify) _____

Total Facility Waste Amount

cubic feet _____

gallons small quantity

Total Facility Area

square feet _____

acres 20

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☒ Suspected ☐ Likely ☐ N

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and asses hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

I Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

J Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required to notify, check "Other".

Name Philip W. Nuber, Colonel, USAF

Street Commander, 833 CSG

City Holloman AFB State N.M. Zip Code 88330

Signature [signature] Date 2 Dec 83

☒ Owner, Preser
☐ Owner,
☐ Transporter
☐ Operator, Pres
☐ Operator, Past
☐ Other

EPA Notification of Hazardous Waste Site

Environmental Protecti
Agency
Washington DC 20460

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

Person Required to Notify:
Enter the name and address of the person or organization required to notify.

Name 833 CSG/DEEV
Street
City Holloman AFB State N.M. Zip Code 88330

Site Location:
Enter the common name (if known) and actual location of the site.

Name of Site West Area Landfill #2
Street
City Holloman AFB County Otero State N.M. Zip Code 88330

Person to Contact:
Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title) Nowak, Lawrence Environmental Coordinator
Phone 505-479-6511 ext. 4491

Dates of Waste Handling:
Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year) 1970 To (Year) 1977

Waste Type: Choose the option you prefer to complete

Option 1: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☐ Pesticides
5. ☐ Heavy metals
6. ☐ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☒ Mixed Municipal Waste
10. ☒ Unknown
11. ☐ Other (Specify)

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical; General
9. ☐ Plating/Polishing
10. ☒ Military/~~Ammunition~~
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☐ Other (Specify)

Option 2: This option is available to persons familiar with th Resource Conservation and Recovery Act (RCRA) Section 30(regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous wa listed in the regulations under Section 3001 of RCRA. Enter appropriate four-digit number in the boxes provided. A copy the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the sit located.

F Waste Quantity:

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☒ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☐ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☐ Other (Specify) _____

Total Facility Waste Amount

cubic feet _____

gallons Small quantity

Total Facility Area

square feet _____

acres _____

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☒ Suspected ☐ Likely ☐ N

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and asses hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required

Name Philip W. Nuber, Colonel, USAF

Street Commander, 833 CSG

City Holloman AFB State N.M. Zip Code 88330

Signature [signature] Date 2 Dec 83

☒ Owner, P
☐ Owner,
☐ Transporter
☐ Operator, Pres
☐ Operator, Pas
☐ Other

EPA Notification of Hazardous Waste Site

Environmental Protecti
Agency
Washington DC 20460

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

Person Required to Notify:

Enter the name and address of the person or organization required to notify.

Name 833 CSG/DEEV

Street

City Holloman AFB State N.M. Zip Code 88330

Site Location:

Enter the common name (if known) and actual location of the site.

Name of Site MOBSS LANDFILL

Street

City Holloman AFB County Otero State N.M. Zip Code 88330

Person to Contact:

Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title) Nowak, Lawrence Environmental Coordinator

Phone 505-479-6511 ext. 4491

Dates of Waste Handling:

Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year) 1976 To (Year) 1979

Waste Type: Choose the option you prefer to complete

Option 1: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☒ Posticides
5. ☐ Heavy metals
6. ☐ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☐ Mixed Municipal Waste
10. ☒ Unknown
11. ☐ Other (Specify)

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical; General
9. ☐ Plating/Polishing
10. ☒ Military/~~Ammunition~~
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☐ Other (Specify)

Option 2: This option is available to persons familiar with th Resource Conservation and Recovery Act (RCRA) Section 30 regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous wa listed in the regulations under Section 3001 of RCRA. Enter appropriate four-digit number in the boxes provided. A copy the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the si located.

Form Approved

F Waste Quantity:

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☒ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☐ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☐ Other (Specify) _____

Total Facility Waste Amount

cubic feet _____

gallons small quantity

Total Facility Area

square feet _____

acres 1/2

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☒ Suspected ☐ Likely ☐ N

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and asses hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

I Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required

Name Philip W. Nuber, Colonel, USAF

Street Commander, 833 CSG

City Holloman AFB State N.M. Zip Code 88330

Signature [signature] Date 20 Dec 83

☒ Owner, se
☐ Owner, t
☐ Transporter
☐ Operator, Pre
☐ Operator, Pas
☐ Other

EPA Notification of Hazardous Waste Site

Environmental Protecti
Agency
Washington DC 20460

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

Person Required to Notify:
Enter the name and address of the person or organization required to notify.

Name 833 CSG/DEEV
Street
City Holloman AFB State N.M. Zip Code 88330

Site Location:
Enter the common name (if known) and actual location of the site.

Name of Site Grease Trap Disposal Area
Street
City Holloman AFB County Otero State N.M. Zip Code 88330

Person to Contact:
Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title) Nowak, Lawrence Environmental Coordinator
Phone 505-479-6511 ext. 4491

Dates of Waste Handling:
Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year) 1972 To (Year) 1979

Waste Type: Choose the option you prefer to complete

Option I: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☒ Pesticides
5. ☐ Heavy metals
6. ☐ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☐ Mixed Municipal Waste
10. ☐ Unknown
11. ☒ Other (Specify) sludges, grit and cooking grease

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical/General
9. ☐ Plating/Polishing
10. ☒ Military/~~Ammunition~~
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☐ Other (Specify)

Option 2: This option is available to persons familiar with th Resource Conservation and Recovery Act (RCRA) Section 30 regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous wa listed in the regulations under Section 3001 of RCRA. Enter appropriate four-digit number in the boxes provided. A copy the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the si located.

Form Approved

F Waste Quantity:

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☐ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☐ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☒ Other (Specify) Buried waste in ground

Total Facility Waste Amount

cubic feet

gallons Small quantity

Total Facility Area

square feet

acres 1/4

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☒ Suspected ☐ Likely ☐ No

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and assess hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

I Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required

Name Philip W. Nuber, Colonel, USAF

Street Commander, 833 CSG

City Holloman AFB State N.M. Zip Code 88330

Signature Philip W. Nuber Date 2 Dec 83

☒ Owner, Present
☐ Owner,
☐ Transporter
☐ Operator, Pres
☐ Operator, Past
☐ Other

EPA Notification of Hazardous Waste Site

Environmental Protection Agency
Washington DC 20460

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

Person Required to Notify:
Enter the name and address of the person or organization required to notify.

Name 833 CSG/DEEV
Street
City Holloman AFB State N.M. Zip Code 88330

Site Location:
Enter the common name (if known) and actual location of the site.

Name of Site Missile Fuel Spill Area
Street
City Holloman AFB County Otero State N.M. Zip Code 88330

Person to Contact:
Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title) Nowak, Lawrence Environmental Coordinator
Phone 505-479-6511 ext. 4491

Dates of Waste Handling:
Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year) 1955 To (Year) 1975

Waste Type: Choose the option you prefer to complete

Option 1: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☐ Pesticides
5. ☐ Heavy metals
6. ☐ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☐ Mixed Municipal Waste
10. ☐ Unknown
11. ☒ Other (Specify)
Fuel

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical; General
9. ☐ Plating/Polishing
10. ☒ Military/~~Ammunition~~
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☐ Other (Specify)

Option 2: This option is available to persons familiar with the Resource Conservation and Recovery Act (RCRA) Section 300 regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous was listed in the regulations under Section 3001 of RCRA. Enter t appropriate four-digit number in the boxes provided. A copy o the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the site located.

Form Approved

F Waste Quantity:

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☐ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☐ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☒ Other (Specify) Track Launch Area (south)

Total Facility Waste Amount

cubic feet

gallons small quantity

Total Facility Area

square feet

acres 1/2

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☒ Suspected ☐ Likely ☐ No

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and assess hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

I Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required to notify check "Other"

Name Philip W. Nuber, Colonel, USAF

Street Commander, 833 CSG

City Holloman AFB State N.M. Zip Code 88330

Signature Philip W. Nuber Date 2 Dec 83

☒ Owner, Prese
☐ Owner
☐ Transporter
☐ Operator, Pre
☐ Operator, Pa
☐ Other

EPA Notification of Hazardous Waste Site

Environmental Protecti
Agency
Washington DC 20460

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

Person Required to Notify:

Enter the name and address of the person or organization required to notify.

Name 833 CSG/DEEV

Street

City Holloman AFB State N.M. Zip Code 88330

Site Location:

Enter the common name (if known) and actual location of the site.

Name of Site Golf Course Landfill

Street

City Holloman AFB County Otero State N.M. Zip Code 88330

Person to Contact:

Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title) Nowak, Lawrence Environmental Coordinator

Phone 505-479-6511 ext. 4491

Dates of Waste Handling:

Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year) 1968 To (Year) 1978

Waste Type: Choose the option you prefer to complete

Option I: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☒ Pesticides
5. ☐ Heavy metals
6. ☐ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☐ Mixed Municipal Waste
10. ☐ Unknown
11. ☐ Other (Specify)

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical; General
9. ☐ Plating/Polishing
10. ☒ Military/~~Ammunition~~
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☐ Other (Specify)

Option 2: This option is available to persons familiar with th Resource Conservation and Recovery Act (RCRA) Section 30 regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous wa listed in the regulations under Section 3001 of RCRA. Enter appropriate four-digit number in the boxes provided. A copy the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the si located.

F Waste Quantity:

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☒ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☐ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☐ Other (Specify) _____

Total Facility Waste Amount

cubic feet _____

gallons Small quantity

Total Facility Area

square feet _____

acres 1/8

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☒ Suspected ☐ Likely ☐ N

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and asses hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required to notify, check "Other".

Name Philip W. Nuber, Colonel, USAF

Street Commander, 833 CSG

City Holloman AFB State N.M. Zip Code 88330

Signature [signature] Date 2 DEC 85

☒ Owner, Pres
☐ Owner
☐ Transporter
☐ Operator, Pr
☐ Operator, Pa
☐ Other

EPA Notification of Hazardous Waste Site

Environmental Protectio
Agency
Washington DC 20460

This initial notification information is required by Section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and must be mailed by June 9, 1981.

Please type or print in ink. If you need additional space, use separate sheets of paper. Indicate the letter of the item which applies.

Person Required to Notify:

Enter the name and address of the person or organization required to notify.

Name 833 CSG/DEEV

Street

City Holloman AFB State N.M. Zip Code 88330

Site Location:

Enter the common name (if known) and actual location of the site.

Name of Site West Area Landfill #1

Street

City Holloman AFB County Otero State N.M. Zip Code 88330

Person to Contact:

Enter the name, title (if applicable), and business telephone number of the person to contact regarding information submitted on this form.

Name (Last, First and Title) Nowak, Lawrence Environmental Coordinator

Phone 505-479-6511 ext. 4491

Dates of Waste Handling:

Enter the years that you estimate waste treatment, storage, or disposal began and ended at the site.

From (Year) 1974 To (Year) 1978

Waste Type: Choose the option you prefer to complete

Option 1: Select general waste types and source categories. If you do not know the general waste types or sources, you are encouraged to describe the site in Item I—Description of Site.

General Type of Waste:
Place an X in the appropriate boxes. The categories listed overlap. Check each applicable category.

1. ☐ Organics
2. ☐ Inorganics
3. ☐ Solvents
4. ☐ Pesticides
5. ☐ Heavy metals
6. ☐ Acids
7. ☐ Bases
8. ☐ PCBs
9. ☒ Mixed Municipal Waste
10. ☒ Unknown
11. ☐ Other (Specify)

Source of Waste:
Place an X in the appropriate boxes.

1. ☐ Mining
2. ☐ Construction
3. ☐ Textiles
4. ☐ Fertilizer
5. ☐ Paper/Printing
6. ☐ Leather Tanning
7. ☐ Iron/Steel Foundry
8. ☐ Chemical; General
9. ☐ Plating/Polishing
10. ☒ Military/~~Ammunition~~
11. ☐ Electrical Conductors
12. ☐ Transformers
13. ☐ Utility Companies
14. ☐ Sanitary/Refuse
15. ☐ Photofinish
16. ☐ Lab/Hospital
17. ☐ Unknown
18. ☐ Other (Specify)

Option 2: This option is available to persons familiar with th Resource Conservation and Recovery Act (RCRA) Section 30C regulations (40 CFR Part 261).

Specific Type of Waste:
EPA has assigned a four-digit number to each hazardous wa listed in the regulations under Section 3001 of RCRA. Enter appropriate four-digit number in the boxes provided. A copy the list of hazardous wastes and codes can be obtained by contacting the EPA Region serving the State in which the sit located.

F Waste Quantity:

Place an X in the appropriate boxes to indicate the facility types found at the site.

In the "total facility waste amount" space give the estimated combined quantity (volume) of hazardous wastes at the site using cubic feet or gallons.

In the "total facility area" space, give the estimated area size which the facilities occupy using square feet or acres.

Facility Type

1. ☐ Piles
2. ☐ Land Treatment
3. ☒ Landfill
4. ☐ Tanks
5. ☐ Impoundment
6. ☐ Underground Injection
7. ☐ Drums, Above Ground
8. ☐ Drums, Below Ground
9. ☐ Other (Specify) _____

Total Facility Waste Amount

cubic feet _____

gallons Small quantity

Total Facility Area

square feet _____

acres 3

G Known, Suspected or Likely Releases to the Environment:

Place an X in the appropriate boxes to indicate any known, suspected, or likely releases of wastes to the environment.

☐ Known ☒ Suspected ☐ Likely ☐ No

Note: Items H and I are optional. Completing these items will assist EPA and State and local governments in locating and assess hazardous waste sites. Although completing the items is not required, you are encouraged to do so.

H Sketch Map of Site Location: (Optional)

Sketch a map showing streets, highways, routes or other prominent landmarks near the site. Place an X on the map to indicate the site location. Draw an arrow showing the direction north. You may substitute a publishing map showing the site location.

Description of Site: (Optional)

Describe the history and present conditions of the site. Give directions to the site and describe any nearby wells, springs, lakes, or housing. Include such information as how waste was disposed and where the waste came from. Provide any other information or comments which may help describe the site conditions.

Signature and Title:

The person or authorized representative (such as plant managers, superintendents, trustees or attorneys) of persons required to notify must sign the form and provide a mailing address (if different than address in item A). For other persons providing notification, the signature is optional. Check the boxes which best describe the relationship to the site of the person required to notify. If you are not required

Name Philip W. Nuber, Colonel, USAF

Street Commander, 833 CSG

City Holloman AFB State N.M. Zip Code 88330

Signature Philip W. Nuber Date 2 Dec 83

☒ Owner, ' er
☐ Owner, ,
☐ Transporter
☐ Operator, Pres
☐ Operator, Past
☐ Other

APPENDIX C

RCRA FACILITY ASSESSMENT PRELIMINARY REVIEW/VISUAL SITE INSPECTION

SWMU 101 - Building 121 Landfill

DESCRIPTION

Unit Type: Landfill

Location: Located southeast of Building 121.

Purpose of Unit: Apparently used for disposal of domestic solid wastes from the base.

Period of Operation: Unknown.

Dimensions/Volume: Unknown.

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

___ In Ground _x_ Above Ground

_x_ Less than 1000 ft to Surface Water (Arroys)

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: The landfill is reportedly located beneath the area beneath and adjacent to Building 121.

CLOSURE INFORMATION

___ Active
_x_ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

_x_ Solids	___ Corrosive	___ Organics
___ Liquids	___ Flammable	___ Inorganics
___ Gases	___ Reactive	___ Metals
___ Sludges		

Details: The exact nature of the materials disposed is not known but it may contain domestic solid waste. Holloman AFB representatives indicated that a soil borings in this area revealed hospital wastes.

Source of Wastes: Unknown.

Disposition of Waste: Wastes have not been removed from this area.

RELEASE CONTROLS

___ Liner	___ Diking	___ Sewer Connection
___ Level Controls	___ Overflow Controls	___ Corrosion Protection
___ Leak Detection	___ Cover	

Details: The unit is partially covered by Building 121 and other structures. Wastes were disposed on unlined soil. There are no surface runoff controls.

MONITORING

___ Monitoring Wells	___ Downgradient Wells
___ Upgradient Wells	___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air	___ VSI Noted Release to Air
___ Past Release to Soil/Groundwater	___ VSI Noted Release to Soil/Groundwater
___ Past Release to Surface Water	___ VSI Noted Release to Surface Water
___ Past Release to Subsurface Gas	___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: No wastes or releases of wastes were observed during the VSI.

Details of Past Releases: Wastes were placed on the ground surface at this unit.

RELEASE POTENTIAL

Air	_x_ Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	_x_ High
Surface Water	___ Low	_x_ Medium	___ High
Subsurface Gas Generation	___ Low	___ Medium	_x_ High

Details of Release Potential: The potential for release to soil and groundwater and for generation of subsurface gas is high since wastes were placed on unlined soil. The potential for surface water releases is medium due to the absence of rainfall runoff controls and proximity of the unit to an arroyo.

REFERENCES: V-1

PHOTOGRAPHS: 5-8, 5-10, 5-11

SWMU 105 - Golf Course Landfill

DESCRIPTION

Unit Type: Landfill (IRP Site 19)

Location: Located 800 feet north of the southern base boundary and due south of the golf course.

Purpose of Unit: Disposal of grass clippings and unused rodenticides.

Period of Operation: 1968 - 1978.

Dimensions/Volume: Unknown

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

_x_ In Ground ___ Above Ground

_x_ Less than 1000 ft to Surface Water (nearest surface drainage ditch is 1000 feet away)

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: Wastes were disposed on the ground surface and were not covered.

CLOSURE INFORMATION

___ Active
_x_ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

x Solids	___ Corrosive	x Organics
x Liquids	___ Flammable	___ Inorganics
___ Gases	___ Reactive	___ Metals
___ Sludges		

Details: Golf course grass clippings and some unused rodenticides.

Source of Wastes: Golf course

Disposition of Waste: The wastes remain in this unit.

RELEASE CONTROLS

___ Liner	___ Diking	___ Sewer Connection
___ Level Controls	___ Overflow Controls	___ Corrosion Protection
___ Leak Detection	___ Cover	

Details: This unit is unlined and has no cover.

MONITORING

___ Monitoring Wells	___ Downgradient Wells
___ Upgradient Wells	___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air	___ VSI Noted Release to Air
___ Past Release to Soil/Groundwater	___ VSI Noted Release to Soil/Groundwater
___ Past Release to Surface Water	___ VSI Noted Release to Surface Water
___ Past Release to Subsurface Gas	___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: There were no releases observed from the unit during the VSI.

Details of Past Releases: There was no evidence of past releases observed during the VSI or noted in the file information.

RELEASE POTENTIAL

Air	x Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	x High
Surface Water	___ Low	___ Medium	x High
Subsurface Gas Generation	___ Low	x Medium	___ High

Details of Release Potential: The potential for release to soil/groundwater and surface water is high because wastes containing hazardous constituents were disposed in this unlined unit and because of the relative proximity of a drainage ditch. The potential for release to air and for the generation of subsurface gas is medium if volatile wastes were disposed in the unit.

REFERENCES: 8, V-1

PHOTOGRAPHS: 17-1

SWMU 116 - West Area Landfill #2

DESCRIPTION

Unit Type: Landfill (IRP Site 22)

Location: The unit is located south of fairway no. 7 on the base golf course.

Purpose of Unit: This unit was used to dispose of domestic garbage, tree limbs, and possibly 55-gallon drums.

Period of Operation: Early 1970s - 1977.

Dimensions/Volume: One to two acres.

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster _x_ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

_x_ In Ground ___ Above Ground

_x_ Less than 1000 ft to Surface Water (800 feet to nearest drainage ditch)

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: Wastes were disposed directly on the ground surface in this area.

CLOSURE INFORMATION

___ Active
_x_ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

_x_ Solids	___ Corrosive	___ Organics
___ Liquids	___ Flammable	___ Inorganics
___ Gases	___ Reactive	___ Metals
___ Sludges		

Details: Waste materials included paper bags, food cans, boxes, boards, tree limbs, and limited quantities of drummed wastes.

Source of Wastes: Various locations on Holloman AFB.

Disposition of Waste: The wastes remain in this unit.

RELEASE CONTROLS

___ Liner	___ Diking	___ Sewer Connection
___ Level Controls	___ Overflow Controls	___ Corrosion Protection
___ Leak Detection	___ Cover	

Details: There are no release controls associated with this unit.

MONITORING

___ Monitoring Wells	___ Downgradient Wells
___ Upgradient Wells	___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air	___ VSI Noted Release to Air
___ Past Release to Soil/Groundwater	___ VSI Noted Release to Soil/Groundwater
___ Past Release to Surface Water	___ VSI Noted Release to Surface Water
___ Past Release to Subsurface Gas	___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: There were no releases observed from the unit during the VSI.

Details of Past Releases: There was no evidence of past releases observed during the VSI or noted in the file information.

RELEASE POTENTIAL

Air	_x_ Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	_x_ High
Surface Water	___ Low	___ Medium	_x_ High
Subsurface Gas Generation	___ Low	___ Medium	_x_ High

Details of Release Potential: This unit presents a high potential for release to soil and groundwater, and surface water. Several 55-gallon drums of unkown materials are believed to be disposed of in landfill. There is no cover material to allow for the accumulation of subsurface methane.

REFERENCES: 8, V-1

PHOTOGRAPHS: 14-3

SWMU 115 - West Area Landfill #1

DESCRIPTION

Unit Type: Landfill (IRP Site 21).

Location: Located southwest of Solar Lab.

Purpose of Unit: General disposal

Period of Operation: 1974 - 1978.

Dimensions/Volume: Unit area occupies two to three acres.

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster _x_ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

_x_ In Ground ___ Above Ground

_x_ Less than 1000 ft to Surface Water

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: Wastes were disposed directly on the ground surface in this area.

CLOSURE INFORMATION

___ Active
_x_ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

_x_ Solids	___ Corrosive	___ Organics
___ Liquids	___ Flammable	___ Inorganics
___ Gases	___ Reactive	___ Metals
___ Sludges		

Details: Solid wastes include: rubbish, plastic sheets, boxes and empty cans. Some 55-gallon drums were noted during the landfills' active life. Only rubble was observed during the VSI.

Source of Wastes: Unknown

Disposition of Waste: Wastes remain in the landfill.

RELEASE CONTROLS

___ Liner	___ Diking	___ Sewer Connection
___ Level Controls	___ Overflow Controls	___ Corrosion Protection
___ Leak Detection	___ Cover	

Details: No release controls, unlined landfill

MONITORING

___ Monitoring Wells	___ Downgradient Wells
___ Upgradient Wells	___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air	___ VSI Noted Release to Air
___ Past Release to Soil/Groundwater	___ VSI Noted Release to Soil/Groundwater
___ Past Release to Surface Water	___ VSI Noted Release to Surface Water
___ Past Release to Subsurface Gas	___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: Only wastes observed in landfill appeared to be rubble.

Details of Past Releases: No past releases have been documented in the available file materials.

RELEASE POTENTIAL

Air	_x_ Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	_x_ High
Surface Water	_x_ Low	___ Medium	___ High
Subsurface Gas Generation	_x_ Low	___ Medium	___ High

Details of Release Potential: There is a high potential for release to surface water and for generation of subsurface gas if the drums contained hazardous constituents.

REFERENCES: 8, V-1

PHOTOGRAPHS: 14-3

SWMU 108 - MOBSS Landfill Disposal Trench

DESCRIPTION

Unit Type: Landfill (IRP Site 23)

Location: Located west of the solar observatory.

Purpose of Unit: Disposal of cans and drums of outdated pesticides.

Period of Operation: 1976 - 1979.

Dimensions/Volume: Less than one half acre.

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster _x_ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel
___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors _x_ Below Ground
___ In Ground ___ Above Ground
_x_ Less than 1000 ft to Surface Water
___ Less than 1000 feet to Drinking Water Well
___ Less than 1000 feet to Residences

Details: Solid wastes were disposed in unlined trenches in this area.

CLOSURE INFORMATION

___ Active
_x_ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

_x_ Solids	___ Corrosive	_x_ Organics
_x_ Liquids	___ Flammable	___ Inorganics
___ Gases	___ Reactive	___ Metals
___ Sludges		

Details: Cans of diazion, dibromochloromethane, and 55-gallon drums of unknown contents.

Source of Wastes: Unknown

Disposition of Waste: Land disposal unit

RELEASE CONTROLS

___ Liner	___ Diking	___ Sewer Connection
___ Level Controls	___ Overflow Controls	___ Corrosion Protection
___ Leak Detection	_x_ Cover	

Details: Soil cover over unlined trench landfill.

MONITORING

___ Monitoring Wells	___ Downgradient Wells
___ Upgradient Wells	___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near this unit.

RELEASE HISTORY

___ Past Release to Air	___ VSI Noted Release to Air
___ Past Release to Soil/Groundwater	___ VSI Noted Release to Soil/Groundwater
___ Past Release to Surface Water	___ VSI Noted Release to Surface Water
___ Past Release to Subsurface Gas	___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: Exact location of unit could not be discerned. No physical evidence of landfill activities.

Details of Past Releases: No past releases have been documented in the available file materials.

RELEASE POTENTIAL

Air	_x_ Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	_x_ High
Surface Water	_x_ Low	___ Medium	___ Hi
Subsurface Gas Generation	___ Low	_x_ Medium	___ Hig

Details of Release Potential: Unknown materials have been disposed in an unlined landfill. There is a high potential for release to soil and groundwater from this landfill if hazardous wastes or constituents were disposed. Cover could allow for the accumulation of subsurface gas.

REFERENCES: 8, V-1

PHOTOGRAPHS: 14-4

SWMU 104 - Former Army Landfill

DESCRIPTION

Unit Type: Landfill (IRP Site 29)

Location: Located north of the Test Group Headquarter Area - the exact location is unknown.

Purpose of Unit: Disposal of missiles and spent munitions.

Period of Operation: Early 1950s - 1975.

Dimensions/Volume: Unknown

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

_x_ In Ground ___ Above Ground

___ Less than 1000 ft to Surface Water

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: Trench and fill landfill.

CLOSURE INFORMATION

___ Active
_x_ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

x Solids	___ Corrosive	___ Organics
___ Liquids	___ Flammable	___ Inorganics
___ Gases	___ Reactive	___ Metals
___ Sludges		

Details: Spent munitions and missiles - no known hazardous wastes.

Source of Wastes: Various locations throughout Holloman AFB.

Disposition of Waste: Wastes remain in the landfill.

RELEASE CONTROLS

___ Liner	___ Diking	___ Sewer Connection
___ Level Controls	___ Overflow Controls	___ Corrosion Protection
___ Leak Detection	___ Cover	

Details: No known release controls.

MONITORING

___ Monitoring Wells	___ Downgradient Wells
___ Upgradient Wells	___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air	___ VSI Noted Release to Air
___ Past Release to Soil/Groundwater	___ VSI Noted Release to Soil/Groundwater
___ Past Release to Surface Water	___ VSI Noted Release to Surface Water
___ Past Release to Subsurface Gas	___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: The exact location of the landfill could not be found during the VSI.

Details of Past Releases: There was no evidence of past releases noted in the file information.

RELEASE POTENTIAL

Air	x Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	x High
Surface Water	x Low	___ Medium	___ High
Subsurface Gas Generation	___ Low	___ Medium	x High

Details of Release Potential: The potential for release is unknow since it is not known whether hazardous constituents were disposed in this area. The landfill is unlined and there are no other release controls. Therefore, the release potential to soil and groundwater and potential for generation of subsurface gas would be high if hazardous constituents are present with disposed materials.

REFERENCES: V-1, 8

PHOTOGRAPHS: 10-11

SWMU 113 - Sludge Disposal Trenches

DESCRIPTION

Unit Type: Landfill (IRP Sites 20, 30, and 33).

Location: Located west of the Fire Department Training Areas (SWMUs 170 and 171).

Purpose of Unit: Burial site for wastewater treatment plant grit, and grease trap.

Period of Operation: 1942 - present.

Dimensions/Volume: At least four trenches, each three-foot deep by 50 feet long by two foot wide.

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

_x_ In Ground ___ Above Ground

___ Less than 1000 ft to Surface Water

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: The trenches are unlined and backfilled with dirt when they are filled. Several trenches are already filled and covered.

CLOSURE INFORMATION

_x_ Active
___ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

_x_ Solids	___ Corrosive	___ Organics
_x_ liquids	___ Flammable	___ Inorganics
___ Gases	___ Reactive	___ Metals
_x_ Sludges		

Details: The trenches are used for disposal of sludge from the Grit Chamber (SWMU 149) at the Wastewater Treatment Plant. Small amounts of solvents and heavy metals may be present. The trenches also receive wastes from grease traps and oil/water separators.

Source of Wastes: Various locations throughout Holloman AFB.

Disposition of Waste: Wastes remain in trenches. Soil is backfilled into the pit. Waste may infiltrate and seep into the soils.

RELEASE CONTROLS

___ Liner	___ Diking	___ Sewer Connection
___ Level Controls	___ Overflow Controls	___ Corrosion Protection
___ Leak Detection	___ Cover	

Details: No release controls. The trenches are unlined.

MONITORING

___ Monitoring Wells	___ Downgradient Wells
___ Upgradient Wells	___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air	___ VSI Noted Release to Air
___ Past Release to Soil/Groundwater	___ VSI Noted Release to Soil/Groundwater
___ Past Release to Surface Water	___ VSI Noted Release to Surface Water
___ Past Release to Subsurface Gas	___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: There were no releases observed from the unit during the VSI.

Details of Past Releases: There was no evidence of past release noted in the file information.

RELEASE POTENTIAL

Air	x Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	x High
Surface Water	x Low	___ Medium	___ High
Subsurface Gas Generation	___ Low	___ Medium	x High

Details of Release Potential: There is a high potential for release to the soil and groundwater and for subsurface gas generation. The trenches are unlined with no other release controls.

REFERENCES: V-1, 8

PHOTOGRAPHS: 10-12, 11-1

SWMU 165 - Building 1176 Pond

DESCRIPTION

Unit Type: Surface Impoundment

Location: Located between Building 1176 and the Lost River Basin (AOC U).

Purpose of Unit: Received runoff from Building 1176 Troughs (SWMU 185), deluge water from the Test Sled Launch Area Collection Basin (SWMU 172), and general runoff from the Building 1176 area.

Period of Operation: Unknown

Dimensions/Volume: Pond is approximately 50 feet long and 30 feet wide.

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

___ In Ground _x_ Above Ground

___ Less than 1000 ft to Surface Water

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: The ond is unlined and surrounded by woody vegetation.

CLOSURE INFORMATION

___ Active
_x_ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

___ Solids
_x_ Liquids
___ Gases
___ Sludges
_x_ Corrosive
___ Flammable
___ Reactive
___ Organics
___ Inorganics
___ Metals

Details: The impoundment formerly received wastewater effluent from Building 1176 and deluge water containing small amounts of fuel from the test track. The wastewater from Building 1176 was acidic with a mixture of liquid rocket fuel components.

Source of Wastes: Building 1176 troughs and general area, Test Track deluge water (SWMU 172).

Disposition of Waste: It appears that runoff now accumulates in pond and infiltrates the soil, discharges into the Lost River Basin, or evaporates.

RELEASE CONTROLS

___ Liner
___ Level Controls
___ Leak Detection
___ Diking
___ Overflow Controls
___ Cover
___ Sewer Connection
___ Corrosion Protection

Details: The pond is unlined and does not appear to have any release controls.

MONITORING

___ Monitoring Wells
___ Upgradient Wells
___ Downgradient Wells
___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air
___ Past Release to Soil/Groundwater
___ Past Release to Surface Water
___ Past Release to Subsurface Gas
___ VSI Noted Release to Air
___ VSI Noted Release to Soil/Groundwater
___ VSI Noted Release to Surface Water
___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: There were no releases observed from the unit during the VSI. The water in the impoundment appeared rust-colored during the VSI.

Details of Past Releases: There was no evidence of past releases noted in the file information.

RELEASE POTENTIAL

Air	_x_ Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	_x_ High
Surface Water	___ Low	___ Medium	_x_ High
Subsurface Gas Generation	_x_ Low	___ Medium	___ High

Details of Release Potential: There is a high potential that the water in the pond could seep into the soil/groundwater or into Lost River Basin. The potential for release to soil and groundwater is high if hazardous constituents are present in the liquid or sediments.

REFERENCES: V-1

PHOTOGRAPHS: 7-7

SWMU 177 - Building 1176 Sumps

DESCRIPTION

Unit Type: Sump

Location: Located east and south of Building 1176.

Purpose of Unit: Collection point for washdown waters from troughs (SWMU 181) originating at Building 1176.

Period of Operation: The sumps were put into operation in 1960. It is not known when they were taken out of service.

Dimensions/Volume: The sumps are approximately four feet deep and three feet in diameter.

Material of Construction: ___ Steel ___ Wood _x_ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

___ In Ground _x_ Above Ground

___ Less than 1000 ft to Surface Water

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: The sump east of building is made of concrete. The sump south of building is buried.

CLOSURE INFORMATION

___ Active
_x_ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

___ Solids
_x_ Liquids
___ Gases
___ Sludges

_x_ Corrosive
___ Flammable
___ Reactive

___ Organics
___ Inorganics
___ Metals

Details: The sumps formerly collected acidic wastewater generated from liquid fuel formulation in Building 1176. Fuels formulated were a mix of monomethyl hydrazine and diesel oxidizer. Liquid fuels are no longer formulated.

Source of Wastes: Building 1176 Test Sled Maintenance.

Disposition of Waste: Sump appears to be ultimate disposition of waste. Some liquids may have run off to the Building 1176 Pond (SWMU 165).

RELEASE CONTROLS

___ Liner
___ Level Controls
___ Leak Detection

___ Diking
___ Overflow Controls
___ Cover

___ Sewer Connection
___ Corrosion Protection

Details: The sump to the east of buiding is about four feet deep to keep the waste contained. There were no release controls observed.

MONITORING

___ Monitoring Wells
___ Upgradient Wells

___ Downgradient Wells
___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air
_x_ Past Release to Soil/Groundwater
___ Past Release to Surface Water
___ Past Release to Subsurface Gas

___ VSI Noted Release to Air
___ VSI Noted Release to Soil/Groundwater
___ VSI Noted Release to Surface Water
___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: There were no releases observed from the unit during the VSI. The sumps are no longer used.

Details of Past Releases: The sump is corroded to the degree that the side walls have deteriorated. Concrete at the end of the trough is also corroded.

RELEASE POTENTIAL

Air	_x_ Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	_x_ High
Surface Water	___ Low	___ Medium	_x_ High
Subsurface Gas Generation	_x_ Low	___ Medium	___ High

Details of Release Potential: There is a high potential for past releases to soil and groundwater through corrosion holes in the concrete. Building 1176 Pond (SWMU 165) and Lost River Basin (AOC U), contained water during the VSI. There is a high potential that the acid from past releases seeped into the basin and pond. The ongoing release potential is low because the troughs and sumps are no longer used.

REFERENCES: V-1

PHOTOGRAPHS: 7-6, 7-8

SWMU 179 - Discharge Box

DESCRIPTION

Unit Type: Sump

Location: Located across the road south of the Test Sled Launch Area Collection Basin (SWMU 167).

Purpose of Unit: Collects water from the Collection Basin

Period of Operation: Unknown

Dimensions/Volume: The unit is approximately five feet deep and six feet on each side.

Material of Construction: ___ Steel ___ Wood _x_ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

_x_ In Ground ___ Above Ground

_x_ Less than 1000 ft to Surface Water

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: The unit has concrete sidewalls and a soil bottom.

CLOSURE INFORMATION

_x_ Active
___ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

___ Solids
_x_ Liquids
___ Gases
___ Sludges

___ Corrosive
___ Flammable
___ Reactive

___ Organics
___ Inorganics
___ Metals

Details: The sump collects water discharged from the Test Launch Area Collection Area. This water may contain small amounts of fuel deposited on the test track.

Source of Wastes: Test track

Disposition of Waste: Water in the Discharge Box is discharged to a drainage ditch which flows to the Building 1176 Pond (SWMU 165).

RELEASE CONTROLS

___ Liner
___ Level Controls
___ Leak Detection

___ Diking
_x_ Overflow Controls
___ Cover

___ Sewer Connection
___ Corrosion Protection

Details: The discharge outlet is located approximately 12 inches from the top of the sump.

MONITORING

___ Monitoring Wells
___ Upgradient Wells

___ Downgradient Wells
___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air
___ Past Release to Soil/Groundwater
___ Past Release to Surface Water
___ Past Release to Subsurface Gas

___ VSI Noted Release to Air
___ VSI Noted Release to Soil/Groundwater
___ VSI Noted Release to Surface Water
___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: There were no releases observed from the unit during the VSI.

Details of Past Releases: There was no evidence of past releases noted in the file information.

RELEASE POTENTIAL

Air	_x_ Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	_x_ High
Surface Water	___ Low	___ Medium	_x_ High
Subsurface Gas Generation	___ Low	___ Medium	_x_ High

Details of Release Potential: The release potential to soil and groundwater is high since the unit has a soil bottom and there may be fuel constituents present in the water from the test track. The potential for release to surface water is also high since wastewater is discharged to the Building 1176 Pond (SWMU 165) through a drainage ditch. This wastewater may eventually reach the Lost River Basin (AOC U). The potential for generators of subsurface gas is high due to the volatile nature of the fuel.

REFERENCES: V-1

PHOTOGRAPHS: 7-4

SWMU 181 - Building 1176 Drainage Trough

DESCRIPTION

Unit Type: Conveyance System

Location: Located east and south of Building 1176.

Purpose of Unit: The troughs reportedly convey washdown water from Building 1176 into adjacent sumps (SWMU 177).

Period of Operation: The start-up date was 1960. It is not known when the troughs were taken out of service.

Dimensions/Volume: Troughs are approximately 25 feet long and one foot wide.

Material of Construction: ___ Steel ___ Wood ___ Concrete
___ FRP ___ Plaster ___ Earthen

Underlain By: ___ Concrete ___ Asphalt ___ Gravel

___ Grass _x_ Soil

Environmental: ___ Indoors _x_ Outdoors ___ Below Ground

___ In Ground _x_ Above Ground

___ Less than 1000 ft to Surface Water

___ Less than 1000 feet to Drinking Water Well

___ Less than 1000 feet to Residences

Details: The troughs are constructed of open-topped clay tile. Presently, there is a stainless steel pipe in the trough on the eastern side which serves as a gas vent from the building.

CLOSURE INFORMATION

___ Active
_x_ Inactive/Physically Present
___ Closed Under State or EPA
___ Other

REGULATORY STATUS

___ RCRA
___ State or local permit
_x_ Not regulated

WASTES MANAGED

___ Solids
_x_ Liquids
___ Gases
___ Sludges

_x_ Corrosive
___ Flammable
___ Reactive

___ Organics
___ Inorganics
___ Metals

Details: Troughs formerly collected acidic wastewater generated from formulation of liquid fuels in Building 1176. Fuels formulated were a mixture of monomethyl hydrazine and diesel oxidizer. Liquid fuels are no longer formulated.

Source of Wastes: Building 1176 - Test Sled Maintenance

Disposition of Waste: Troughs convey wastewater into sumps (SWMU 177).

RELEASE CONTROLS

___ Liner
___ Level Controls
___ Leak Detection

___ Diking
_x_ Overflow Controls
___ Cover

___ Sewer Connection
___ Corrosion Protection

Details: The clay tiles prevented contact of wastewater with underlying soil.

MONITORING

___ Monitoring Wells
___ Upgradient Wells

___ Downgradient Wells
___ Surface Water Monitoring

Monitoring Frequency: No monitoring wells exist near the unit.

RELEASE HISTORY

___ Past Release to Air
_x_ Past Release to Soil/Groundwater
___ Past Release to Surface Water
___ Past Release to Subsurface Gas

___ VSI Noted Release to Air
___ VSI Noted Release to Soil/Groundwater
___ VSI Noted Release to Surface Water
___ VSI Noted Release to Subsurface Gas

VSI Noted Release Conditions: There were no releases observed from the unit during the VSI.

Details of Past Releases: Concrete at the pad of the trough, near the sumps is corroded.

RELEASE POTENTIAL

Air	_x_ Low	___ Medium	___ High
Soil/Groundwater	___ Low	___ Medium	_x_ High
Surface Water	___ Low	___ Medium	_x_ High
Subsurface Gas Generation	_x_ Low	___ Medium	___ High

Details of Release Potential: There is a high potential from past releases to soil and groundwater through the holes created in the concrete due to corrosion. Building 1176 Pond (SWMU 169) and Lost River Basin contained runoff from this area during the VSI. There is high potential that the acid from past releases seeped into the basin and pond. The ongoing release potential is low because the troughs and sumps are no longer used.

REFERENCES: V-1

PHOTOGRAPHS: 7-6, 7-8

APPENDIX D

SITE 10 DECISION DOCUMENT AND CORRESPONDENCE

File: 17G
R.L.

HOLLOMAN AFB
NEW MEXICO

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 599

File: 17B
R.L. 599

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2850

Bruce King
Governor

Judith M. Espinosa
Secretary

Ron Curry
Deputy Secretary

September 26, 1991

Mr. Roger Wilkson, IRP Program Coordinator
833rd CSG/DEV
Holloman Air Force Base, NM 88330

IRP Document Review: October 1990 Draft Decision Documents - Sites 1, 10, 25, 31, 50, 53, 55

Dear Mr. Wilkson:

The New Mexico Environment Department has reviewed the Draft Decision Documents prepared by Walk, Haydel and Associates, dated October, 1990, for the Installation Restoration Program sites listed above. Our comments follow, arranged by site.

Site 1 - Main Base Landfill

We concur that closeout of IRP activities at the Main Base Landfill is appropriate, based on information contained in the documents referred to in the draft Record of Decision for this site.

It is our understanding, of course, that the landfill will be in compliance with the New Mexico Solid Waste Management Regulations covering closure and post-closure care when it ceases to be in active use. An area of concern is the presence of several arroyos at the landfill site, and we presume you are already aware of Section 2-201 of the New Mexico Water Quality Control Commission Regulations prohibiting the disposal of refuse in any natural watercourse. Care must be taken as necessary to ensure that future arroyo cutting does not release any landfill contents into the arroyos.

Site 10 - Old Main Base Landfill

We also concur with the decision to close out IRP activities at this site, with the understanding that the apparent increase in contamination levels towards the northwest of the area investigated in connection with this site will be correlated with, and hopefully explained by, future IRP investigations (for instance at Sites 8 or 9).

Site 25 - Drainage Lagoon

We agree that this site seems to pose no environmental threat and that no further investigation is warranted.

NMED Decision Document Comments
September 26, 1991

Site 31 - Fire Department Training Area

The Hazardous and Radioactive Materials Bureau has expressed reservations about ceasing investigation at this site because of the presence of benzene in appreciable concentrations in groundwater. This suggests that soil containing benzene (and perhaps other contaminants) in levels exceeding the allowable concentrations as defined by the TCLP test may be present at the site. To ensure that no soil meeting the definition of a hazardous waste remains at the site, at least one TCLP test (volatiles and metals analysis would be sufficient) must be performed on a sample representative of the location of highest observed soil contamination - presumably in the vicinity of the oil-water separator just above the static water level.

Site 50 - Building 301, Aircraft Maintenance Hangar

We concur with the closeout of IRP activities at this site.

Site 53 - JP-4 Underground Waste Tank

We agree that IRP activities can appropriately end at this site, so long as the tank has been leak tested and found to be tight. Please provide confirmation that this has been done. We assume, of course, that Holloman Air Force Base is in compliance with the New Mexico Underground Storage Tank Regulations as they apply to this and all USTs on the Base.

Site 55 - Military Gas Station

We concur with the closeout of IRP activities at this site, subject to the active tanks at the gas station having been demonstrated to be leak-free (as with Site 53, please let us know how and when this has been done).

If you have any questions or comments, please give me a call at 827-2754.

Sincerely,

David Morgan
Environmental Specialist
Groundwater/Toxic Sites Bureau

c: Mr. Ed Horst, Hazardous and Radioactive Waste Bureau

File: 17B
R.L.
31 602

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
215 NORTH 17TH STREET
OMAHA, NEBRASKA 68102-4978

REPLY TO
ATTENTION OF

CEMRO-ED-E (200-1c) 14 August 1991

MEMORANDUM FOR COMMANDER, 833 CSG/DEV, Holloman AFB, NM 88330-5000

SUBJECT: Installation Restoration Program (IRP) Decision Documents

1. One of HQ TAC/DEV's goals is to close out all IRP sites which do not require further action and program those IRP sites requiring further action. Contracts have been awarded to prepare Decision Documents for the no further action sites. HQ TAC wants to get as many as possible of these decision documents signed before the end of the fiscal year. Your help is needed to reach the goal.

2. A review of the records of the IRP work performed at your installation has identified several IRP sites which were recommended for no further action. The enclosed decision documents have been prepared for those sites to complete documentation for site closeout in the IRP. The following is a list of the enclosed decision documents.

Site LF-01	(Old Site 1) - Main Base Landfill
Site LF-10	(Old Site 10)- Old Main Base Landfill
Site SD-25	(Old Site 25)- Drainage Lagoon
Site FT-31	(Old Site 31)- Fire Department Training Area
Site OT-44	(Old Site 50)- Building 301, Aircraft Maintenance Hangar
Site SS-46	(Old Site 53)- JP-4 Underground Waste Tank
Site SS-48	(Old Site 55)- Military Gas Station
Site LF-07	Rubble Disposal Site
Site SS-13	Sodium Arsenite Spill Site
Site SS-18	Chromic Acid Spill Site
Site OT-32	Collapsed Sewer Lines from Private Research Area
Site OT-34	Spent Munitions Burial Site
Site LF-40	Causeway Rubble Disposal Site
Site OT-52	Boles and San Andres Well Field
Site OT-53	Bonita Lake
Site OT-54	Silver City Radar Site
Site OT-55	El Paso Radar Site

3. Request your installation commander sign the decision documents, retain the originals and forward one copy to HQ USAF/CEVR, one copy to HQ TAC/DEVR and one copy of the signed signature page to this office, no later than 30 days from receipt of the documents. Please do not send a copy to the EPA or your state regulator at this time. HQ TAC is preparing a standardized presentation to the regulators to show the Air Force's overall gameplan and to assure the Regulators that the Air Force fully intends to clean up all sites which warrant action. The meeting will be arranged, with your coordination, at a later date.

4. It is important to be aware that any IRP site which has been closed out can have response activities reinitiated under CERCLA or RCRA if subsequent evidence shows this to be necessary. The decisions to close out these sites in the IRP are Air Force decisions based on past assessments and investigations which recommended no further action. Since the IRP is an Air Force program, it is not necessary to obtain EPA or state regulator approval in order to close a non-NPL site in the IRP. For bases proposed for the NPL, the Air Force intends to use these documents to confirm the Air Force view, but they will not use them to interfere with the Federal Facility Agreement process. The Air Force wants to cooperate with the regulators as much as possible, so any disagreement by them with the decision of no further action for a particular site will be taken into consideration.

5. Any site, which you consider should have additional response action under the IRP can be withheld from signature. However, if the decision document is withheld from signature, request you submit to HQ TAC the appropriate documents which justify the need for additional action and certify that the action meets the eligibility criteria for Defense Environmental Restoration Account (DERA) funding so further work can be programmed. Refer to the IRP Guidance Manual (White Book) and the DERA Eligibility/Programming Guidance for format and specific guidance.

6. If you have any questions contact Mr. Cedric Adams, HQ TAC/DEVR, Autovon 574-4430 or Mr. Tom Jensen of my staff, telephone (402) 221-7679.

FOR THE COMMANDER:

Encls

Robert F Smart
for RANDAL K. PETERSEN, P.E.
Chief, Environmental Branch
Engineering Division

File: 17B
R.L. 6074

61

INSTALLATION RESTORATION PROGRAM
HOLLOMAN AIR FORCE BASE, NEW MEXICO

DECISION DOCUMENTS

SITE LF-01 (OLD SITE 1) - Main Base Landfill

SITE LF-10 (OLD SITE 10) - Old Main Base Landfill

SITE SD-25 (OLD SITE 25) - Drainage Lagoon

SITE FT-31 (OLD SITE 31) - Fire Department Training Area

SITE OT-44 (OLD SITE 50) - Building 301, Aircraft Maintenance Hangar

SITE SS-46 (OLD SITE 53) - JP-4 Underground Waste Tank

SITE SS-48 (OLD SITE 55) - Military Gas Station

CONTRACT NUMBER DACA45-86-C-0043
WALK, HAYDEL & ASSOCIATES JOB NUMBER 3781.50

NOVEMBER 1990

UNDER CONTRACT WITH:

OMAHA DISTRICT, CORPS OF ENGINEERS
215 NORTH 17TH STREET
OMAHA, NEBRASKA

FOR:
HEADQUARTERS, TACTICAL AIR COMMAND
HQ, TAC/DEVR
LANGLEY AIR FORCE BASE, VIRGINIA 23665

PREPARED BY:

WALK, HAYDEL & ASSOCIATES, INC.
PROJECT MANAGERS - ENGINEERS - CONSTRUCTION MANAGERS

INSTALLATION RESTORATION PROGRAM
HOLLOMAN AIR FORCE BASE, NEW MEXICO

DECISION DOCUMENTS

SITE LF-01 (OLD SITE 1) - Main Base Landfill

SITE LF-10 (OLD SITE 10) - Old Main Base Landfill

SITE SD-25 (OLD SITE 25) - Drainage Lagoon

SITE FT-31 (OLD SITE 31) - Fire Department Training Area

SITE OT-44 (OLD SITE 50) - Building 301, Aircraft Maintenance Hangar

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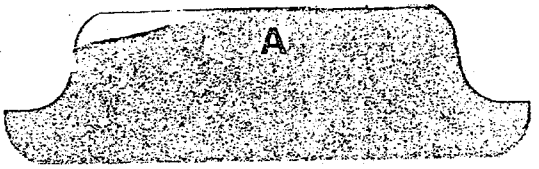
PREPARED BY:

WALK, HAYDEL & ASSOCIATES, INC.
PROJECT MANAGERS - ENGINEERS - CONSTRUCTION MANAGERS

INSTALLATION RESTORATION PROGRAM

DECISION DOCUMENT
SITE LF-10 (OLD SITE 10) - OLD MAIN BASE LANDFILL
HOLLOMAN AIR FORCE BASE, NEW MEXICO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INSTALLATION RESTORATION PROGRAM

DECISION DOCUMENT
SITE LF-10 (OLD SITE 10) - OLD MAIN BASE LANDFILL
HOLLOMAN AIR FORCE BASE, NEW MEXICO

November 1990

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- 3.3 Site Investigations
  - 3.3.1 Phase I
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- 4.3 Reasons for Not Considering Alternatives

5.0 CONCLUSIONS

TECHNICAL DOCUMENT TO SUPPORT SITE CLOSEOUT

1.0 INSTALLATION

Holloman Air Force Base (AFB) is located on approximately 50,700 acres of land in Otero County in south-central New Mexico approximately 95 miles north-northeast of El Paso, Texas. The basin lies in the northern-most reaches of the Chihuahuan Desert and is bound on the east and west by the Sacramento and San Andres Mountains, respectively. The nearest population center is the city of Alamogordo which is located seven miles east of the base boundary. The major highway serving the base is U.S. Highway 70 which runs in a southwesterly-northeasterly direction along the southern base boundary.

2.0 SITE IDENTIFICATION

2.1 Site Description

Site LF-10 encompasses the area around the present day 4th Satellite Communication Squadron (SPACECOM) complex (see attached sketch of site).

2.2 Site Location

Site LF-10, the Old Main Base Landfill, consists of approximately 20 acres located north of the main base area and east of the Civil Engineering complex.

2.3 Site Setting

The topography of the site is dominated by a large arroyo, Dillard Draw, and the SPACECOM complex. The arroyo forms the site's eastern boundary. SPACECOM is situated in the north central area of the site. Due to past landfill activities and recent construction, the area is well graded and slopes gradually to the south

and east. This directs most surface drainage toward the arroyo.

3.0 BACKGROUND

3.1 Nature of Site

Site LF-10, the Old Main Base Landfill, was utilized from 1942 to 1958. During that time the landfill received domestic solid waste from the base and possibly drums containing waste oils and solvents. A base incinerator was located in the area and the ash from its operation was also buried in the landfill.

3.2 Identification of Site

In 1982, the Corps of Engineer's Fort Worth District drilled sixteen soil borings in the Site LF-10 area for the construction of the Mobile Satellite Communications Unit building. The boring logs show the presence of trash and debris in the former landfill area. As a result of these findings, Site LF-10 was investigated under the United States Department of Defense (DOD) Installation Restoration Program (IRP), with a subsequent investigation under the Comprehensive Environmental Response, Compensation, and Liability Act's (CERCLA) Remedial Investigation (RI) protocol.

3.3 Site Investigations

3.3.1 Phase I

Site LF-10 was initially investigated under Phase I of the IRP. The Phase I investigation, conducted from December 1982 to August 1983 by the engineering firm of CH_2M Hill, concluded that further

investigative work was not necessary; therefore, the site was not included in a Phase II investigation.

3.3.2 Remedial Investigation

In November 1987, a subsurface investigation was conducted within the SPACECOM complex to determine why the complex hardstand was exhibiting signs of differential settling and concrete stress. Findings of the subsurface investigation reported trash and debris at various depths in several of the borings. Included in the trash at one location were what appeared to be medical vials containing a yellow-orange coagulated liquid. A dark greenish-black sludge with a pungent odor, which did not appear to be a petroleum product, was also encountered in one of the borings. As a result of this investigation, a RI was conducted at Site LF-10.

The RI field activities were conducted intermittently from January 1988 to June 1989 by Walk, Haydel & Associates, Inc. and consisted of the installation of seven monitoring wells and the drilling of fourteen soil borings and three Dennison cores. Soil and groundwater samples were collected and analyzed. The RI concluded that there was no evidence of significant contamination at Site LF-10; however, further investigative work was recommended northwest of Site LF-10 in the area around Site SD-08. It was suggested that contamination may be present in that

area and may be orginating from an unknown source outside of Site LF-10.

3.4 Risk Assessment

A Baseline Risk Assessment (RA) was prepared for Site LF-10. The RA was performed in support of the RI conducted at the site. The RA concluded that Site LF-10 poses no significant risk to public health or the environment.

3.5 Regulatory Agency and Public Involvement

Site LF-10 was investigated under the Department of Defense's Installation Restoration Program and CERCLA's Remedial Investigation protocols. A copy of the final RI Report and final RA Report was submitted to the State of New Mexico's Department of Health and Environment.

4.0 ALTERNATIVES

4.1 Alternative Control Measure Analysis

The only control measure considered for Site LF-10 was the no action measure. The basis for choosing this control measure was the Baseline Risk Assessment's conclusion that Site LF-10 poses no significant risk to public health or the environment.

4.2 Permanency

The no action alternative is a permanent option because conditions at Site LF-10 pose no significant risk to public health or the environment.

4.3 Reasons for Not Considering Alternatives

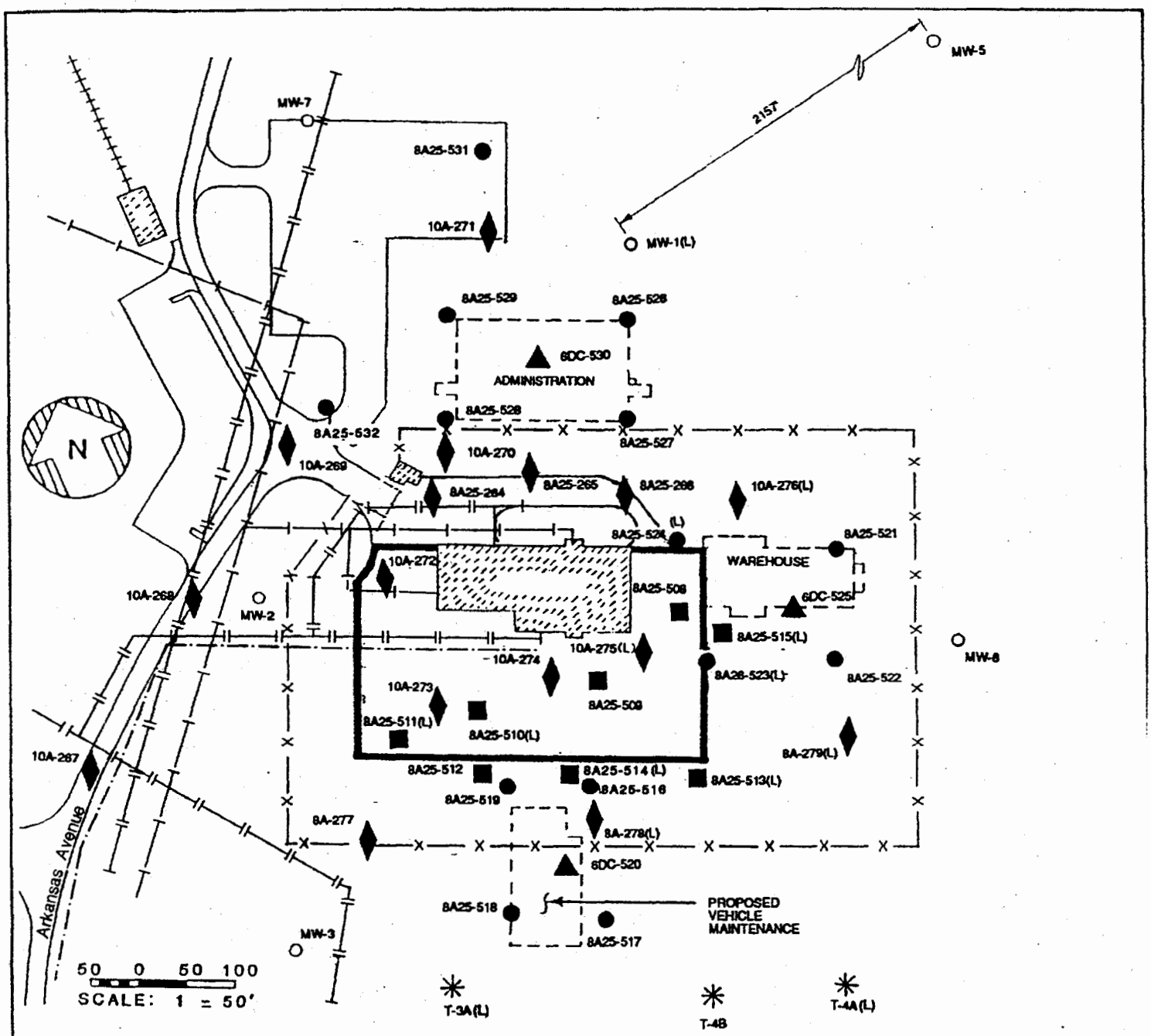
Due to the lack of contamination at Site LF-10 the consideration of other alternatives, other than the no action alternative, was deemed unnecessary.

5.0 CONCLUSIONS

The Remedial Investigation and subsequent RI Report and Baseline Risk Assessment Report concluded that Site LF-10, Old Main Base Landfill, posed no significant threat to human health or the environment. Therefore, further investigation or remedial measures are not appropriate, and Site LF-10 is closed out under the Installation Restoration Program. If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise future changes in environmental regulations or laws may reverse the closeout decision.

By: Lloyd W Newton

Title: _____ Date: _____



LEGEND:

- EXISTING HARDSTAND
- EXISTING FACILITIES
- RI SOIL BORINGS
- DENNISON CORES
- MONITORING WELLS
- TEST BORINGS
- COE BORING, JUNE 1982
- COE BORING, NOV. 1987
- SANITARY SEWER
- WATER LINE
- GAS LINE
- (L) LANDFILL MATERIAL ENCOUNTERED
- EXISTING FENCE
- PROPOSED BUILDING

SITE LF-10
OLD MAIN BASE LANDFILL

CONTRACT NO. DACA45-86-C-0043

REMEDIAL INVESTIGATION
HOLLOMAN AFB, NEW MEXICO

TECHNICAL DOCUMENT TO SUPPORT SITE CLOSEOUT

SITE: Site LF-10 Holloman AFB New Mexico, (Site 10) - Old Main Base Landfill

STATEMENT OF BASES:

I am basing my decision on the following documents which include investigative results for Site LF-10 - Main Base Landfill at Holloman AFB:

- Final Installation Restoration Program, Remedial Investigation Report, Holloman AFB, New Mexico, Walk, Haydel & Associates, Inc., December 1989.
- Final Installation Restoration Program, Baseline Risk Assessment Report, Holloman AFB, New Mexico, Walk, Haydel & Associates, Inc., December 1989.
- Installation Restoration Program, Phase II - Confirmation/Quantification, Stage 1, Final Report for Holloman AFB, New Mexico, Dames & Moore, March 1987.
- Installation Restoration Program Records Search for Holloman AFB, New Mexico, CH2M Hill, August 1983.

DESCRIPTION OF SELECTED REMEDY:

During the Remedial Investigation (RI), soil and groundwater samples were collected and analyzed for volatile organics, acid/base/neutral extractable organics (BNA's)

pesticides/polychlorinated biphenyls (PCB's), total recoverable petroleum hydrocarbons (TRPH) and total recoverable metals.

A number of organic compounds were detected in low concentrations in two borings upgradient of the area in which landfilled materials were found. Also, one BNA extractable organic, di-n-butylphthalate, was detected in a soil sample. Since di-n-butylphthalate is a common laboratory contaminant and was not detected in the primary sample, it is not considered a site contaminant. No pesticides/PCB's were detected in any soil samples and TRPH concentrations in all of the soil borings are within the ranges detected at other Holloman AFB sites which showed no evidence of volatile or semi-volatile contamination. Metals reported are within background ranges identified at Holloman AFB.

No volatile contaminants were found in any of the wells. Three BNA extractable organics, one pesticide and two tentatively identified compounds were found in one well and two BNA extractable organics and four pesticides were detected in another well. Low concentrations of TRPH were detected in two wells, but no specific organic contaminants were found in these wells.

Seven metals were detected in groundwater samples in concentrations either above the Federal Primary and Secondary Drinking Water Standards or the EPA Ambient water Quality Criteria for Protection of Human Health (drinking water). Metal concentrations are not, however, above background ranges found at Holloman AFB.

Based on RI findings, there is no conclusive evidence of significant contamination at Site LF-10. A Baseline Risk Assessment performed for Site LF-10 concluded that Site LF-10 poses no significant risk to public health or the environment. Therefore, <u>no further investigative work</u> is recommended for Site LF-10 - Old Main Base Landfill.

Due to detected organics and pesticides in wells located upgradient (northwest) of areas in which landfilled material was found, there may be contamination in this area from an off-site source near Site SD-08. It is recommended that a more detailed investigation be conducted northwest of Site LF-10 at Site SD-08. Prior to any additional field work, a records search should be conducted to identify any potential contamination sources in the area.

DECLARATIONS:

Consistent with the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) and the National Contingency Plan (40 CFR Part 300), I have determined that the no action alternative at Site LF-10 - Main Base Landfill is a cost-effective remedy and provides adequate protection of public health, welfare and the environment.

_____ By: Lloyd W. Newton
LLOYD W. NEWTON, Brig Gen, USAF

Date Title: Installation Commander

_____ _____

Date By: _____

Title: _____

Department of Environmental Quality

State of New Mexico

_____ _____

Date By: _____

Title: _____

U.S. Environmental Protection Agency
Region VI

APPENDIX E

CORRESPONDENCE

File: 17-A
R.L.

233

DEPARTMENT OF THE AIR FORCE
AIR FORCE REGIONAL CIVIL ENGINEER CENTRAL REGION (AFESC)
1114 COMMERCE STREET
DALLAS, TEXAS 75242

MAR 8 1984

DEEV

16 MAR REC'D

Mr. Jim Highland
Federal Facility Compliance Officer
US Environmental Protection Agency
Region VI
Inter First Two Building
1201 Elm Street
Dallas, Texas 75270

Dear Mr. Highland:

We are forwarding a revised EPA-8900-1 submittal (Notification of Hazardous Waste sites) on Holloman Air Force Base, New Mexico.

This revision is based on the recently completed Phase I Installation Restoration Program (IRP). Your office has copies of the study and it has been peer-reviewed by EPA.

If you have any questions regarding this submittal, please contact Captain Don Bradford, Deputy Chief, Environmental Planning Division, (214) 767-2514.

Sincerely,

PAUL D. GARCIA, Major, USAF
Chief, Environmental Planning Division

1 Atch
EPA 8900-1, 2 sets of maps

Cy to: HQ TAC/DEEV wo atch
833 CSG/DEE wo atch

OFFICE	COORD	ACT	INIT	DATE
DE	✓			
DE-1	✓			04/15
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DA				
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DEI				
DEM				

File:
R.L.

584

CONFIRMATION NOTICE NO.1

TO:	U.S. Army Engineer District ATTN: CEMRO-ED-EA (Larry Janis) 215 North 17th Street Omaha, Nebraska 68102-4978
CONTRACTOR:	Sirrine Environmental Consultants, Inc.
SUBCONTRACTOR:	Radian Corporation
CONTRACT NUMBER:	DACW45-89-D-0515
DELIVERY ORDER NUMBER:	5023. Radian DO #16
TITLE:	IRP for Holloman AFB, New Mexico
DATE OF THIS REPORT:	8 March 1991
SUBJECT:	**RECORDS SEARCH BY RADIAN PERSONNEL AT HAFB**

The following paragraphs discuss the findings of the records search conducted by Mr. Tom Holcomb at Holloman Air Force Base on the dates of 11 through 28 February 1991. Mr. Tom Morahan joined Mr. Holcomb between the dates of 25 through 27 February 1991 to conduct the PA/SI at the Primate Research Institute and the Radioactive Material Burial Site. The results of the records search are discussed by site and only the significant findings are highlighted.

Radian is examining the implications on the scope of work of the significant findings of the literature search. These implications will be discussed at an upcoming meeting with the USACE personnel.

1.) Site 4 - Acid Trailer Burial Site

Mr. Holcomb visited the site with Mr. Roger Wilkson and Lt. Mark Smith on 12 February 1991. No evidence of a burial site was apparent. Construction debris and other materials were dumped in the arroyo east of the POL Storage Area.

Mr. Pete Carbargal, supervisor of the POL Storage Area, was contacted. He did not recall acid trailers being buried or removed east of the POL Area. He did recall 3 storage tanks being removed in the field south of the POL Area. They were not Acid Trailer Tanks.

Mr. Marvin Weber, a chemist with the Test Group between 1951 and 1986, worked on fuels testing and development. He visited Holloman on 21 February 1991 and showed us the burial location. The tanks were buried 1/4 mile north of the Unconventional Fuels Storage Area adjacent to the Malone Draw. During the site visit one tank was positively identified. The other tank remained covered. Bottles containing chemicals and other debris were also found at the site.

On 26 February 1991, Mr. Holcomb and Mr. Morahan return to site with a metal detector. The visible tank was confirmed and 2-3 other potential locations were determined with the metal detector.

The metal detector was also used to screen the area east of the POL Storage Area. Suspicious locations were screened, but no tanks were detected.

2.) Site 8 - Refuse Collection Truck Washrack

During the preliminary visit, an old oil-water separator and a drainage basin were being replaced with one new oil-water separator. An open pit around the new separator revealed black stains on the first foot of soil. The pit was backfilled with clean soil and the old soil was kept on site. Mr. Ben Barrerras, Refuse Collection Foreman, indicated that it was common for the sewer line from the washrack to clog causing the drainage basin and oil-water separator to overflow. Mr. Barrerras confirmed that pesticides were used prior to the 1970's for fly control.

Other areas of concern at the washrack include an engine oil storage basin, cracks in the concrete of the washrack and general stains in the soil throughout the washrack's yard.

3.) Site 9 - Waste POL Drum Storage Area

The site location and history were confirmed by Mr. Pete Carbargal, Supervisor, POL Storage Area. He indicated that the site was approximately 200 x 300 feet and the storage area was surrounded by a chain-link fence. Site visits, however, revealed oil stains and drum bungs in a larger area (500 x 600 feet) than described by Mr. Carbargal. Historical aerial photos will be used to further determine the boundaries of the storage area.

4.) Site 11 - Main Base Electrical Substation

Interviews with Mr. Gary Jolly, Chief of Electrical Operations, confirmed historical data. He provided analytical records of soil samples and PCB oil samples from the transformers and oil circuit breakers. PCBs were not detected in any soil samples during a 1983 investigation; however, the records do not indicate where the samples were collected. PCB oil from the circuit breakers had concentrations of less than 50 ppm. This oil was commonly dumped on the ground. At the site visit, no obvious stains were seen in the soil. Most of the site is underneath power lines which will prohibit drilling activities in the immediate vicinity.

5.) Site 14 - Former Entomology Area

The records search revealed that the Former Entomology Area was not located in Building 67 as indicated in previous records. Interviews with Mr. Bill Wright, former Head of Pest Control, and Mr. Herbert Jordan, former Chief of Operations, and historical photos from Bioenvironmental Engineering all revealed that the Former Entomology storage and mixing area were located adjacent to existing Building 66. The approximate location was determined in the field with Mr. Wright and with the historical photos. It is true that the Former Entomology Office was located in Building 67.

6.) Site 16 - Entomology Shop Area

According to Mr. Wright, prior to 1988 rinsewaters from washing and mixing equipment did not go to a septic tank, but were discharged into an open pit/boring on the southeast side of the building. In 1988, the discharge was connected to the sewer system. Other areas of concern at the shop include the catch basin and the washrack areas.

Prior to 1977, the Entomology Shop was used as an emergency power generation plant. Although no equipment is still on site, transformers and other equipment were used at this location.

7.) Site 19 - Golf Course Landfill

The location of the Golf Course Landfill was confirmed. The "landfill" is primarily a dump site in various locations across a 2 acre radius south of fairway No. 7. No other landfills are known of in the golf course area.

8.) Site 20 - Wastewater Treatment Plant Grit Burial Site

Mr. Ron Schotter, Environmental Engineering, provided a site tour and explanation. The pits dimensions were approximately 2 x 5 x 40 feet, and they

were located east of Pond B between the dirt road and fence. The pits were dug perpendicular to the pond and spread approximately 200-300 feet north-south. Evidence of the pits could be seen on the surface.

Southwest Engineers were on-site 15 February 1991 to provide a cost estimate for trenching operations.

9.) Site 21 - West Area Landfill No. 2

Contrary to previous records, base personnel in Environmental Engineering indicate that the West Area Landfill No. 2 is not located south of fairway No. 7. It is located east of the Solar Observatory. The golf course landfill is located south of fairway No. 7 and no other dumps are known to exist at the golf course. The West Area Landfill No. 2 is primarily a dump site for construction debris in a 2-3 acre basin.

10.) Site 22 - West Area Landfill No. 1

The site visit confirms historical records of the landfill location. Debris is dumped sporadically over a 2-3 acre area in and around what appeared to be an arroyo or basin.

11.) Site 23 - MOBSS Landfill

The landfill is located on the east side of a large borrow pit located west of the Solar Observatory. Asphalt, construction debris, a concrete vault, a trailer, 2-3 empty 55 gallon drums, 4-5 gallon metal buckets with roofing tar and other materials were found at the dump site. The site runs approximately 300-400 feet north-south and 100 feet east-west.

12.) Site 24 - Former Equipment Maintenance Area

Previous reports indicated conflicting waste disposal practices. One report claimed that waste was discharged through the septic system and another indicated that waste was disposed of into a drainage ditch. Mr. Ken Bloom, Mr. Marvin Weber and Mr. Joe Hayden, all employees or former employees of the Test Group, were interviewed separately. They agreed that wastes were not disposed of in a drainage ditch and were most likely discharged into the septic system. Site visits, as-built drawing and building records indicate that septic systems are present at each of the five buildings and have been since they were built in 1959. Two drainage ditches are located near the facility; however, they are located over 300-400 feet from the buildings. The ditches were inspected and no evidence of waste disposal was seen.

According to Mr. Hayden and Mr. Weber, Building 924 was primarily used as the maintenance building and is still used today for this purpose. The other buildings (920-923) were used primarily as storage facilities with maintenance operations occurring infrequently.

13.) Site 28 - Former North Area Washrack

The location of the washrack was identified. It is located west of Building 1083. The drain and oil-water separator are filled with grit and soil.

14.) Site 29 - Former Army Landfill

The Former Army Landfill is located in the North Base, north of the water tower. Its boundaries are, apparently, clearly defined by a small berm that extends 400 feet north-south and 350 feet east-west. However, dumping of materials has occurred outside the berm along the southern border. The contents appear to be primarily construction debris, but munitions may potentially be present.

15.) Sites 30 and 33 - Grease Trap Disposal Area and Cooking Grease Disposal Trenches

The pits are located between the Skeet Range and Fire Training Area, and they are still active. Prior to 1988, the pits were operated by the Water and Wastewater Department. Sgt. Mendez conducted disposal activities from 1980 through 1988 and is familiar with practices prior to 1980. According to Sgt. Mendez, the pits were occasionally used to dispose of oil-water separator sludge and uncontrolled dumping may have occurred as well. He provided a site tour to show the approximate location of the covered pits.

Mr. Chuck Price, of the Exterior Plumbing Department, has conducted disposal activities since 1988. He provided a tour to site the location of the pits since 1988. Mr. Price indicated that, occasionally, sewage from the PRI was also dumped in these pits when the sewer line clogged.

16.) Site 36 - Unconventional Fuels Storage Area

Records from Bioenvironmental Engineering indicate that a total of four run-off pits received spills from Buildings 1191 and 1192. Three run-off pits were existed south of Building 1192 and one run-off pit was located south of Building 1191. The exact location of all these pits could not be determined during the site visit.

The records also indicate that all the collection tanks (runoff pits) were replaced with new tanks in 1978. The old tanks were left in place and filled with cement. Prior to closing the facility, soil samples were collected near the runoff pits in

1978, 1981 and 1987. The results indicated normal pH levels in the soil and no fuel contaminants were detected.

Mr. Weber provided a site tour and explanation of the operations. Building 1192 was used to store the oxidizers and Building 1191 was used to store the propellants. Prior to 1957, the nitric acid was stored in a similar facility across the street to the west. The foundations of those buildings are in place. The concrete is pitted from acid spills and the drains in the concrete appear to lead directly to the ground below. No investigation has been done at this location.

17.) Site 38 - Sled Test Maintenance Area

As-built drawings indicated that the septic system was located on the south side of the building. The site tour confirmed this, as there were steel guard-posts above the septic tank to prevent vehicles from driving over the tank.

18.) Site 41 - Coco Blockhouse Borehole Disposal Pit

As-built drawings and real estate records were reviewed to determine the location of the 250 foot borehole. Neither indicated any record of the borehole. As-built drawings did illustrate two sumps located on the north end of the North Pad at Coco Blockhouse. These sumps were planned to collect spills.

Mr. Marvin Weber recalled the borehole and during a site visit with him, Mr. Weber indicated that there were two boreholes. They were located where the as-built drawings planned the two sumps. Mr. Weber said two boreholes were installed because the oxidizers and propellants had to be disposed of separately. The boreholes were necessary because the Coco Blockhouse is located in a low point. The boreholes were drilled to approximately 250 feet, filled with gravel and utilized for drainage.

Mr. Norman Burnett, Head of Fueling Operations (1959-1986), was also interviewed. Mr. Burnett said all spills were washed down with water and allowed to drain to the adjacent soils. He does not recall the boreholes or sumps.

Mr. Harry Ridge, Civil Engineering Maintenance, was interviewed and provided a site tour. He recalls the boreholes being located south of the Coco Blockhouse in the fueling area. The field was searched visually and with a metal detector. No evidence of a borehole was found.

The existence and location of the boreholes have not been confirmed and are not known at this time.

19.) Site 42 - Radioactive Burial Site

Mr. Morahan visited the site with Ron Schotter and Roger Wilkson, from Civil Engineering, on Tuesday, 26 February 1981. Sergeant Harris of Bio-Environmental Engineering was also in attendance and performed screening activities to ensure no radiation was encountered. The site appeared to lie within a 50 foot by 70 foot fenced area. A small concrete pad was located in the center of the area. The pad was also evident in photographs uncovered in the literature search. Alpha, beta, and gamma radiation was at or below background at ground level all around the site.

20.) Site 1251 - Waste Disposal Pit

A bidders meeting to remove and dispose of the materials in the pit was conducted on 20 and 21 February 1991. The bidders included Hazchem, Rinchem and Chemical Handling Corporation. The participants inventoried the materials in the pit to provide a cost estimate for their removal and disposal. The cost estimates are to be based on a worst-case scenario because the contents of the drums and buckets are unknown.

21.) Primate Research Institute Disposal Area

On 25 February Mr. Morahan and Mr. Holcomb met with Roger Wilkson, Lt. Smith, and Sharon Moore, of Civil Engineering, to interview an anonymous ex-employee. The employee indicated at least two dates when unknown liquids were disposed at a general location in the PRI yard within the moat. Later in the day, Mr. Harry Ridge, Mr. Bob Emerlee, and Ms. Sher Woods, PRI employees, were interviewed along with Preston Marx, PRI director. PRI yard construction plans and schedules were discussed and Mr. Ridge and Mr. Marx conducted a walk-through of the yard area with Holcomb, Morahan, Wilkson, and Lt. Smith. Many potential disposal areas were identified, including the Solvent Evaporation Pit Waste Management Unit. On 26 February, Holcomb, Morahan, Wilkson, Ridge, and Lt. Smith walked the site again. Sergeant Harris and Captain Emerson, from Bio-Environmental Engineering, performed alpha and beta/gamma detection, respectively. No radiation was detected on the surface of the property.

File: 17-A-4
R.L.

31C-6a

331

9 December 1991

Holloman Air Force Base, NM
Recommendation, Study, and
Investigation of 29 Waste Sites

Name	Organization	Phone No.
Richard Mayer	EPA	214-655-6725
Wally Hise	Radian	512-454-4797
RON STIRLING	USACE	(402) 221-376
SANDY FRYE	USACE - omaha	(402) 221-7642
ROGER WILKSON	Holloman AFB	505-479-58
DAVID MORGAN	NMED	505-827-275
Sharon Moore	Holloman AFB	(505) 479-3931
Tom Holcomb	Radian	512-454-479
RON JAHNS	AFCEE/ESD	(214) 767-4648

MEETING AGENDA

INVESTIGATION, STUDY, AND RECOMMENDATION FOR 29 WASTE SITES HOLLOMAN AFB, NM

9 December 1991

I. Introduction

II. Overview of Current Investigation

III. Site-Specific Investigations

IV. Data Evaluation and Reporting

V. Determination of Remedial Actions

VI. Risk Assessment

VII. Summary and Recommended Approach

I. Introduction

- Organizational Roles
- Meeting Objectives
- Project Background

Table 1

(Continued)

SWMU Name	SWMU No.	IRP Site No.	Status
Building 882 Spills	AOC-D	26	√
Building 296 Fuel Tank Leaks	AOC-O	--	•
Building 301 Fuel Tank Leaks	AOC-P	--	X
POL Storage Tank Leaks	AOC-T	2 & 5	√
Pad 9 Drainage Pit	141	--	*
Former Entomology Shop	229	14	√
Building 131 O/WS	4	--	*
Building 702 O/WS	21	47	•
Radioactive Waste Disposal Area	111	42	√
Building 702 Waste Oil Tank	122	--	•
Building 703 Washrack Discharge Area	133	--	•
Buildings 920-924 Drainage Ditch	134	24	√
Coco Blockhouse Disposal Well	192	41	√

√ = Site is currently being investigated under the IRP Program.

* = Workplan is currently being written to investigate these sites.

** = Already investigated with the Base Sewage Treatment Lagoons.

X = Remedial Investigation has already been completed. Decision Documents to close the sites have been submitted.

• = Sites are being investigated under the Base's Rapid Response Program.

1 = Reference HSWA Permit issued 22 August 1991 by EPA Region VI.

Permit modification (may be) { - letter stating why
- and 270.42 permit modification

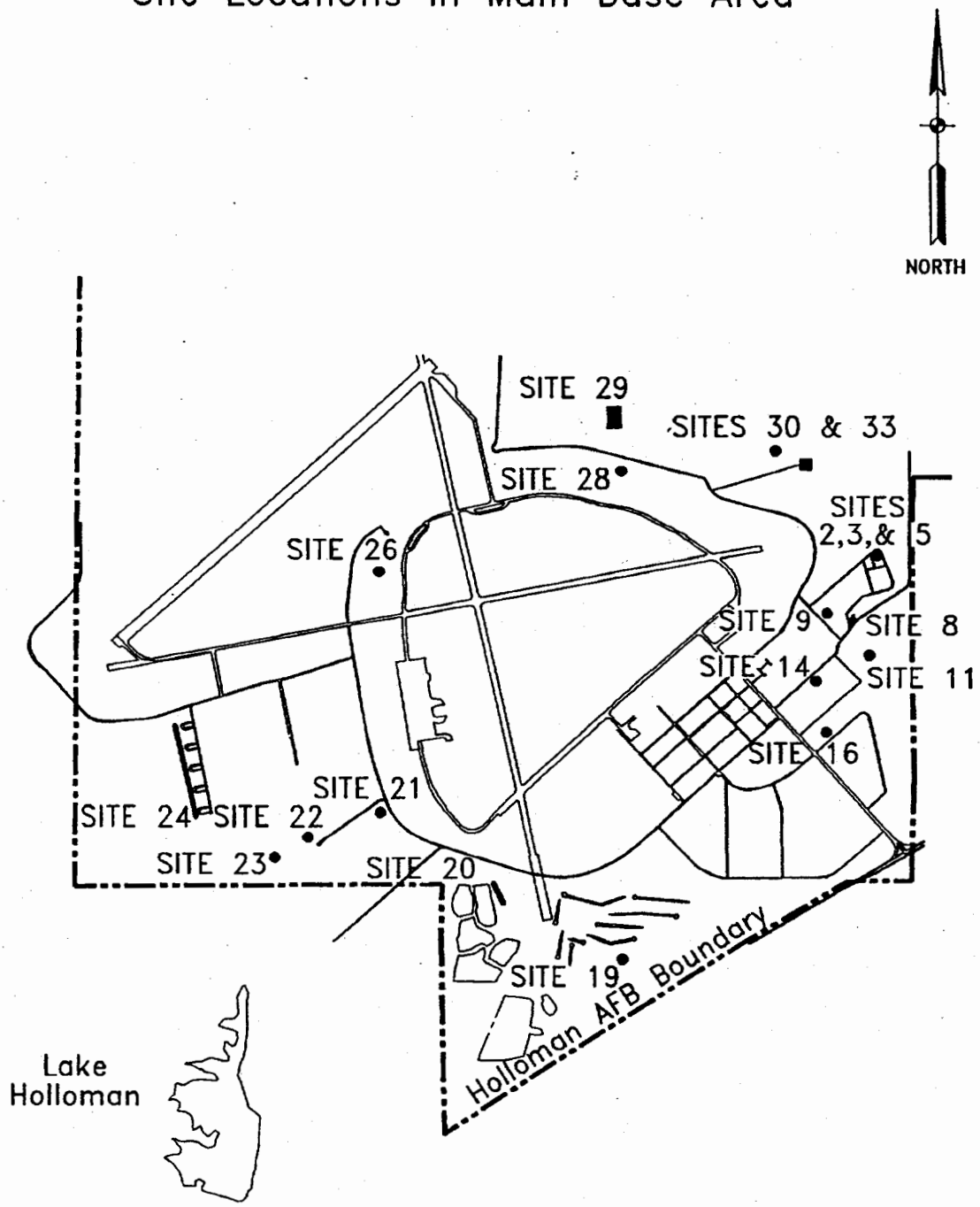
Table 1 From The Holloman AFB Hazardous Waste Permit[1]

SWMU Name	SWMU No.	IRP Site No.	Status
Building 1 Waste Accumulation Area	42	9	√
Acid Trailer Disposal Site	102	4	√
Former Army Landfill	104	29	√
Golf Course Landfill	105	19	√
Main Base Landfill	106	1	X
Main Base Substation PCB Disposal Area	107	11	√
MOBSS Landfill Disposal Trench	108	23	√
Old Main Base Landfill	109	10	X
Sludge Disposal Trenches	113	20,30,33	√
TEL Disposal Site	114	3	√
West Area Landfill #1 PCB Disposal Area	115	22	√
West Area Landfill #2	116	21	√
Fire Department Training Area 1	170	31	X
Fire Department Training Area 2	171	31	X
Building 1191 Fuel Runoff Pits	178	36	√
Building 824 Waste Accumulation Area	212	28	√
Taxiway 4 Tank 28	130	--	X
Building 21 Entomology Leachfield	132	16	√
Building 1166 Test Track Drainfield	137	38	√
Building 1166 Oil/Water Separator Drainage Pit	138	--	--
Lake Holloman, which includes the earthen ditch carrying discharge from Lagoon G to Lake Holloman	139	-SL	**
Lake Stinky	140	-SL	**
Building 21 Pesticide Rinsewater Spill Area	AOC-A	--	--

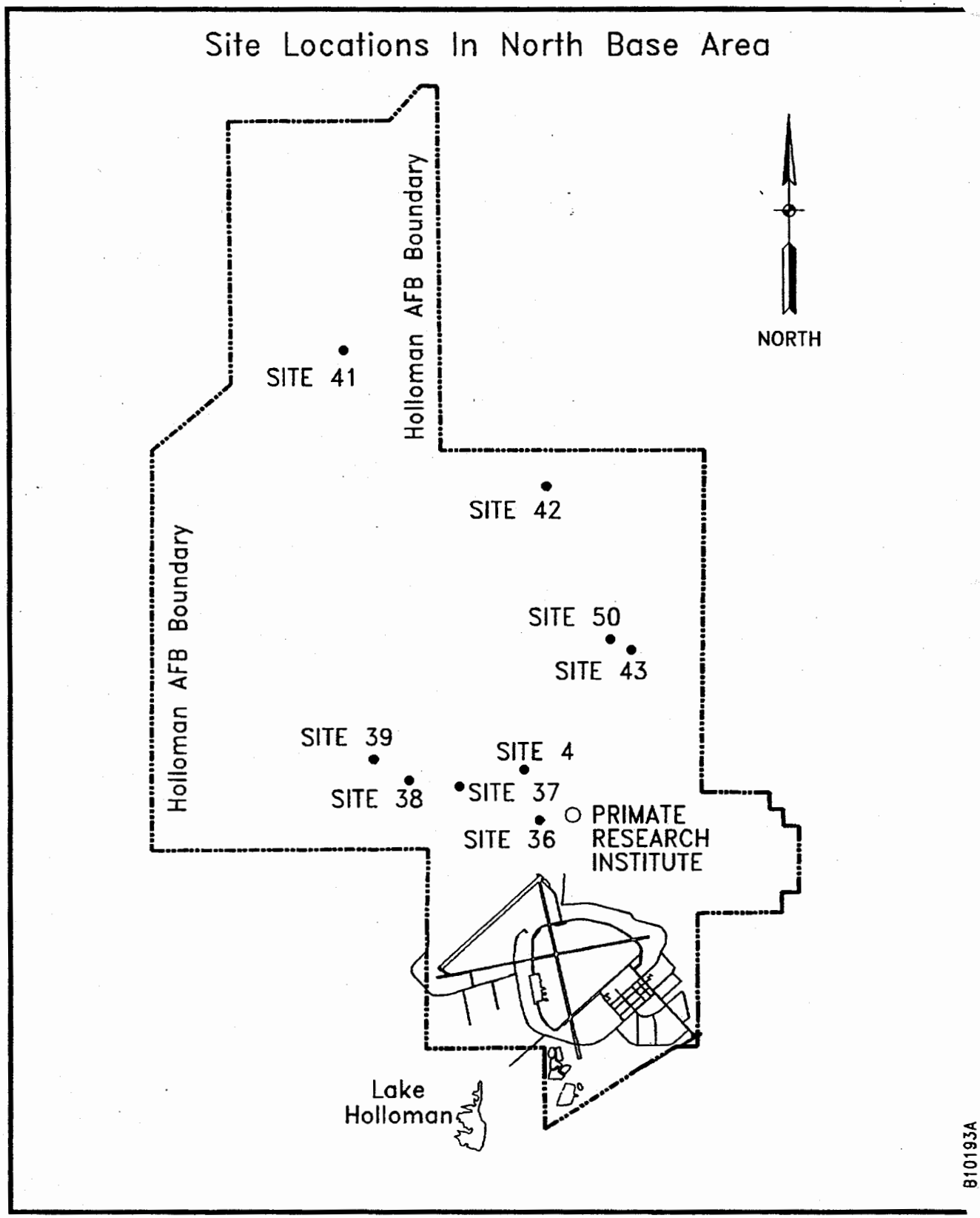
II. Overview of Current Investigation

- Literature Search
- Project Plans (CDAP and SSHP)
- Field Investigation
  - -- Soil Borings
  - -- Monitor Wells
  - -- Sample Analyses
  - -- Aquifer Testing

Site Locations In Main Base Area



B10192A


Site Locations In North Base Area
NORTH
Holloman AFB Boundary
Holloman AFB Boundary
SITE 41
SITE 42
SITE 50
SITE 43
SITE 39
SITE 4
SITE 38
SITE 37
SITE 36
PRIMATE RESEARCH INSTITUTE
Lake Holloman
B10193A

IRP Site Name	IRP Site No.	SWMU No.
POL Spill Site No. 1	2	AOC T
POL Spill Site No. 2	~~3~~ 5	114
Acid Trailer Burial Site	4	102
Tetraethyl Lead Disposal Area	~~5~~ 3	AOC T
Refuse Collection Truck Washrack	8	82
Waste POL Drum Storage/Spill Area	9	42
Main Base Electrical Substation	11	107
Former Entomology Shop Area	14	197
Existing Entomology Shop Area	16	132
Golf Course Landfill	19	105
Wastewater Treatment Plant Grit Burial Site	20	113
West Area Landfill No. 2	21	115
West Area Landfill No. 1	22	116
MOBSS Landfill	23	108
Former Equipment Maintenance Area	24	134
Possible Missile Fuel Spill Site	26	AOC D
Former North Area Washrack Site	28	212
Former Army Landfill	29	104
Grease Trap Disposal Pits	30	113
Cooking Grease Disposal Trenches	33	113
Unconventional Fuels Area Spill Site	36	178
Early Missile Testing Site	37	AOC L
Sled Test Maintenance Area	38	137
Missile Fuel Spill Area	39	165, 167, 179, 185
Coco Blockhouse Borehole Disposal Site	41	192
Radioactive Waste Burial Pit	42	111
Atlas Electrical Substations	43	AOC G
Waste Disposal Pit	50	--
Primate Research Institute/Borehole Disposal Pit	51	--

IRP - SWMU DISCREPANCIES

IRP ID	SWMU ID
2	AOC T
5	AOC T
20	113
30	113
33	113
39	167
--	165
--	179
--	185

RESOLUTION OF DISCREPANCIES

- IRP 2 & 5 (AOC T) - Combined
- IRP 20 (SWMU 113) - Separated
- IRP 30 & 33 (SWMU 113) - Combined
- IRP 39 (SWMU 167) - Added SWMUs 165, 179, and 185

VII. Summary and Recommended Approach

- IRP/RFI Integration
- Risk Assessment JAN 6 Plans to conduct Risk Assessment.
- Site-Specific Recommendations
  - -- No Further Action
  - -- Additional Investigation
  - -- Remediation

III. Site-Specific Investigations

- Quarterly Progress Report (January)
  - Site 4, Response Actions
  - Preliminary Results.

Map
Boring location
tabulature Results

Raw data in Appendix

Draft Final 30, June '92

IV. Data Evaluation and Reporting

- **Field Methods and Procedures**
- **Regional Geology and Hydrogeology**
- **Site-Specific Results**
  - -- **Geologic**
  - -- **Hydrogeologic**
  - -- **Analytical**
  - -- **Other Investigations**
- **Conclusions and Recommendations**

Dec 92

V. Determination of Remedial Actions

- Develop Alternatives
  - -- Identify and Screen Potential Treatment Technologies
  - -- Combine Technologies into Remedial Alternatives
- Screen Alternatives
  - -- Technical (Effectiveness and Implementability)
  - -- Environmental and Human Health
  - -- Cost
- Detailed Evaluation of Alternatives
- Recommended Remedial Action

VI. Risk Assessment

- **Receptor and Pathway Identification for Each Site**
- **Screen ~~Alternatives~~ Sites to Determine Level of Contamination**

  -- **For "Grossly" Contaminated Sites, Stop at Screening** $> 10^{-4}$

  -- **For "Clean" Sites, Perform Site-Specific Risk Assessment** $< 10^{-6}$

  -- **For "In Between" Sites, Perform Site-Specific Risk Assessment to Accurately Determine Risk and Facilitate Selection of Remedial Action/Treatment**

$10^{-4} \leftarrow X \rightarrow 10^{-6}$

File: 17C
R.L. 260

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202-2733

January 13, 1992

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Col. Ira L. Hester
Commander, 833 Combat Support Group
Holloman Air Force Base, New Mexico 88330

Dear Col. Hester:

We hereby approve your RCRA Facility Investigation (RFI) Workplan for the Table 1 SWMU's. The approved RFI Workplan consists of the RFI Workplan dated August 8, 1991.

You shall immediately initiate the implementation of this approved RFI Workplan. The RFI Report for the Table 1 SWMU's is due July 30, 1992. If you have any questions concerning this matter, please contact Rich Mayer of my staff at (214) 655-6775.

Sincerely yours,

Allyn M. Davis

Allyn M. Davis
Director
Hazardous Waste Management Division

cc: Kathleen Sisneros, NMED

File: 21 F
R.L.
17
[redacted]

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS 49TH FIGHTER WING (TAC)
HOLLOMAN AIR FORCE BASE NM 88330-5000

REPLY TO ATTN OF: 49 CES/CEV

12 MAY 1992

SUBJECT: Hazardous and Solid Waste Amendment Permit Modifications

TO: US Environmental Protection Agency, Region VI
ATTN: Rich Mayer
Hazardous Waste Division
1445 Ross Ave.
Dallas, TX 75202-2733

1. In January of 1992, Holloman requested a Class I (40 CFR 270.42) modification to our Hazardous and Solid Waste Amendments (HSWA) Permit. The modifications requested were the following: Move Solid Waste Management Units (SWMU's) 165, 166, 179, AOC-G and AOC-L from Table 2 to Table 1 of our permit; move SWMU's 138 and 141 from Table 1 to Table 2 of our permit; and remove SWMU AOC-O (IRP-45) from our permit.

2. Subsequent to EPA approval, Holloman AFB made the above mentioned modifications. At Atch 1, we have provided the revised Table 1, Table 2, and Table 3 of our HSWA Permit. The modified tables have been distributed to all interested parties cited on our facility mailing list (Atch 2).

3. If you have any questions, please contact Roger Wilkson at (505) 479-3931.

HOWARD E. MOFFITT
Deputy Base Civil Engineer

2 Atch
1. HSWA Tables
2. Facility Mailing List

Readiness is our Profession

TABLE 1

SWMU	Unit Name
42	Bldg. 1 WAA
102	Acid Trailer Burial Site
104	Former Army Landfill
105	Golf Course Landfill
106	Main Base Landfill
107	Main Base Substation PCB Disposal Area
108	MOBSS Landfill Disposal Trench
109	Old Main Base Landfill
113	Sludge Disposal Trenches
114	TEL Disposal Site
115	West Area Landfill #1 PCB Disposal Area
116	West Area Landfill #2
170	Fire Department Training Area 1
171	Fire Department Training Area 2
178	Building 1191 Fuel Runoff Pits
212	Bldg. 824 WAA
130	Taxiway 4 Tank 28
132	Bldg. 21 Entomology Leachfield
137	Bldg. 1166 Test Track Drain Field
139	Bldg. 1166 Oil/Water Separator Drainage Pit
140	Lake Stinky
AOC-A	Bldg. 21 Pesticide Rinsewater Spill Area
AOC-D	Bldg. 882 Spills
AOC-P	Bldg. 301 Fuel Tank Leak
AOC-T	POL Storage Tank Leaks
229	Former Entomology Shop
4	Bldg. 131 O/WS
21	Bldg. 702 O/WS
111	Radioactive Waste Disposal Area
122	Bldg. 702 Waste Oil Tank
133	Bldg. 703 Washrack Discharge Ditch
134	Bldgs. 920-924 Drainage Ditch
192	Coco Block House Disposal Well
165	Bldg. 1176 Pond
166	MOBSS Drainage Lagoon
179	Discharge Box
AOC-G	Atlas Sudstation PCB Spill
AOC-L	Early Missile Test Site

TABLE 2

SWMU	Unit Name
118	Bldg. 21 Pesticides Holding Tank
119	Bldg. 121 Waste Oil Tank
120	Bldg. 309 Waste Oil Tank
121	Bldg. 316 Waste Oil Tank
123	Bldg. 704 Waste Oil Tank
124	Bldg. 752 Waste Oil Tank
125	Bldg. 868 Fire Water Tank
126	Bldg. 1000 Waste Oil Tank
127	Bldg. 1092 Waste Oil Tank
128	Bldg. 1166 Waste Oil Tank
129	Bllldg. 1191 Spill Tank
135	Bldg. 1092 Oil/Water Separator Drainage Pit
136	Bldg. 1119 Washrack Drainage Area
138	Bldg. 166 Oil/Water Separator Drainage Pit
141	Pad 9 Drainage Pit
155	Sludge Drying Beds
156	Imhoff Tanks (5)
AOC-U	Lost River Basin
164	Bldg. 1080 Pond
177	Bldg. 1176 Sumps
181	Bldg. 1176 Drainage Trough
183	Air Base Sewer System
184	Wastewater Recirculating Line
101	Bldg. 121 Landfill
54	Bldg. 702 WAA
56	Bldg. 807 WAA
63	Bldg. 867 WAA
71	Bldg. 1778A WAA
75	DRMO Hazardous Waste Storage Area
78	Trim Pad 3 WAA
91	Bldg. 816 Washrack

TABLE 3

SWMU	Unit Name
11	Bldg. 300 O/WS
12	Bldg. 304O/WS
13	Bldg. 304A O/WS
14	Bldg. 306 O/WS
15	Bldg. 309 O/WS
16	Bldg. 315 O/WS
17	Bldg. 316 O/WS
18	Bldg. 500 O/WS
19	Bldg. 638 O/WS
20	Bldg. 639 O/WS
21	Bldg. 702 O/WS
22	Bldg. 704 O/WS
23	Bldg. 800 O/WS
24	Bldg. 801 O/WS
25	Bldg. 805 O/WS
26	Bldg. 809 O/WS
27	Bldg. 810 O/WS
28	Bldg. 822 O/WS
29	Bldg. 827 O/WS
30	Bldg. 830 O/WS
31	Bldg. 855 O/WS
32	Bldg. 868 O/WS
33	Bldg. 869 O/WS
34	Bldg. 902 O/WS
35	Bldg. 903 O/WS
36	Bldg. 1000 O/WS
37	Bldg. 1080 O/WS
38	Bldg. 1080A O/WS
39	Bldg. 1092 O/WS
40	Bldg. 1166 O/WS
41	Bldg. 1266 O/WS
1	Bldg. 55 O/WS
2	Bldg. 121 O/WS
3	Bldg. 130 O/WS
4	Bldg. 131 O/WS
5	Bldg. 137 O/WS
6	Bldg. 193 O/WS
7	Bldg. 198 O/WS
8	Bldg. 231 O/WS
9	Bldg. 282 O/WS
10	Bldg. 283 O/WS

FACILITY MAILING LIST

Honorable Pete V. Domenici
U.S. Senator
4239 Dirkson Senate Office Building
Washington, D.C. 20510

Honorable Joe Skeen
U.S. Representative
1007 Longworth House Office Building
Washington. D.C. 20515

Honorable Bill Richardson
U.S. Representative
1610 Longworth House Office Building
Washington, D.C. 20515

Honorable Steve Schiff
U.S. Representative
1520 Longworth House Office Building
Washington, D.C. 20515

Bill Montoya
Director
NM Game and Fish Department
State Capitol
Santa Fe, NM 87501

Honorable Dan King
Mayor of Alamogordo
City Hall, P.O. Box 129
Alamogordo, NM 88310

Dennis Ditmanson
Superintendent
White Sands National Monument
P.O. Box 458
Alamogordo, NM 88310-0478

Bureau of Land Management
1800 Marquess
Las Cruces, NM 88005

Commander: US Army White Sands Missile Range
Attn: Brig Gen Warton
WSMR, NM 88002-5076

Commander
USAD Artillery Center and Fort Bliss
Attn: ATZC-ISE-E
Fort Bliss, TX 79734-0400

Ms. Sharon Moore
Base Environmental Coordinator
Holloman AFB
Building 55, 49 CES/CEV
Holloman AFB, NM 88330-5000

HQ Tactical Air Command
Building 681, HQ TAC/DEV
Langley AFB, VA 23665-5001

Ms. Laurie Shomo
Fish and Wildlife Service
3530 Pan American Highway, NE
Albuquerque, NM 87107

U.S. Forest Service
Federal Building
Lincoln National Forest
Alamogordo, NM 88310

State of New Mexico
Health and Environment Dept.
411 E. 10th Street
Alamogordo, NM 88310

State of New Mexico
Harold Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87503

Department of Interior
Office of Environmental
Project Review
Washington, DC

Mr. Norm Thomas
U.S. Environmental Protection
Agency
First Interstate Bank Tower
1445 Ross Ave
Dallas, TX 75202

Alamogordo Public Library
920 Oregon Avenue
Alamogordo, NM 88310

Mr. Walt Whitford
Mesilla Valley Audubon Society
4210 Tesota
Las Cruces, New Mexico 88001

Honorable Jeff Bingaman
U.S. Senator
502 Hart Senate Office Building
Washington, D.C. 20510

Ms. Jennifer Fowler-Propst
Field Supervisor
Ecological Services
U.S. Fish and Wildlife Service
Suite D, 3530 Pan American Hwy NE
Albuquerque, N.M. 87107

Regional Director
Planning and Cultural Resources
Southwest Region
National Park Service
P.O. Box 728
Santa Fe, N.M. 87504-0728

Mr. Charles A. Calhoun
Projects Superintendent
Upper Rio Grande Projects Office
Bureau of Reclamation
P.O. Box 252
Albuquerque, N.M. 87103

Mr. Dan Page
Project Superintendent
Rio Grande Project
Bureau of Reclamation
700 East San Antonio
El Paso, Texas 79901

Ms. Claudia Nissley
Advisory Council on Historic Preservation
730 Simms Street, Room 450
Golden, Colorado 80401

Mr. Larry Woodard
State Director
Bureau of Land Management
P.O. Box 27115
Santa Fe, N.M. 87502

District Chief, WRD
U.S. Geological Survey
4501 Indian School Road, Northwest
Suite 200
Albuquerque, New Mexico 87110-3929

Governor of New Mexico
Capitol Building
Santa Fe, New Mexico 87503

New Mexico State Clearing House
for Intergovernmental Review
Dept of Finance and Administration
Room 425, State Capitol
Santa Fe, New Mexico 87503

New Mexico Energy, Minerals, and
Natural Resources Department
State Forestry Division
Villagra Bldg, 400 Galisteo Street
Santa Fe, New Mexico 87503

New Mexico Environment Department
Surface Water Quality Bureau
P.O. Box 26110
Santa Fe, New Mexico 87502
ATTN: Mr. David Coss

State Park and Recreation Div.
State Forestry Division
Villagra Bldg, 408 Galisteo St.
Santa Fe, New Mexico 87503

Mr. Skeeter Paul
Director, State Parks & Recreation
P.O. Box 1147
Santa Fe, New Mexico 87504

Mr. Thomas W. Merlan
State Historic Preservation Officer
22 East Palace Avenue, Room 101
Santa Fe, New Mexico 87503

New Mexico State University
Dept Fishery and Wildlife Sciences
P.O. Box 4901
Las Cruces, New Mexico 88003

The Nature Conservancy
New Mexico Field Office
107 Cienega
Santa Fe, New Mexico 87501

Fred A. Gross Jr.
President, NM Wildlife Federation
92A Rosa Ct.
Los Alamos, New Mexico 87544

Cathy Butcher
President, Rio Grande Chapter
Sierra Club
207 San Pedro NE
Albuquerque, New Mexico 87108

File:
R.L.

45'd

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS 49TH FIGHTER WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO

2 SEP 1992

FROM: 49 CES/CEV
Holloman AFB, NM 88330-5000

SUBJ: Installation Restoration Program (IRP) Sites Finished Status

TO: HQ ACC/CEVR

1. Presently, the Environmental Protection Agency (EPA) has concurred with the No Further Action (NFA) option on six sites and concurred with long-term monitoring of an additional ten sites. Upon final decision documents in October of 1992, Holloman AFB will have "finished" 35 sites. This will result in a percentage of 60% in FY93.

2. Due to completion dates of a 29 site Remedial Investigation/Feasibility Study (RI/FS), HAFB will not meet the ACC goal of 45% site completed but, will exceed the ACC FY93 goal of 55%.

3. Holloman AFB FY93 program consist of Remedial Design/Remedial Action (RD/RA) of 6 sites. Of these six sites, one site is expected to be remediated and the remaining 5 sites will have in-place remedial systems. If projects are funded, this will bring HAFBs finished sites to 41. This will result in a percentage of 71% sites finished in FY93.

4. If you have any questions, please contact Roger Wilkson or Warren Neff at DSN 867-5062.

ROGER WILKSON
Remedial Project Manager

AR 570

File: 17A46
R.L.
31-C-3-E

24 SEP 1992

FROM: 49 CES/CEV
550 Tabosa Ave
Holloman AFB, New Mexico 88330-8458

SUBJ: Responses to Deficiency Comments on Holloman AFB Resource Conservation and Recovery Act (RCRA) Remedial Investigation (RI) Table 1 Solid Waste Management Units (SWMU) Report

TO: Mr Rich Mayer (GH-PS)
United States Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, TX 75202

1. Attached are responses to the deficiency comments on the Holloman AFB RCRA Facility Investigation (RFI) Table 1 SWMU Report. In order to expedite the final RFI Report for the Table 1 SWMUs, Holloman AFB would appreciate your review and preliminary approval of the responses (attach 1) prior to incorporating them into the final RFI Report.

2. Holloman AFB has not received comments from the New Mexico Environment Department (NMED), and, therefore, assumes that the deficiency comments provided by the EPA Region VI will address NMED's concerns. Unless otherwise informed, the RFI Report will be revised without comments from NMED.

3. Based on your comments, the next phase of the Installation Restoration Program (IRP) and RCRA Program will involve six general recommendations: site closeout/no further action (SC/NFA); site closeout/no further action with groundwater monitoring (SC/NFA-GM); feasibility study/corrective measures study (FS/CMS); feasibility study/corrective measures study with further investigation (FS/CMS-FI); further investigation (FI); and removal action/interim measures (RA/IM). Each of the 29 sites discussed in the report were recommended for one of these categories. The attached table (attach 2) lists the sites and the corresponding recommendation.

4. Further investigation is being done at 12 sites to determine the extent of contamination. Eight of these sites are also recommended for the FS/CMS which is currently being conducted. The FS/CMS will be completed for these sites prior to implementing the recommended further investigation. The additional investigation will be completed on the FS/CMS sites

during a "pre-design investigation" that is planned for the fourth quarter of fiscal year 1993. The further investigation at the four sites not recommended for the FS/CMS will also be conducted at that time.

5. The deficiency comments did not address AOC L (IRP Site 37), SWMU 111 (IRP Site 42), and IRP Site 51 (not a SWMU). Holloman AFB assumes that the recommendations for these SWMUs/IRP sites as stated in the draft final report (June 1992) are acceptable to EPA Region VI.

6. No deficiency comments were submitted for the draft final "Risk Assessment Report, Investigation, Study, and Recommendation for 29 Waste Sites" (June 1992). Holloman AFB assumes that no revisions to this document are necessary.

7. The revised RFI Report will be submitted to EPA Region VI on 5 October 1992, 30 days after the receipt of the deficiency comments. Holloman AFB anticipates final approval of the RFI Report within 30 days after EPA receives the revised document.

8. In the coming months, Holloman AFB will be submitting a CMS Plan for the eight sites recommended for the FS/CMS and a Proposed Plan/Class III Permit Modification for the 13 sites recommended for SC/NFA (and SC/NFA-GM).

9. Holloman AFB would like to set a date to discuss our proposed responses to the deficiency comments. In order to make the required report submittal date, Holloman recommends that a conference call take place prior to 25 September, 1992. Roger Wilkson or Warren Neff will be in touch with you to determine a convenient time.

10. If you have any questions, please call Roger Wilkson or Warren Neff at (505) 479-3931.

SIGNED

GORDON R. JANIEC, Lt Col, USAF
Base Civil Enigeer

2 Atchs
1. Responses to EPA comments
2. Summary Table

cc; w/Atchs
NMED (David Morgan)

CEV COORD: R

RESPONSES TO EPA REGION VI DEFICIENCY COMMENTS ON HOLLOMAN AFB RFI TABLE 1 SWMU REPORT

Investigation, Study and Recommendation for
29 Waste Sites, Holloman AFB, NM

COMMENT 1 - SWMU AOC-T, POL Storage Tank Leaks

SWMU AOC-T, POL Storage Tank Leaks (IRP Sites 2&5): The full extent of groundwater contamination has not been determined. Holloman needs to amend the RFI report to include the details for installing additional groundwater monitoring wells and the schedule for performing this work. Furthermore, the source of the contamination has not been located. The RFI report needs to include a plan to identify the source of the contamination.

Response: Contaminants present at this site pose an unacceptable risk to human health and the environment; therefore, remedial action is necessary. A FS/CMS will be conducted for this site to determine the appropriate remedial action. This site also requires further investigation to determine the source of BTEX constituents in near-surface soil, and to define the extent of contamination downgradient of the identified source. The additional investigation will be conducted after completion of the FS in a "pre-design investigation" phase. Following are recommendations for the pre-design investigation:

- Conduct a soil gas survey and Hydropunch® (or similar method) sampling to identify the location of potential sources in the vadose zone (particularly from 0 to 10 ft BGL), and to determine the lateral extent of BTEX constituents downgradient of the identified source(s).

- Using results of the soil gas survey, drill up to 10 additional soil borings at and adjacent to suspected source locations. Analyze soil samples for BTEX constituents and TPH.

- Also using the soil gas survey and Hydropunch® sampling results, install up to four additional monitor wells downgradient of the suspected source(s) to determine the extent of groundwater contamination.

- Resample new and existing monitor wells once for BTEX constituents.

COMMENT 2 - SWMU #114, POL Tank Sludge Burial Site

SWMU #114, POL Tank Sludge Burial Site (IRP Site 3): Same comment as SWMU AOC-T, previous page.

Response: Contaminants present at this site pose an unacceptable risk to human health and the environment; therefore, remedial action is necessary. A FS/CMS will be conducted for this site to determine the appropriate remedial action. The site also requires additional investigation to fully characterize the extent of groundwater contamination. Future groundwater monitoring and groundwater remedial measures for Site 3 will be combined with Sites 2 & 5 due to the proximity of the sites and similar nature of contaminants. The additional pre-design investigation discussed for comment #1 will also address this site. No additional soil or waste sampling is necessary to characterize the site.

COMMENT 3 - SWMU #104, Acid Trailer Burial Site

SWMU #104, Acid Trailer Burial Site (IRP Site 4): Holloman needs to include the details of the further assessment of the groundwater wells in the RFI report to determine if a release has occurred. EPA agrees that a removal action/interim measure is appropriate at this site. Holloman needs to submit this plan to EPA when submitting the amended Table 1 report.

Response: Groundwater Assessment--The results of the risk assessment are inconclusive for this site because of the uncertainty regarding the significance of selenium in one downgradient monitor well. Additional background groundwater data are necessary to resolve this uncertainty. One monitor well will be installed in Ritas Draw upgradient of this site and sampled as necessary to establish background groundwater metals concentrations.

Removal Action/Interim Measure--Holloman AFB will formally submit a plan to EPA Region VI and NMED to inform them of their intentions regarding the Removal

Action/Interim Measure for the Acid Trailer Burial Site. A permit modification will be requested to modify the compliance schedule for this unit.

COMMENT 4 - Building 131 Oil/Water Separator, SWMU #4; and Building 131 Washrack, SWMU #82

Building 131 Oil/Water Separator, SWMU #4; and Building 131 Washrack, SWMU #82 (IRP Site 8): It is not clear from reading this report that the extent of soil contamination around the northwestern perimeter of the truck washrack has been delineated. Since the "old" oil/water separator overflowed at the northwest end, no borings were taken around the northwest perimeters of this unit. Please revise your report to include additional borings around this unit. In addition, the report needs to include additional groundwater monitoring wells to delineate the full extent of pesticide contamination. Also, since well MW-08-01 contains volatile contamination of benzene and ethyl benzene, additional work to find the source and the extent of contamination needs to be included in the revised report. Furthermore, Holloman needs to notify EPA of the newly identified SWMU or SWMUs and the newly identified release(s) (pages 8 and 9 of the HSWA permit).

Response: Contaminants present at this site pose an unacceptable risk to human health and the environment; therefore, remedial action is necessary. A FS/CMS will be conducted for this site to determine the appropriate remedial action. This site also requires further investigation to define the vertical and lateral extent of organochlorine pesticides and metals contamination in the vadose zone soils around the washrack. The additional investigation to accomplish this will be implemented after the completion of the FS in a pre-design investigation phase. Following are recommendations for the pre-design investigation:

- Drill soil borings around the washrack to define the lateral and vertical extent of organochlorine pesticides and metals contamination. The number and location of soil borings will be determined using a geostatistical grid centered around the southeast portion of the washrack. Analyze soil samples for organochlorine pesticides and metals.

- Using Hydropunch® (or similar method) sampling, collect groundwater samples to determine the extent of groundwater contamination. Analyze groundwater samples for metals and organochlorine pesticides.

- Based on results of the Hydropunch® sampling, install up to three monitor wells at the downgradient edge of contamination.

- Resample all new and existing wells for organochlorine pesticides and metals.

The benzene contamination detected in upgradient monitor well MW-08-01 is not considered a result of site activities and will not be addressed in the FS/CMS or the pre-design investigation. The benzene contamination is more likely related to former underground storage tanks (USTs) used to hold waste fuels, located 100 ft west (upgradient) of the site. The former UST area will be identified as a new SWMU as required by Holloman's HSWA permit (Requirement IV.F). The site will be addressed in a separate investigation.

COMMENT 5 - Former Entomology Shop Area, SWMU #229

Former Entomology Shop Area, SWMU #229 (IRP Site 14): Holloman recommends further action at this site due to unacceptable risk to on-site workers; however, it is not clear in the report what Holloman intends to do. Please clarify in the revised report.

Response: Contaminants present at the site pose an unacceptable risk to human health and the environment; therefore, remedial action is necessary. A FS/CMS will be conducted for this site to determine the appropriate remedial action. This site also requires further investigation to define the vertical and lateral extent of organochlorine pesticides in the vadose zone. The additional investigation will be implemented after completion of the FS in a pre-design investigation phase. Following are recommendations for the pre-design investigation:

- Use geostatistical methods to determine spacing for a sample grid. Collect soil samples from the specified grid spacing across the potentially contaminated areas.

- Collect samples from smaller intervals to better delineate to the vertical extent of contamination.

- Analyze soil samples for organochlorine pesticides.

COMMENT 6 - Building 21 Entomology Leachfield, SWMU 132; Building 21 Pesticide Rinsewater Spill Area, SWMU # AOC-A; and Building 21 Pesticide Holding Tank

Building 21 Entomology Leachfield, SWMU 132; Building 21 Pesticide Rinsewater Spill Area, SWMU # AOC-A; and Building 21 Pesticide Holding Tank (IRP Site 16): The RFI report fails to address the Pesticide Collection Pit. It is not clear from reading the report whether this pit has been investigated and by what methods. Also, there should have been a boring taken where the old discharge pipe is located. The RFI needs to include the investigation of those units.

In addition, the full extent of groundwater contamination (horizontal and vertical) has not been delineated. Holloman needs to include further groundwater investigation in the revised RFI report to delineate the full extent of contamination.

Response: The risk assessment indicated that this site does not pose a threat to human health and the environment. Therefore, the recommendation for site closeout/no further action was made. However, to address the concern that site has not been fully characterized, the following recommendations are made:

- Collect up to eight additional soil samples: locate four in the approximate area of the outfall for the Old Discharge Pipe (SWMU 132); and locate four adjacent to the Pesticide Collection Pit (AOC-A).

- Composite soil samples from the surface to groundwater (4 ft BGL), and analyze them for organochlorine pesticides.

- Using Hydropunch® (or similar method) sampling, collect groundwater samples to determine the extent of groundwater contamination. Analyze groundwater samples in a laboratory for organochlorine pesticides by EPA Method 8080.

COMMENT 7 - Golf Course Landfill, SWMU #105

Golf Course Landfill, SWMU #105 (IRP Site 19): EPA tentatively agrees with Holloman's no further action recommendation, except that EPA will require periodic monitoring of the groundwater. The RFI report needs to include a monitoring schedule.

In addition, the report needs to include a narrative on the effect of the drainage ditch on obtaining a representative groundwater sample from monitoring well MW-19-02.

Response: Groundwater Monitoring--Holloman AFB will provide a CERCLA Proposed Plan and RCRA Class III Permit Modification to EPA requesting site closeout and no further action, respectively. In the Proposed Plan and Class III Permit Modification, Holloman AFB will provide details for conducting continued groundwater monitoring. Specifically, the documents will address proposed analyses, frequency and duration of monitoring, and methods to determine action levels. The two administrative controls required in Comment 8 will be implemented. The required administrative controls and 60-day public comment period for the IRP Proposed Plan and RCRA Class III Permit Modification will be fulfilled to achieve a final decision of site closeout/no further action from EPA Region VI.

Groundwater Flow--The drainage ditch located south of the landfill has minimal affect on obtaining a representative groundwater sample from MW-19-02. The drainage is a small man-made surface depression that channels water from the base during peak rainfall periods. During the peak rainfall events, it is possible that recharge occurs along the ditch. The accumulation of rainfall in the ditch is, however, minimal and the surface depression is shallow; therefore, the ditch should not affect local groundwater flow direction or groundwater quality. Two water level surveys (November 1991 and March 1992) indicate expected groundwater flow direction and depths for the site.

COMMENT 8 - Wastewater Treatment Plant Grit Burial Site, SWMU #113

Wastewater Treatment Plant Grit Burial Site, SWMU #113 (IRP Site 20): Before EPA can tentatively agree on no further action for the above SWMU, Holloman must

include a justification in the revised report for leaving the pits in place vs. removing the waste. The waste in one pit is in contact with the groundwater and is most likely contaminating the groundwater and will continue in the future. If EPA tentatively concurs with the no further action justification rationale, two administrative controls will be required.

The two administrative controls are: 1) survey plat of the SWMU according to procedures required in 264.116; and 2) that warning signs are posted marking the unit location to alert any oncoming persons of the unit/area. Before EPA can approve a Class III permit mod for no further action on the SWMU, Holloman must certify and send documentation to EPA providing completion of the two administrative requirements. However, Holloman should be aware that a Class III permit modification requires a 60-day public comment period and a public hearing. Only after completion of these requirements can a final decision be made by EPA concerning the above SWMU.

Response: This site will not be recommended for site closeout/no further action. Instead, the site will be included in the FS/CMS to determine the appropriate remedial action. No additional investigation is necessary to further characterize the site; however, verification soil sampling will be conducted following waste treatment/removal.

COMMENT 9 - West Area Landfill No. 2, SWMU #116

West Area Landfill No. 2, SWMU #116 (IRP Site 21): Same comment as Comment 7 on SWMU #105.

Response: Same as response to Comment 7.

COMMENT 10 - West Area Landfill No. 1, SWMU #115

West Area Landfill No. 1, SWMU #115 (IRP Site 22): Same comment as Comment 7 on SWMU #105.

Response: Same as response to Comment 7.

COMMENT 11 - MOBSS Landfill, SWMU #108

MOBSS Landfill, SWMU #108 (IRP Site 23): Same comment as Comment 7 on SWMU #105.

Response: Same as response to Comment 7.

COMMENT 12 - Former Equipment Maintenance Area, SWMU #134

Former Equipment Maintenance Area, SWMU #134 (IRP Site 24): Same comment as Comment 7 on SWMU #105. Further monitoring of wells MW-24-04 and MW-24-01 is needed to conclusively verify volatile organic contamination in those wells.

Response: Monitor wells MW-24-04 and MW-24-01 will be resampled to verify the presence of volatile organic contamination. Groundwater samples collected from the two wells will be analyzed for BTEX constituents. If volatile organic constituents are present at concentrations greater than action levels, groundwater samples will be collected using the Hydropunch® (or similar method) to determine the extent of contamination in the drainage ditches. Hydropunch® samples will be analyzed in a laboratory for BTEX constituents.

COMMENT 13 - Possible Missile Fuels Spill Sites, SWMU #AOC D

Possible Missile Fuel Spill Sites, SWMU #AOC D (IRP Site 26): With the results of this investigation, EPA tentatively agrees that no further action is needed. Please refer

to the comments on SWMU #113 (last two sentences of second paragraph) on the requirements of a Class III permit mod.

Response: The recommendation will remain the same for this site. The required administrative controls and 60-day public comment period for the IRP Proposed Plan and RCRA Class III Permit Modification will be fulfilled to achieve a final decision of site closeout/no further action from EPA Region VI.

COMMENT 14 - Building 824 Waste Accumulation Area, SWMU #212

Building 824 Waste Accumulation Area, SWMU #212 (IRP site 28): With the results of this investigation, EPA tentatively agrees that no further action is needed. Please refer to the comments on SWMU #113 (last two sentences of the second paragraph) on the requirements of a Class III permit mod.

Response: The recommendation will remain the same for this site. The required administrative controls and 60-day public comment period for the CERCLA Proposed Plan and RCRA Class III Permit Modification will be fulfilled to achieve a final decision of site closeout/no further action from EPA Region VI.

COMMENT 15 - Former Army Landfill, SWMU #104

Former Army Landfill, SWMU #104 (IRP Site 29): Before EPA can agree with a no further action recommendation, Holloman must: 1) install additional groundwater monitoring wells around this landfill to provide adequate flow path coverage; or, 2) drill an adequate number of soil borings underneath the landfill to determine contamination. This additional work should be included in the revised RFI report.

Response: Additional groundwater monitoring will be used to determine if a release has resulted from the wastes at the site. No soil samples will be collected due to the dangers associated with sampling an area potentially containing unexploded ordnance. The following additional investigation is recommended:

- Conduct geophysical surveys to determine the location and extent of wastes buried at this site.

- Install two monitor wells, one each located 200 ft north and south of MW-29-02;

- Resample the new and existing monitor wells, and analyze the groundwater for the same suite of parameters analyzed for in this investigation (except groundwater quality parameters); and

- Using the same receptors and pathways identified in the risk assessment, and the expanded data set for this site, re-evaluate the risk this site poses to human health and the environment.

COMMENT 16 - Sludge Disposal Trenches, SWMU #113

Sludge Disposal Trenches, SWMU #113 (IRP Sites 30&33): Holloman recommended further investigation of this SWMU; however, no concrete plan was given. Please include this plan in the revised report.

Response: This site was recommended for the FS/CMS to determine appropriate remedial action. Additional trenching will be conducted around the perimeter of the site to ensure that all pits have been located; however, no other additional investigation is necessary to characterize the wastes present at the site. In the unlikely event that more waste pits are discovered, additional sampling and analysis will be completed as specified for this investigation. Trenching will be done during a pre-design investigation phase.

COMMENT 17 - Building 1191 Fuel Runoff Pits, SWMU #179

Building 1191 Fuel Runoff Pits, SWMU #179 (IRP Site 36): Same comment as comment 15 on SWMU #104.

Response: Additional investigation will be completed at the site due to the unanticipated groundwater flow direction and the lack of soil data. The following recommendations are made for further investigation:

- Install four monitor wells, one each located downgradient of the four potential sources (Building 1191 and 1192 Drainage Pits, the first Acid Storage Area, and the Aniline Storage Area).

- Collect soil samples from soil borings at each of the four suspected waste areas.

- In addition to the list of parameters used during the RI, analyze soil and groundwater samples for compounds associated with the unconventional fuels program such as Method 8270 (to determine the presence of aniline and N-Nitrosodimethylamine - an indicator for UDMH), and pH (as an indicator for nitric acid).

- Using the new and existing data, re-evaluate the risk this site poses to human health and the environment.

COMMENT 18 - Missile Fuel Spill Area, SWMU #s 177, 181, 165, and 179

Missile Fuel Spill Area, SWMU #s 177, 181, 165, and 179 (IRP Site 39): Soil borings identified as HA-39 are only to 2 feet. These borings will need additional depth to ensure knowledge of the full vertical extent of contamination. In addition, the full extent of contamination in the groundwater needs to be included in the revised RFI report. Also, Holloman needs to include the details of the further action proposed at this site.

Response: Contaminants present at this site pose an unacceptable risk to human health and the environment; therefore, remedial action is necessary. A FS/CMS will be conducted for this site to determine the appropriate remedial action. This site also requires further investigation to define the vertical and lateral extent of soil contamination and lateral extent of groundwater contamination. The additional investigation will be implemented after completion of the FS in a pre-design investigation. Following are recommendations for the pre-design investigation:

- Collect soil samples from up to 8 locations along the drainage ditch downstream of the Oxidizer and Propellant Spill Drainpipes. At each location samples will be collected from the 0- to 2-ft, 2- to 4-ft, and 4-to 6-ft intervals. Analyze the soil samples for lead and cadmium.

- Using Hydropunch® (or similar method) sampling, collect groundwater samples downgradient of MW-39-02 and MW-39-03 to determine the lateral extent of groundwater contamination. Analyze the groundwater samples in the laboratory for halogenated volatile organic compounds.

- Conduct a study of background groundwater quality to determine significance of lead in downgradient monitor wells at this site.

COMMENT 19 - IRP Site 50

Site 50, Waste Disposal Pit: Is this a new SWMU that Holloman identified after permit issuance or a SWMU that EPA did not recommend for investigation? Please clarify in the revised RFI report.

Response: This site was identified as a new IRP Site prior to the issuance of Holloman AFB's HSWA permit; therefore, this site was investigated under the IRP and was not investigated as a SWMU. Holloman AFB does not plan to identify Site 50 as a new SWMU.

COMMENT 20 - SWMU #s 42, 107, 137, 192, and AOC G

No Further Action with Administrative Controls, SWMU #s 42, 107, 137, 192, and AOC G (IRP Sites 9, 11, 38, 41, and 43): With the known information/data presented to date, EPA tentatively agrees that no further action is needed for the following SWMUs (except for two administrative controls): SWMU No. 42 (IRP Site 9), Waste POL Drum Storage/Spill Area; SWMU #107 (IRP Site 11), Main Base Substation PCB Disposal Area; SWMU #137 (IRP Site 38), Building 166 Test Track Drainfield; SWMU #192 (IRP Site 41), Coco Block House Disposal Well; and SWMU #AOC-G (IRP Site 43), Atlas Substation PCB Spill.

The two administrative controls are: 1) Survey plat of the SWMU according to procedures required in 264.116; and 2) that warning signs are posted marking the unit location to alert any oncoming persons of the unit/area. Before EPA can approve a Class III permit mod for no further action on these SWMUs, Holloman must certify

and send documentation to EPA providing completion of the two administrative requirements. However, Holloman should be aware that a Class III permit modification requires a 60-day public comment period and a public hearing. Only after completion of these requirements can a final decision be made by EPA concerning the above SWMUs.

Response: SWMU 42 (Site 9) -- The results of the risk assessment and environmental evaluation at this site suggest that lead concentrations in soil at this site are excessive if the site is used as a soccer field or for other recreational activities in the future (which was the field's intended purpose). Therefore, this site will not be considered for site closeout/no further action at this time. Instead, the site will be included in the FS/CMS to determine appropriate remedial alternatives (depending on its intended future use).

IRP Sites 11, 38, 41, and 43 -- The recommendation will remain the same for Sites 11 (SWMU 107), 38 (SWMU 137), 41 (SWMU 192), and 43 (AOC-G). The required administrative controls and 60-day public comment period for the CERCLA Proposed Plans and RCRA Class III Permit Modification will be fulfilled to achieve a final decision of Site Closeout/No Further Action from EPA Region VI.

Summary of Remedial Investigation and Risk Assessment Results

IRP Site ID	IRP Site Name	SWMU No.	Risk Assessment Results	Next Phase of IRP and RCRA Program
2&5	POL Spill Sites No. 1 and No. 2	AOC T	Unacceptable	FS/CMS-FI
3	POL Tank Sludge Burial Site	114	Unacceptable	FS/CMS-FI
4	Acid Trailer Burial Site	102	Unacceptable	RA/IM-FI
8	Refuse Collection Truck Washrack	4, 82	Unacceptable	FS/CMS-FI
9	Waste POL Drum Storage/Spill Area	42	Unacceptable	FS/CMS-FI
11	Main Base Electrical Substation	107	Acceptable	SC/NFA
14	Former Entomology Shop Area	197	Unacceptable	FS/CMS-FI
16	Existing Entomology Shop Area	132, AOC A	Acceptable	FI
19	Golf Course Landfill	105	Acceptable	SC/NFA-GM
20	Wastewater Treatment Plant Grit Burial Site	113	Acceptable	FS/CMS
21	West Area Landfill No. 2	116	Acceptable	SC/NFA-GM
22	West Area Landfill No. 1	115	Acceptable	SC/NFA-GM
23	MOBSS Landfill	108	Acceptable	SC/NFA-GM
24	Former Equipment Maintenance Area	134	Acceptable	FI
26	Possible Missile Fuel Spill Site	AOC D	Acceptable	SC/NFA
28	Former North Area Washrack Site	212	Acceptable	SC/NFA
29	Former Army Landfill	104	Acceptable	FI

(Continued)

IRP Site ID	IRP Site Name	SWMU No.	Risk Assessment Results	Next Phase of IRP and RCRA Program
30&33	Grease Trap Disposal Pits and Cooking Grease Disposal Trenches	113	Unacceptable	FS/CMS-FI
36	Unconventional Fuels Area Spill Site	178	Acceptable	FI
37	Early Missile Testing Site	AOC L	Unacceptable	FS/CMS-FI
38	Sled Test Maintenance Area	137	Acceptable	SC/NFA
39	Missile Fuel Spill Area	165, 167, 177, 179, 181	Unacceptable	FS/CMS-FI
41	Coco Blockhouse Borehole Disposal Site	192	Acceptable	SC/NFA
42	Radioactive Waste Burial Pit (PA)	111	--	SC/NFA
43	Atlas Electrical Substations	AOC G	Acceptable	SC/NFA
50	Waste Disposal Pit	--	Acceptable	SC/NFA
51	Primate Research Laboratory Borehole Disposal Pit (PA)	--	--	SC/NFA

-- = Not appropriate.
FS/CMS = Feasibility Study/Corrective Measures Study
SC/NFA = Site Closeout/No Further Action
RA/IM = Removal Action/Interim Measure
FI = Further investigation
PA = Preliminary Assessment
GM = Groundwater monitoring for a limited time period

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2850

File: R.L. 17A 655

BRUCE KING
GOVERNOR

JUDITH M. ESPINOSA
SECRETARY

RON CURRY
DEPUTY SECRETARY

January 25, 1993

Mr. Howard E. Moffitt
Deputy Base Civil Engineer
49 CES/CEV
550 Tabosa Ave.
Holloman Air Force Base, NM 88330-8458

Dear Mr. Moffitt:

I have taken this opportunity to respond to your letter of December 16 to David Morgan in regard to soil and ground water remediation standards acceptable to the Environment Department at Holloman Air Force Base.

A basewide soil cleanup standard of 1000 parts per million of total petroleum hydrocarbons (TPH), measured as agreed for UST sites in the letter of November 2, 1992 to you from James P. Bearzi, will be acceptable to NMED at all sites involving release of petroleum hydrocarbons - provided there are no RCRA hazardous constituents present for which risk-based cleanup levels would be more stringent. For instance, levels of benzene in soil under proposed Subpart S corrective action guidance may not exceed 25 parts per million. As a practical matter, it is very unlikely that any constituent associated with petroleum hydrocarbons would be present in unacceptable concentrations at a site where no soil contained more than 1000 ppm TPH. However, enough confirmatory analyses must be performed at each site to ensure that this is the case.

Remediation of existing ground water contamination will not be required by NMED at Holloman Air Force Base, unless a situation is present where a human or ecological receptor is exposed to unacceptable risk from contact with the contaminated water. We agree that direct ingestion of the water by humans is not a plausible exposure scenario. However, additional ground water contamination will not be acceptable. To implement this principle, existing contaminant plumes must be adequately characterized and monitor wells in those plumes must be sampled at least annually for the contaminants present. If contaminants at any point in a plume increase in concentration, or if additional contaminants are discovered, further investigation may be required to locate and remove the source.

The Environment Department will, however, insist on remediation of any ground water contamination resulting from current or future activities at Holloman Air Force Base.

Sincerely,

Kathleen M. Sisneros, Director
Water and Waste Management Division

c: Benito J. Garcia, Chief, HRMB
Steven J. Cary, Chief, GWPRB
Rich Mayer, EPA Region 6

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

22-B-1-3

Recvd 27 Jul

JUL 22 1993

Mr. Howard E. Moffitt
Deputy Base Engineer
Environmental Management
550 Tabosa Avenue
Holloman Air Force Base, New Mexico 88330-8458

Subject: Notice of Deficiency for Phase II RFI Workplan for Table 1 SWMUs

Dear Mr. Moffitt:

The Environmental Protection Agency (EPA), Region 6 has completed a technical review of Holloman Air Force Base's (HAFB's) RCRA Facility Investigation (RFI) Phase II Workplan for Table 1 SWMUs dated 27 April 1993, and we have determined that the workplan is deficient. A list of deficiencies is enclosed for your response.

A revised Phase II Workplan which addresses the enclosed deficiencies is due to EPA and the New Mexico Environment Department by 1 September 1993. If HAFB's revised Phase II Workplan is not approvable, the EPA may make further modifications as required. The modified workplan then becomes the approved Phase II RFI Workplan. If Holloman expects any difficulties in meeting this deadline, written notice and a request for additional time should be submitted to Region 6 as soon as possible.

If you have any questions regarding this notice of deficiency letter or the enclosed deficiencies, please contact Lowell Seaton of my staff at (214) 655-8304.

Sincerely yours,

for William K. Honker, P.E.
Chief, RCRA Permits Branch

Enclosure

cc: Benito Garcia, NMED
Dave Morgan, NMED

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Deficiency Comments on Holloman Air Force Base
Phase II RFI Workplan for Table 1 SWMUs

AOC-T (IRP Sites 2 & 5) POL Spill Sites 1 & 2

The spill of JP-4 fuel pooled in the southeast corner of the bermed area. More soil gas surveys should be conducted southeast of the bermed area. Three additional soil gas surveys should be located south of proposed soil gas locations 36, 38, and soil boring SB-02&5-15 respectively.

One additional soil boring should be drilled to 25 feet BGL outside of the bermed area. This would be a total of eight soil borings, four inside and four outside of the bermed area.

SWMU 114 (IRP Site 3) Tetraethyl Lead Disposal Site

This SWMU has known contamination based on the Phase I RFI. The one proposed additional soil boring located two feet from the Phase I soil boring will not further delineate the lateral and vertical extent of contamination. Four soil borings in a concentric circle around the disposal pit should be drilled to determine the lateral and vertical extent of contamination.

There is some confusion as to the extent of contamination discovered during the Phase I RFI. Is just the shaded area on Figure 5-4 contaminated or is the extent of contamination greater? Section 5.2.2.2 of the workplan states that lead was detected in all surface soil samples during the Phase I RFI.

If all of the surface soil samples collected during the Phase I RFI were contaminated with lead, then additional surface soil samples oriented north-south are required beyond the 120 foot sampling trench sampled during the Phase I RFI. In addition, surface samples oriented east-west are required to delineate the lateral extent of contamination.

SWMU 102 (IRP Site 4) Acid Trailer Burial Site

What is the purpose of installing one upgradient monitoring well but no downgradient wells? Please explain the purpose of this well when there are no proposed downgradient wells for comparison.

If the four monitoring wells installed during the Phase I RFI are to be sampled, then the Groundwater Sampling narrative needs to be revised. Please show the four existing monitoring wells on Figure 5-5 and update the chart on page 5-22 to include the sampling of the four existing downgradient wells.

SWMUs 4 & 82 (IRP Site 8) Refuse Truck Collection Washrack

The summary chart on page 5-28 is incorrect. The narrative states that 14 soil borings will be performed but the chart lists only 12. Please correct the chart.

SWMU 229 (IRP Site 14) Former Entomology Shop

No comments.

SWMUs 118, 132, & AOC-A (IRP Site 16) Existing Entomology Shop

The workplan proposes four soil borings around the old discharge pit (SWMU 132). The workplan proposes to collect 2-ft split spoon samples (i.e. 0-2 ft, 2-4 ft) per boring and composite the samples into one laboratory sample per boring. Compositing of samples is discouraged. Two discrete samples per boring should be sent to the laboratory for analysis.

SWMU 113 (IRP Site 20) Grit Chamber Burial Site

No comments. Holloman AFB should submit a permit modification request to EPA to delete this SWMU from the RFI.

SWMU 134 (IRP Site 24) Former Maintenance Area

No comments.

SWMU 104 (IRP Site 29) Former Army Landfill

The proposed monitoring wells are located too far (60′ to nearly 200′) from the boundary of the landfill. The monitoring wells should be located within 20 feet of the landfill.

SWMU 113 (IRP Sites 30 & 33) Grease Trap Disposal Pits

On page 5-55, the workplan states that the Phase I 29 Site RFI ranked the site as dirty with unacceptable exposure and risk scenarios. The site was recommended for further action. However, the recommendations in section 5.2.10.3 recommend no further action except long term monitoring. Please explain this discrepancy.

SWMUs 129 & 178 (IRP Site 36) Former Unconventional Fuels Storage Area

No comments.

AOC-L (IRP Site 37) Early Missile Testing Site

According to the workplan, petroleum hydrocarbons and PCBs were detected at all transformer pads. This contamination must be addressed. Please submit a workplan or documentation to EPA describing proposed remedial actions for these transformer pads.

Holloman AFB wishes to submit a permit modification request to delete this SWMU from the RFI. EPA must review and approve of HAFB's remedial actions at this SWMU prior to considering the permit modification request. Long term monitoring is recommended for this site.

SWMUs 165, 177, 179, and 181 (IRP Site 39) Missile Fuel Spill Site

No comments.

Section 5.5 - Monitor Well Installation Plan

Section 5.5.2.2 of the workplan describes how depths and screened intervals of monitor wells will be determined. Consideration should also be given to the contaminants of concern at the SWMU under investigation. If dense nonaqueous phase liquids (DNAPLs) such as trichloroethane (TCE) are potential contaminants, then monitor well screens will need to be placed at the bottom of the aquifer. As proposed in the workplan, all monitor well screens (10 feet in length recommended in section 5.5.3.1) are to installed at the soil/water interface.

Section 7.0 - Long Term Monitoring Plan

According to Webster's II New Riverside University Dictionary, "biannual" means: happening twice each year; and "biennial" means: happening every second year. Is it Holloman AFB's intent to conduct long term sampling twice each year or every two years? Please clarify this confusion.

CAK
copy

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
525 Camino De Los Marquez
P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-4358
Fax (505) 827-4389

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

May 15, 1995

Mr. Howard E. Moffitt
Deputy Base Civil Engineer
49 CES/CEV
550 Tabosa Avenue
Holloman Air Force Base, New Mexico 88330-8458

Dear Mr. Moffitt:

This letter serves to update the policy of the New Mexico Environment Department (NMED) in regard to soil and groundwater concerns at Holloman Air Force Base (HAFB). These concerns were addressed initially in NMED's letter of January 25, 1993.

NMED has previously agreed in a November 2, 1992 letter from the Underground Storage Tank (UST) Bureau to HAFB that a basewide soil cleanup standard of 1000 parts per million (ppm) of Total Petroleum Hydrocarbons (TPH) is allowable at UST sites involving release of petroleum hydrocarbons. This 1000 ppm TPH standard is also a solid waste land disposal standard (New Mexico Solid Waste Management Regulations, EIB/SWMR-4, Section 708). This TPH standard is acceptable to NMED provided that there are no RCRA hazardous constituents present in soils for which calculated risk-based levels would be more stringent. Sufficient confirmatory analyses must be performed at each site to ensure that hazardous constituent concentrations are not exceeded in soils containing no more than 1000 parts per million TPH.

Remediation of existing contamination in unprotected groundwater will not be required by NMED at HAFB, unless a situation occurs in which a human or ecological receptor is or may be exposed to unacceptable risk from contact with the contaminated water. NMED agrees that, in cases where the Total Dissolved Solid (TDS) content renders the water non-potable, direct ingestion of the water by humans is not a plausible exposure scenario. However, additional or continued contamination of the groundwater is not and will not be acceptable to NMED. To implement this policy, existing soil and groundwater contaminant plumes must be adequately characterized. Monitoring wells defining contaminant plumes must be sampled at least annually for the contaminants present to determine if a

release has occurred and the source of any release. If contaminants at any point in a plume increase in concentration, or if additional contaminants are discovered, further investigation may be required to locate and remove the source. Additionally, NMED will insist on remediation of any groundwater contamination resulting from current or future activities at HAFB.

Sincerely,

Ed Kelley

Ed Kelley, Ph.D., Director
Water and Waste Management Division

EK:RK:rk

cc: Benito Garcia, Chief, HRMB
Marcy Leavitt, Chief, GWPRB
Ronald Kern, HRMB
Dennis McQuillan, GWPRB
Steve Pullen, HRMB
David Morgan, GWPRB
David Neleigh, EPA Region VI, 6H-PN

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17-A-49

RADIAN
CORPORATION

(Mailing Address)
P.O. Box 201088
Austin, TX 78720-1088
(Shipping Address)
8501 North Mopac Blvd.
Austin, TX 78759
(512) 454-4797

15 June 1995

Mr. Lowell Seaton
Environmental Engineer
New Mexico/Federal Facilities Section
RCRA Permits Branch
Hazardous Waste Management Division
U.S. EPA Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Mr. Seaton:

On behalf of Holloman Air Force Base, NM (HAFB), and the U.S. Army Corps of Engineers (USACE), Omaha District, Radian Corporation hereby submits specific responses to those comments provided by U.S. EPA Region VI (EPA) on 2 June 1995 to Mr. Warren Neff, HAFB, concerning the *Phase I RFI Report, Table 2 Solid Waste Management Units, Volumes I and II* (1994). A summary response to EPA's comments concerning the *Holloman Risk Assessments — Sewage Lagoons and Lakes, Investigation* (1993) is also provided. As stated in the summary response, additional investigation and risk assessment activities have been performed since submittal of the 1993 report. The 1993 risk assessment for the sewage lagoons and lakes is now being updated and the revised report will take EPA's comments into account during its preparation.

Please review the provided responses prior to the scheduled meeting on 20 and 21 June 1995 at HAFB, NM between EPA, the Base, the USACE, and Radian. If you have any questions or comments, please do not hesitate to contact Mr. Warren Neff (HAFB) at (505) 475-5395 or me at (512) 454-4797 (Radian).

Sincerely,

Robin Nelson

Robin Nelson
Project Manager

RN:dm

cc: Warren Neff/HAFB, NM
Mark Mercier/USACE
Tom Holcomb/Radian

RESPONSE TO COMMENTS

Comments by: U.S. EPA Region VI Mr. Lowell Seaton	Project: Table 2 Phase I RCRA Facility Investigation Holloman Air Force Base, New Mexico
Received: 2 June 1995	Report: *Phase I RFI Report, Table 2 Solid Waste Management Units, Volumes 1 and 2*

GENERAL COMMENTS

SELECTION OF CHEMICALS OF POTENTIAL CONCERN/ACTION LEVELS

Comment 1: The decision tree presented in Figure C1-1 in Volume II Attachment C1 presents a method for selecting chemicals of concern based on residential risk to humans. A similar tree for selection of chemicals of concern based on ecological risk was not found. It is not appropriate to use the list screened for human risk when assessing the effects on the environment.

Response: The decision tree presented in Figure C1-1 was applied to selecting chemicals of potential concern (COPCs) for human health risk assessments only. As stated in the ecological risk assessment, all chemicals detected above background and/or laboratory blank concentrations were included in the ecological risk assessment. No screening of chemicals was conducted for the ecological risk assessment. Therefore, a decision tree was not included for selection of chemicals of potential ecological concern (COPECs), because all chemicals detected above background and/or laboratory blank concentrations were included in the ecological risk. The report will be revised to clearly describe the decision process used for the ecological risk assessments.

Comment 2: Table B-1 in Volume II, page B-2 presents two different upper tolerance limits (UTLs) for antimony and thallium. This suggests confidence intervals may have been calculated without using non-detects, thereby artificially increasing the UTL for the background analyte. One-half of the detection limit should be substituted for each non-detect in calculation of the UTL. If this method was used, it is important to note that the detection limit of the analytical method used can have a significant effect on the final background UTL. The higher the detection limit, the greater the chance for an artificially high background UTL. It is therefore important to utilize analytical methods which provide the lowest practical detection limit. As an example, arsenic could be analyzed to a much lower detection limit than that provided by SW6010 (i.e., by atomic absorption). This is important in that the arsenic UTL in Table B-1 is above what would be considered a human risk-based action level and may be overestimated. Also, the calculations of UTLs

as a reasonable level for remediation seems appropriate, however, the UTLs should not be used to screen out COPCs.

Response: The two different UTLs for antimony and thallium are for two different analytical methods—graphite furnace atomic absorption (GFAA) and inductively coupled plasma emission spectroscopy (ICAP). All UTLs were calculated by analytical method and analyte. Antimony and thallium data generated for this project are for GFAA analyses; therefore, these data were compared to corresponding GFAA UTLs.

For the *Holloman Base-wide Background Study* (Radian, 1993), all of the data were "uncensored." That is, the laboratory reported all measurements rather than censoring them at the detection limit. Thus, there were no "non-detected" results for which proxy concentrations needed to be estimated (i.e., all of the background statistics were calculated using the reported measured results and proxies were not estimated).

The UTL reported for arsenic is for arsenic by ICAP. It is true that if arsenic had been analyzed by GFAA, a lower UTL may have been achieved (GFAA results tend to be less variable than ICAP and, thus, provide lower detection limits). For comparison purposes, background arsenic results by ICAP were compared to site arsenic results that were analyzed by GFAA. The UTLs, however, were not used to screen out COPCs. As described in Attachment C1 of Appendix C, a "means" comparison was performed between background and site results to determine COPCs for metals. Only after COPCs were determined were UTLs used for further constituent evaluation.

Comment 3: Many of the action levels which are missing in Table A-1 can be found in EPA Soil Screening Guidance (EPA/540/R-94/101). An oral cancer slope factor of 1.8 mg/kg/day can be used for arsenic.

Response: The data quality objectives for data evaluation and decision making in the EPA approved RFI Work Plan (26 May 1993) are based on the use of the proposed Subpart S Action Levels and the statistical comparison of site results to naturally occurring background analyte concentrations. Since the draft EPA soil screening Guidance was not published until December 1994, (after submittal of the RFI Report to EPA in October 1994), it was not available for consideration as a data evaluation criterion. In addition, Holloman AFB, NM, believes that changes in agency guidance should not invalidate efforts that were made in good faith based on the currently accepted agency guidance, or cause these efforts to be redone.

Comment 4: All the action levels listed in Table A-1 are human-health based. These levels may or may not be reasonable estimates of levels in media at or below which corrective action is likely to be necessary when ecological risk concerns are factored in.

Response: The action levels contained in Table A-1 were not used to evaluate risk to ecological receptors. However, Holloman AFB, NM, agrees that ecological risk concerns may require adjustments to risk-based levels. For this reason, the ecological risk assessments performed at the Base use levels appropriate for the receptor species.

Comment 5: Many of the chemicals of concern are reported at values below the detection limit. The detection limit should be less than the action level for all chemicals of concern. On page C1-21, it is stated that uncensored measurements are better than proxy concentrations. This may be true, but the goal of the risk assessment, at this point, should be to produce a conservative estimate and, therefore, a proxy concentration can be used.

Response: Whenever possible, the EPA approved RFI Work Plan (26 May 1993) and EPA approved Quality Assurance Project Plan (QAPP-26 May 1993) selected promulgated analytical methods with detection limits below action levels. However, given that some action levels are below detection limits (regardless of method) and that matrix interferences (e.g., the high calcium levels in Holloman AFB soils interfere with several analytical methods) do occur, it is unavoidable that some increases in sample-specific detection limits will occur. Every effort was made during the RFI to ensure the lowest possible detection limits. In addition, uncensored data were collected to ensure that the lowest measurement results possible were used to make site evaluations and conclusions.

Both the use of proxy concentrations and uncensored data in risk assessments are acceptable and in accordance with EPA guidance. However, the use of uncensored data allows for better definition of measurement variability and is preferable to the use of proxy concentrations (*Statistical Methods for Environmental Pollution Monitoring*, Gilbert, 1987). Holloman AFB agrees that conservative estimates are appropriate for risk evaluations. Using uncensored data is a conservative approach and is more representative of site conditions than the use of proxies. This belief is consistent with EPA and Congressional policy on risk assessments and allows the risk assessment and the development of remedial alternatives to focus on practical, cost-effective, expedited site remediation.

Comment 6: In attachment C5 of Volume II page C5-1, it is stated that Region III risk numbers will be used to screen out chemicals of potential concern. The action levels listed in this section by which chemicals of potential concern were selected are all off by a factor of 10. They appear to have been calculated based on a hazard index of 1 instead of the hazard index referenced which is 0.1. It is not appropriate to use a hazard index of 1 to screen out chemicals of potential concern. A new list of chemicals of potential concern for human-health risk should be generated using a hazard index of 0.1.

Response: A hazard index of 1.0 was inadvertently used for noncarcinogens. This will be corrected prior to submitting the final report. As shown in Table 1, only a few additional compounds will fail the screen (i.e., a few additional compounds will be identified as COPCs) as a result of this correction. Although the numbers were off by a factor of 10, most of the regulatory ratios (the observed maximum concentration divided by the Region III screening level) were well below 1.0 and do not surpass the decision criteria of 1.0 when multiplied by 10. Although arsenic is identified as a chemical or concern based on the screen, arsenic was not detected at concentrations above the Base background upper tolerance limit (UTL) for this analyte.

Table 1
Additional Contaminants of Concern
After Correcting by a Factor of 10

SWMU	Surface Soil	Subsurface Soil	Comments
2/119	--	Arsenic	Arsenic <Background UTL
15/120	--	Arsenic	Arsenic <Background UTL
17/121	--	Arsenic	Arsenic <Background UTL
21/22/123	Arsenic	Arsenic	Arsenic <Background UTL. Toluene, Barium, and Xylene were identified as COPCs for groundwater but all are present at concentrations < Trigger criteria.
36/126	--	--	
32/125	--	Arsenic	Arsenic <Background UTL
40/128/138	Cadmium	--	
56	--	--	
63	Arsenic	Arsenic	Arsenic <Background UTL
71	Arsenic	--	Arsenic <Background UTL
78	Arsenic	--	Arsenic <Background UTL
91	Arsenic	--	Arsenic <Background UTL
118/132/ AOC-A	AOC-A	MPCA	MPCA <Trigger criteria
124	--	--	
136	--	Arsenic	Arsenic <Background UTL
155	Arsenic, MCPA	Arsenic	Arsenic <Background UTL, MCPA <Trigger criteria
156	--	Arsenic, Thallium	Arsenic <Background UTL, No trigger criteria for Thallium
AOC-U	Arsenic	--	Arsenic <Background UTL

ECOLOGICAL RISKS

Comment 7: The overall procedure presented for conducting ecological risk assessments is too narrow for some SWMUs. Black-tailed jackrabbits are the only ecological pathway evaluated. This would be appropriate if herbivores were the only ecological pathway; however, in several instances, you have carnivores (e.g., wolves, cougars), birds (e.g., falcons, eagles), and fish (e.g., pupfish). These pathways need to be addressed. Chemicals can have toxicities that differ in orders of magnitude between species, especially between trophic levels. Examples of this can be seen in metal toxicity differences between fish and mammals or chlorinated pesticide toxicity differences between birds and other species. It is not, however, reasonable to develop a separate risk analysis for every species present. It is important to address all species groups for each site where those pathways are relevant. It is therefore recommended that, at a minimum, the species groups listed above (i.e., birds, carnivores, and fish) be added to the evaluation in each risk assessment where the path exists. This situation is most appropriate at sites which have surface water as part of their exposure pathway.

Response: The ecological risk assessment was conducted according to the scope contained in the EPA approved Work Plan. For this reason, ecological pathways for birds and carnivores were not addressed. The black-tailed jackrabbits were conservatively assessed to be indicator species for all terrestrial receptors. Jackrabbits were assumed to obtain all of their feed from the contaminated site (i.e., size of the home range of jackrabbits, which actually covers several hundred acres in the desert at Holloman AFB, was not incorporated into the assessment), and they were assumed to ingest a considerable amount of surface soil during feeding and grooming activities (i.e., 4 grams/day compared to 1 gram/day for pica children). Bioconcentration of contaminants through the food chain (to predators) was not included in the ecological risk assessment because the size of the feeding range of predators in the desert at Holloman AFB, NM, is enormous (thousands of acres to more than one hundred square miles), and is extremely unlikely that any predator would obtain more than a small portion of its feed from a given contaminated area. The conservative assumptions used to estimate contaminant consumption by black-tailed jackrabbits make them a suitable indicator species for all terrestrial animals. If no adverse effects are indicated for the conservatively modeled jackrabbit, adverse effects to any other species are extremely unlikely.

No surface water is available at any of the sites assessed. Groundwater modeling conducted during the 1992 risk assessment indicated that groundwater contaminants from the main base area would not reach surface water in detectable quantities. At the one site (SWMUs 165/177/179/181) where surface water had the potential to be impacted, the ecological assessment did include the White Sands pupfish as an indicator species for aquatic receptors. (Note: No surface water actually occurs at this site. See response to Comment No. 8 for the location of the nearest surface water to this SWMU group.)

Comment 8: It is not appropriate to ignore surface water ingestion as an exposure pathway to organisms. If only a small portion of an organism's diet is composed of water ingestion, then cite this and adjust the exposure appropriately. A small amount of poison can kill as quickly as a large amount depending on the chemicals present and the duration of the exposure.

Response: If present, surface water would have been included in the sampling program. However, no surface water is present at any of the Solid Waste Management Units (SWMUs) evaluated in the Table 2 RFI and, therefore, it is not considered a significant exposure pathway. This includes the portion of Lost River Basin (AOC-U) near SWMUs 165/177/179/181, where the nearest surface water present is approximately one mile upstream of AOC-U and approximately two miles downstream of AOC-U.

Comment 9: When evaluating the risk to the pupfish, surface water samples were collected. There is no information on when they were collected and whether the river was in a dry or wet stage. To be conservative surface water samples should be collected when water levels are lowest to give a worst case scenario. Also, fish accumulate toxicants through ways other than direct passage of water over the gills (i.e., through ingestion, uptake from sediment). These pathways to not appear to be addressed.

Response: As discussed in the response to comment No. 8, no surface water is actually present in the portion of Lost River Basin comprised by AOC-U. Surface water samples were collected from the nearest standing water upstream and downstream of AOC-U. The samples were collected during a period of "low water levels" (i.e., no recent significant precipitation) and as such, represent "worst case" conditions. In addition, sediment samples were collected from AOC-U. The results of these analyses indicate that risk to downgradient receptors (including pupfish) via sediment transport is not significant.

Comment 10: It states in the 1992 Radian risk document that acute water quality criteria will be used in development of ecological quotients when chronic water quality criteria were not available. When developing ecological quotients it is not appropriate to use acute data unless, it is corrected using an acute to chronic ratio or other similar process.

Response: Concur. The water quality criteria available at the time of the risk assessment were used in developing the ecological quotients. Is methodology or guidance available for correcting acute values to chronic values or is a blanket safety factor approach suggested? Can EPA provide guidance in this area?

OTHER AREAS OF CONCERN

Comment 11: It sounds like Lake Lucero could be a sink for much of the contamination located on the base. Has anyone evaluated this?

Response: Lake Lucero, the lowest point in the Tularora Basin, is located approximately 20 miles southwest of Holloman AFB, NM. There is no direct surface water pathway from Holloman AFB to Lake Lucero. In addition, the average groundwater flow rate within the basin ranges from 2-ft to 50-ft/year. At this velocity, it would require approximately 2,000 to 50,000 years for groundwater containing contaminants from Holloman AFB, NM, to reach Lake Lucero. This scenario also assumes that no attenuation of the contaminants would occur during groundwater transport.

Comment 12: It is not clear what fish, amphibians, benthic invertebrates or other organisms live in the arroyos. These could all be potential pathways for accumulation up the food chain. By definition, arroyos should not support any fish life given that they dry up every year; however, since the endangered pupfish was listed to exist in one of these bodies of water, it can be assumed that it is not an arroyo. It is also unclear if groundwater leaches into the surface water and if so which of the arroyos receive a water supply from the groundwater.

Response: The arroyos do not support fish or other aquatic organisms, as they do dry up every year and generally contain very little water otherwise. The pupfish exists in some downgradient (below AOC-U) portions of the Lost River Basin that intermittently contain surface water. Pupfish were considered to be the top of the food chain in the Lost River Basin (other fish are not able to survive in the Lost River Basin) and were, therefore, selected as the indicator species. In these areas, where 1-ft to 2-ft of water accumulates, benthic invertebrates may also be present. Groundwater is not believed to leach into the surface water. Groundwater studies at other portions of the Base (Dillard Draw) show that the groundwater does not leach to surface water (*Table 1 Phase II RFI Report*, Radian, 1995). Furthermore, because of the extremely slow movement of groundwater in the area, potentially contaminated groundwater is not expected to impact any of the arroyos.

Comment 13: On page C1-34 of Volume II it states an alpha level of 0.20 is used for comparison of background to site sample data. There is nothing in the guidance document that they cited. (USEPA's RCRA Groundwater Monitoring Guidance) which indicates an alpha of 0.20 is appropriate. It appears an alpha of 0.05 should be used for this comparison.

Response: Concur. The *U.S. EPA RCRA Groundwater Monitoring Guidance* document (U.S. EPA, 1992a) does not specify which alpha level should be used. The U.S. EPA *Guidance For Data Useability in Risk Assessment* (U.S. EPA, 1992b) does recommend using a confidence level of 80% (i.e., an alpha level of

0.20). [See Attachment A—pages 76 (exhibit 48), page 109, and 111 (exhibit 68) from the guidance document]. U.S. EPA, 1992b was inadvertently left out of the References in Section 5.0 of the statistics section and will be included in the final report.

The statistical comparisons can be performed at the 0.05 alpha level instead of the 0.20 alpha level if EPA prefers this. Doing this, however, would result in classifying a number of chemicals that were listed as COPCs as no longer being COPCs. This is because an alpha level of 0.05 allows only a 5% probability of concluding a site mean is greater than the background mean, when in fact it is not. An alpha level of 0.20 allows a higher error rate (i.e., a 20% probability of concluding a site mean is greater than the background mean when in fact it is not), and, thus, is more conservative and more metals are listed as COPCs (i.e., greater than background).

Comment 14: All risk-based trigger criteria in Table 3-1 are a factor of ten high for use in screening of chemicals of potential concern.

Response: The risk-based trigger criteria in Table 3-1 are primarily composed of the proposed Subpart S Action Levels. These levels were used only to aid in determining if a release from a SWMU had occurred and, if so, whether the release was likely to require further evaluation (i.e., not for COPC determination). All screening for chemicals of potential concern was performed using the EPA Region III risk-based concentrations (RBCs) for each chemical. It should also be noted that for many of the Action Levels shown in Table 3-1, the concentrations are presented in µg/kg, not the more commonly used mg/kg presentation. This was done for easier comparison to SWMU analytical data and may have led to confusion concerning the trigger concentrations provided for certain compounds.

Comment 15: In other EPA regions TRPH trigger criteria are usually between 50 and 100 mg/kg in soil, much lower than the proposed New Mexico standard of 1000 mg/kg. The lower remediation levels are based on risk which is primarily determined by benzene concentrations. For SWMUs in which benzene is found above risk-based trigger criteria (e.g., SWMU 123), it is recommended that TRPH should be remediated down to 100 mg/kg levels.

Response: The TRPH cleanup criteria for hydrocarbon contaminated soils at Holloman AFB, NM, is 1000 mg/kg. This cleanup level is approved and documented in correspondence from Ed Kelley, Director, Water and Waste Management Division, NMED to Mr. Howard E. Moffitt, Deputy Base Civil Engineer, Holloman AFB, NM on 15 May 1995.

COMMENTS FOR INDIVIDUAL SWMUS

Comment 16: SWMUs 119 and 2 should not pose risk to human health or the environment based on sample results. The only concern could be whether the sampling scheme would have detected a leak from the pipe between the waste oil tank and the oil/water separator.

Response: Following the guidelines outlined in the EPA approved Work Plan, borings were drilled on either side of SWMUs 2 and 119. As shown in Figure 4.1-1 of the RFI report, samples were collected from boring 119-01 located between the oil/water separator (SWMU 2) and waste oil tank (SWMU 119) and; therefore, should provide sufficient information on a release from the pipe between the units. To more clearly indicate the sampling locations with respect to a potential leak from the pipe, the site figure will be enlarged and the approximate location of the pipe will be added.

Comment 17: SWMU 15 should not pose a risk to human health or the environment based on the sample results. However, it is not clear why no soil samples were collected between 4 and 6 feet bgl which would seem to be the most likely to be contaminated given the depth of the oil/water separator.

Response: Samples were collected every 2 ft from the surface to a depth of 8 ft. However, as specified in the EPA approved Work Plan, only two samples (the 2 to 4 ft and 6 to 8 ft intervals) were submitted for laboratory analysis. Headspace readings were 0.0 ppm from all four intervals sampled and there was no evidence in the field of a release from the SWMU.

Comment 18: At SWMU 17 lead concentrations are above the risk-based trigger criteria; however, given the results of the other inorganic analyses, the additive hazard index for the site should be less than 1, indicating no further action is necessary. It is not clear at this site why soil samples were not collected nearer to the oil/water separator.

Response: Concur. The upper surface of the oil/water separator is located below ground level and is, therefore, not visible from the surface. As-built drawings of the separator were used during placement of the borings at the site. To maintain a safe distance from the unit and to avoid drilling into nearby underground utilities which service the AC Unit at the site, borings were located a few feet on either side of the oil/water separator. The text will be edited to reflect this.

Comment 19: SWMUs 21 and 22 should not pose a risk to human health or the environment based on sample results. SWMU 123 exceeds risk-based trigger criteria for benzene and 1,1-dichloroethene. Given the toxicity of benzene, it is recommended that TRPH be remediated down to 100 mg/kg at this SWMU. Also note that the carcinogenic risks estimated for the future risk for the near site worker scenario

exceeds the 1E-06 acceptable risk level for A and B carcinogens described in Subpart S guidance.

Response: The cleanup standard for TRPH at Holloman AFB is 1000 mg/kg. In accordance with the NMED approved removal procedures for TRPH-contaminated soil, verification sampling for benzene and 1,1-dichloroethene will be conducted as part of the planned removal action at this site to ensure that these constituents are remediated to acceptable levels. Section 264.525(d)(ii)(A) of the proposed RCRA Subpart S Rule specifies that cleanup standards for known or suspected carcinogens will be established at concentration levels which represent an excess upperbound lifetime risk to an individual of between 1×10^{-4} to 1×10^{-6}. Since the excess cancer risk at SWMU 123 is within this range, these constituents are considered to be within the risk range considered acceptable.

Comment 20: SWMUs 125 and 32 should not pose a risk to human health or the environment based on sample results. Analytical results for the sludge sample collected in SWMU 125 were not provided in the report and, therefore, could not be evaluated.

Response: In the original *Draft Final Report,* Table 4.5-4 showing the results of sludge sampling at SWMU 125 was inadvertently excluded from the report. Pages 4-37 and 4-38 were previously submitted separately as an update to correct this oversight. The updated Table 4.5-4 (see Attachment B) will be included in the Final Report.

Comment 21: SWMU 126 should not pose a risk to human health or the environment based on sample results. Extent of TRPH contamination should be determined and remediated for SWMU 36.

Response: Concur. As recommended in Section 4.6.5 (page 4-48, last paragraph), the extent of TRPH-contaminated soil (> 1000 mg/kg) will be determined and remediated.

Comment 22: SWMUs 39, 127, and 135 will require further investigation to quantify risks. Benzene levels are above risk-based trigger criteria in several of the samples, and, therefore, remediation of TRPH to 100 mg/kg should be considered. It is stated that groundwater is not expected to reach Lake Holloman or the Sewage Lagoons. Has a fate and transport model been used to substantiate this conclusion?

Response: Further investigation was planned and conducted in 1994 as part of the Table 1 Phase II RFI. The results will be documented in the *Table 1 Phase II RFI Report* (Radian, 1995). To comply with the NMED cleanup standard, the extent of TRPH-contaminated soil (> 1000 mg/kg) will be determined and remediated. In addition, groundwater is not expected to reach Lake Holloman or the Sewage Lagoons because it flows toward Dillard Draw.

Comment 23: SWMUs 40 and 128 should not pose a risk to human health or the environment based on sample results. Extent of TRPH contamination should be determined and remediated for SWMU 138.

Response: Concur. As recommended in Section 4.8.5 (page 4-64, last paragraph), the extent of TRPH-contaminated soil (> 1000 mg/kg) will be determined and remediated.

Comment 24: At SWMUs 54 and 55 the risks associated with the future near site worker scenario are greater than the 1E-06 levels for Class A and B carcinogens described in Subpart S Guidance. Also, it should be confirmed that TRPH contamination has been cleaned up at SWMU 54.

Response: Section 264.525(d)(ii)(A) of the proposed RCRA Subpart S Rule specifies that cleanup standards for known or suspected carcinogens will be established at concentration levels which represent an excess upperbound lifetime risk to an individual of between 1×10^{-4} to 1×10^{-6}. Since excess cancer risks at SWMUs 54 and 55 are within this range, they are considered to be within the risk range considered acceptable. Carcinogenic risk for the future on-site worker at these SWMUs is driven by the inhalation of arsenic. The reasonable maximum exposure risk is 1 E-05, of which arsenic contributes 80 percent. That this is an <u>excess</u> cancer risk is highly uncertain. While the means comparison used to determine whether arsenic concentrations detected at the site are significantly greater than background concentrations indicated that arsenic was above the background, all sample values are below the Base-wide UTL for arsenic. Therefore, the potential risk presented by inhalation of arsenic may be due to background concentrations of this carcinogen.

As demonstrated through sampling during the RFI, the release at SWMU 54 was confined to the surface. Surficial soil from the site was removed until no visible contamination was present and the excavated area was backfilled with natural soil. Following this activity, a building was constructed at the site and now covers the area of the excavation.

Comment 25: SWMU 56 should not pose a risk to human health or the environment based on sample results.

Response: Concur.

Comment 26: SWMU 63 should not pose a risk to human health or the environment based on sample results. Conclusions for this site state that TRPH levels were not exceeded; however, they were not measured. It should be confirmed that there is no reason to measure TRPHs at this site.

Response: Concur. The waste accumulation area was in operation from 1984 to 1987. During this time, records of the types and quantities of waste stored at the site were collected and maintained. The results of a records search did not indicate that petroleum hydrocarbons were used or stored at this site. However, solvents (primarily paint thinners), were shown to have been managed at the site. Samples were collected and analyzed for volatile organic compounds by Methods SW8015 and SW8240 to indicate whether a potential release of solvents occurred at the site.

Comment 27: Arsenic concentrations at the surface in SWMU 71 exceed risk-based trigger criteria. Due to low risk associated with other inorganics at the site, overall risk to humans should be in the acceptable range. Risk-based trigger criteria for metals and aquatic receptor in Lost River due to surface runoff should be evaluated at this SWMU.

Response: Surface soil samples were collected from within the Lost River Basin (AOC-U) during the RCRA Facility Investigation (RFI). From the results of the qualitative risk assessment (Section 4.21.4) it is concluded that there is no significant risk to ecological receptors at the site. No COPCs were identified for AOC-U. As noted in the response to comment 34, no water was present in the basin at the time of the Table 2 RFI sampling; therefore, no habitat exists for the pupfish in this portion of Lost River Basin.

Comment 28: SWMUs 78 and 91 should not pose a risk to human health or the environment based on sample results.

Response: Concur.

Comment 29: At SWMU 124 there does not appear to be a risk to human health or the environment; however, the sample was only to a depth of 4 inches. Given that high levels of volatile organics were found in the sludge sample, it may be more appropriate to analyze a subsurface sample to assess the release history.

Response: SWMU 124 is an above ground tank. The only reported release from the SWMU is a small leak from the tank during installation of a spigot. As outlined in the approved Work Plan, a surface sample was collected from the area immediately beneath the spigot of the tank where the release was reported to have occurred. No visible staining was noted in the soil; therefore, there is no evidence for a potential subsurface release.

Comment 30: Extent of TRPH contamination should be determined and remediated at SWMU 136.

Response: Concur. As recommended in Section 4.16.5 (page 4-110, last paragraph), the extent of TRPH-contaminated soil (> 1000 mg/kg) will be determined and remediated.

Comment 31: In SWMU 155 ecological risk was not adequately addressed. Exposure pathways should be determined along with risk-based trigger values for possible ecological receptors. Some of the organosphorus and organochlorine pesticides listed are toxic to aquatic life and birds at levels below the detection limits or the analytical methods used.

Response: As presented in Section 4.17.3 (page 4-117, last paragraph), because material of concern at this SWMU is located solely in the subsurface, direct contact with constituents is not expected to be significant. Therefore, there are no ecological receptors at the site. In addition, as noted by the "P" (Quantitation Not Confirmed) and "K" (Presence not confirmed) data flags in Table 4.17-1, the majority of the organophosphorus and organochlorine pesticide constituents were not confirmed in the samples. These "K"-flagged data will be removed from the data summary tables.

Comment 32: In SWMU 156 ecological risk was not adequately addressed. Ecological risk-based trigger numbers should be developed and compared with contamination levels. Additive risks should also be addressed.

Response: As presented in Section 4.18.3 (page 4-133, fourth paragraph), because all material of concern is located solely in the subsurface, direct contact with constituents is not expected to be significant. Therefore, there are no ecological receptors at the site. In addition, as noted by the "P" and "K" flags in Table 4.17-1, the presence ("K"-flag) or reported concentration ("P"-flag) of the majority of the organophosphorus and organochlorine pesticide constituents were not confirmed in the samples. These "K"-flagged data will be removed from the data summary tables.

Comment 33: SWMU 164 is defined as a pond. It is not clear why only jackrabbits were evaluated if water exists in this pond, or why ingestion of water by jackrabbits was not considered. The importance of this pond to ecological receptors other than the jackrabbit should be evaluated along with how often and how long the pond holds water.

Response: The name "Pond 1080" is a local designator for the area also known as SWMU 164 and is not reflective of conditions usually associated with a pond. SWMU 164 is an area where water "ponds" for only very brief periods of time (hours) following heavy precipitation and is, therefore, not used as a source of drinking water for local ecological receptors. The SWMU is also located in a high traffic area adjacent to the Building 1080 flight line and very near the east-west runway, further reducing use by ecological receptors. In addition, the site contains only sparse vegetation and is, therefore, unsuitable for wildlife habitat. The use of the term "pond" will be clarified in the text.

Comment 34: At AOC-U it seems water must exist year round or the white sands pupfish could not survive. If this is the case, both the water and sediment samples should have been analyzed. If, it is not the case, a soil sample should have been collected at the lowest point in the basin (i.e., the last place to hold water in the season); was it? Also, risk-based trigger levels for ecological receptors have not been established; therefore, it is not possible to assess ecological risk. What is the possibility of groundwater leaching into the surface water at this site?

Response: As shown in the EPA approved Work Plan, Figure 4.21-1 (page 4-146), six soil samples were collected from within the Lost River Basin (AOC-U). The samples were collected in areas associated with the potential entrance of constituents into AOC-U and adequately represent the worst-case concentrations expected to be found in AOC-U. At the time of the sampling, no water was present in the basin and as stated previously (see response to Comment No. 8), the nearest surface water to AOC-U is located approximately one mile upstream and two miles downstream of AOC-U. The groundwater table does not intersect the surface of the basin in the area comprised by AOC-U.

Comment 35: Results from the Phase II investigation at SWMUs 118, 132, and AOC-A recommend that only TRPH be remediated. Both PCB's and heptachlor epoxide were detected at concentrations exceeding risk-based trigger levels. Assumptions of risk-based calculations for this area should be defined so the risk due to these two chemicals can be evaluated. Also, it appears QA/QC at this site is questionable. Over 20 chemicals were found and not confirmed, and several blanks were highly contaminated. Ecological risks for future land use were not adequately addressed. Many of the contaminates present are extremely toxic to bird life.

Response: As stated in the last paragraph of Section 5.1 (page 5-5), additional sampling for PCB and organochloine pesticide constituents was recommended for the site. Section 5.1.5 will be edited to reflect this recommendation. In accordance with this recommendation, further investigation was planned and conducted at this site in 1994 as part of the Table 1 Phase II RFI. The results will be reported in the *Final Table 2 Phase I RFI Report*. In addition, the entire site is covered with gravel and offers no forage or cover for wildlife, including birds.

Several analytical methods used for this project were performed by "second-column confirmation." Using this method-specified technique samples are analyzed on two columns containing different packing materials. Because of the different packing materials, each target analyte is detected at different retention times and compounds which co-elute with the target compound on one column will not co-elute with that same target compound on the second column.

When an analyte is detected on both columns, presence of the analyte is considered confirmed. If the analyte is detected on one column but not on the other, the most likely explanation is that the detection is a false-positive, especially when the

concentration is greater than the detection limit. Holloman AFB has chosen to follow a conservative approach and is reporting the concentrations of target analytes detected on one column below the detection limit but not detected in the second column analysis. The use of unconfirmed results is a conservative approach. These data are provided, even though the results may be false positives, to give a "worst-case" scenario of what contamination may be present at each site. These results are indicated with a "K" flag. Results greater than the detection limit with "K" flags will be deleted from the Final RFI Report because the presence of these analytes was not confirmed by the method-specified criteria.

Results are also defined as unconfirmed if the two concentrations differ by a factor of three or greater. In these instances, the most likely explanation is that the higher detection is a result of co-elution. Here, the lower of the two concentrations is reported, because it is more likely to be representative of actual conditions at the site for the target analyte. The data are indicated with a "P" flag.

Unconfirmed detections of analytes, indicated in Tables 5.1-1 through 5.1-5 with a "K" or "P" next to the results, are not indicative of laboratory or other errors. By using these second-column confirmation techniques, analytes which co-elute on one type of column are resolved on the second.

Of the nine analytes present in laboratory blank analyses, only one was detected above the detection limit. Acetone, a common laboratory contaminant, was detected at 4.29 ug/kg, with a detection limit of 1.27 ug/kg. All other analytes were detected below the detection limit, where the quantitative results are not reliable. Sample results that are associated with contaminated blanks are indicated with a "B" flag. The reported concentrations flagged with a "B" were within 10x the concentration detected in the blank; therefore, low-level laboratory contamination may have biased the reported results slightly high.

Results that exceed 10x the blank concentration may be considered unaffected by the low-level laboratory contamination and are not qualified with "B" flags. In keeping with this protocol, the following results should have the "B" flag qualifier removed:

- Samples at SWMU 118, analyzed by Method SW8140 for diazinon; and
- Samples AOC-A-B01-01-01 and AOC-A-B01-02-01, analyzed by Method E418.1 for TRPH.

In addition, although it appears that several laboratory blanks were contaminated, only one or two blanks were associated with the reported sample results for each analytical method. Because the samples were prepared and analyzed with one contaminated blank, a number of the quantified results are affected.

Comment 36: The Phase II investigation at SWMUs 129 and 178 do not address risk to horses. Given that this location is now a horse stable and horses would have the greatest exposure time to contaminants, this pathway should be assessed. Also because drains tend to clog and water, suitable for ingestion, may accumulate around them drain replacement with non-lead drains should be considered.

Response: As shown in Figure 5.2-1, a north-south fence separates the stables from the first acid storage area where the drain sample with elevated lead was collected. Horses do not graze in this area; therefore, there is no pathway by which the horses could be exposed to the lead at the first acid storage area. In addition, an ecological quotient of 0.3 for black-tailed jackrabbits at the site indicates a low probability of any adverse effects from the COPCs at the site. It should also be noted that grazing by horses does not occur at any location on this site. All horses are kept penned and food and water is provided via outside sources. In addition, the average tour duration for active duty personnel ensures that most horses are only present on-site for three to four years maximum.

Comment 37: In the Phase II investigation at SWMUs 165, 177, 179, and 181 elevated levels of TCE were found in the groundwater. The groundwater appears to be only 2 to 3 feet bgl in this area and flows toward the Lost River Basin. It should be described why TCE contamination will not reach or leach into the Lost River Basin. It is also unclear whether the ecological assessment was adequately addressed. Questions or concerns include: 1) What time of year were surface water samples collected (i.e., under wet or dry conditions); 2) Sediment samples should have been collected to assess metal contamination; 3) Bird and carnivore pathways were not addressed; and 4) TCE and its degradation products do not appear to have been considered as pathways to Lost River Basin ecological receptors.

Response: As shown in Figure 5.3-3, TCE concentrations decrease significantly (by at least one order of magnitude) within a distance of 200 ft downgradient of the site. Although surface water was not present in Lost River Basin during the RFI (and therefore surface water samples could not be collected) surface and subsurface soil samples (Figure 4.21-1) were collected near the runoff areas from Building 1176 and analyzed for TCE. TCE was not detected in any of the samples collected.

Samples were collected in November and December 1993. Precipitation during these two months is average to low.

Sediment samples were collected directly downgradient of SWMUs 179 and 181, in the runoff area from Building 1176. This area would be expected to be most highly affected if a release from the SWMUs into the Lost River Basin were to occur. No elevated constituent concentrations were detected in these samples during the RFI.

The ecological risk assessment was conducted according to the scope contained in the EPA approved Work Plan. For this reason, exposure pathways for birds and carnivores were not addressed. EPA was involved in the development of the use of indicator species for the ecological risk assessment. Based on the results of the selection process, the black-tailed jackrabbit was determined to be the most appropriate indicator species (see response to Comment No. 7).

RESPONSE TO COMMENTS

Comments by: U.S. EPA Region VI Mr. Lowell Seaton	Project: Sewage Lagoons and Lakes Investigation Holloman Air Force Base, New Mexico
Received: 2 June 1995	Report: *Holloman Risk Assessments, Sewage Lagoons and Lakes, Investigation*, 1993

Response/Action: As the EPA Region VI noted in the following comments, the risk assessment for the Sewage Lagoons and Lakes Investigation was not complete in December 1993. Many uncertainties were identified during the course of the investigation that precluded understanding the potential risks associated with the sewage lagoons and lakes in the 1993 risk assessment. Additional sampling was performed in 1994 to address these uncertainties. Currently an addendum to the 1993 risk assessment is being developed that will present and evaluate any potential risks associated with the sewage lagoons and lakes. This addendum, which will address both human health and ecological risks, is scheduled to be submitted in July 1995. It is not Holloman AFB's intention to revise the 1993 risk assessment, but rather to use that information in conjunction with information gathered during the 1994 investigation to identify and quantify any potential risks.

The addendum will present: 1) a summary of the potential risks identified in 1993; 2) a discussion of how the uncertainties identified during the 1993 investigation were resolved; 3) a discussion of how the 1993 information was used in conjunction with the 1994 data; and 4) an updated summary and evaluation of the potential risks now associated with the sewage lagoons and lakes. Conclusions about each of the potential risks will be discussed with regard to the anticipated closure of the sewage lagoons. For this reason, specific responses to the comments below are not provided.

GENERAL COMMENTS

EXECUTIVE SUMMARY

Comment 1: The USEPA proposed Subpart S corrective action rule (55 Federal Register 30826, 27 July 1990) does allow for a cancer risk between 10^{-4} and 10^{-6}. This is to take into consideration a) cumulative effects and b) present and future land use of the site. However, it does not provide for a blanket dismissal of a review of the chemicals of concern that produce these values.

a) The Ditch has a cancer risk of $7x10^{-6}$ due almost entirely from Heptachlor epoxide.

b) Lakes Holloman and Stinky both have cancer risks or $1x10^{-5}$. The chemicals of concern are arsenic, Heptachlor and two PCBs (HxCB and PnCB). Each

17-C-9-2 CS
AR 1107

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-1557
Fax (505) 827-1544

GARY E. JOHNSON
GOVERNOR

MARK E WEIDLER
SECRETARY

EDGAR T. THORNTON
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

April 6, 1998

Howard E Moffitt
Deputy Base Civil Engineer
49 CES/CEV
550 Tabosa Ave
Holloman Air Force Base, N.M 88330-8458

RE: APPROVAL OF TABLE 2 RFI REPORT ON 21 SWMUs AND AREAS OF CONCERN
EPA I.D. Number NM6572124422

Dear Mr. Moffitt:

The RCRA Permits Management program (**RPMP**) of the New Mexico Environment Department (**NMED**) has completed review of the Holloman Air Force Base (**HAFB**) Addendum to the Table 2 RCRA Facility Investigation (**RFI**) Report for 17 solid waste management units (**SWMUs**) and 4 areas of concern (**AOCs**) The HRMB's review incorporated the RFI Report dated December 1997.

Pursuant to its authority under the New Mexico Hazardous Waste Act, N.M.S.A. 74-4-1 et seq., and regulations promulgated pursuant thereto, and pursuant to Holloman Air Force Base's (**HAFB's**) Resource Conservation and Recovery Act Hazardous Waste Management Permit (**HSWA Module of Permit**), RPMP approves the RFI Report for the subject Table 2 SWMUs HRMB also authorizes HAFB to proceed with the next Phase of remediation activities of the petroleum-contaminated soil at those SWMUs where No Further Action (**NFA**) does not appear appropriate. In addition, HAFB must submit a petition for NFA and Class 3 Permit Modification for those SWMUs listed in the enclosed Attachment where NFA seems relevant

If you have any questions regarding this matter, you may contact Jerry Bober or Cornelius Amindyas of my staff at (505) 827-1561.

Sincerely,

Robert S. (Stu) Dinwiddie, Ph.D., Manager
RCRA Permits Management Program
Hazardous and Radioactive Materials Bureau

cc Benito Garcia, Chief HRMB
David Neleigh, EPA Region VI (6PD-N)
Allen Chang, EPA Region VI
Cornelius Amindyas, HRMB

FILE: HSWA, HAFB, 98, T_2

ATTACHMENT
EVALUATION OF THE RFI REPORT ON POL-CONTAMINATED SITES

April 6, 1998

Introduction:

The RCRA Permits Management Program (RPMP) of the New Mexico Environment Department has reviewed Holloman Air Force Base (HAFB) December 1997 Addendum to the RCRA Facility Investigation (RFI) Report on the Petroleum, Oil and Lubricant (POL) - contaminated soils for the following twenty-one (21) Table 2 Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs):

1)	SWMU 3	-	Building 130 Oil/Water Separator
2)	SWMU 5	-	Building 137 Oil/Water Separator
3)	SWMU 6	-	Building 193 Oil/Water Separator
4)	SWMU 8	-	Building 231 Oil/Water Separator
5)	SWMU 14	-	Building 30-6 Oil/Water Separator
6)	SWMU 17	-	Building 316 Oil/Water Separator and Waste Oil Tank (WOT)
7)	SWMU 21	-	Building 316 Oil/Water Separator and WOT
8)	SWMU 23	-	Building 800 Oil/Water Separator
9)	SWMU 26	-	Building 809 Oil/Water Separator
10)	SWMU 28	-	Building 822 Oil/Water Separator
11)	SWMU 30	-	Building 830 Oil/Water Separator
12)	SWMU 33	-	Building 869 Oil/Water Separator
13)	SWMU 107	-	Main Base Electrical Substation
14)	SWMU 123	-	Building 704 Waste Oil Tank
15)	SWMU 118	-	Building 21 Pesticide Holding Tank
16)	SWMU 132	-	Former Building 21 Drainage Pit
17)	SWMU 141	-	Pad 9 Drainage Pit
18)	AOC-A	-	Former Building 21 Entomology Shop
19)	AOC-G	-	Atlas Electrical Substations
20)	AOC-P	-	Building 301 Fuel Tank Leaks
21)	AOC-U	-	Lost River Basin

Based upon the information that HAFB provided to the New Mexico Environment Department RCRA Permits Management Program, the proposals in the Phase II Addendum for the POL-contaminated soils at the above SWMUs and AOCs have been grouped as follows:

POL-Contaminated Sites Where No Further Action (NFA) Appears Appropriate:

1) SWMU 3 - Building 130 Oil/Water Separator

2) SWMU 5 - Building 137 Oil/Water Separator

3) SWMU 6 - Building 193 Oil/Water Separator

4) SWMU 8 - Building 231 Oil/Water Separator

5) SWMU 14 - Building 30-6 Oil/Water Separator

6) SWMU 17 - Building 316 Oil/Water Separator and Waste Oil Tank (WOT)

7) SWMU 21 - Building 316 Oil/Water Separator and WOT

8) SWMU 23 - Building 800 Oil/Water Separator

9) SWMU 26 - Building 809 Oil/Water Separator

10) SWMU 28 - Building 822 Oil/Water Separator

11) SWMU 30 - Building 830 Oil/Water Separator

12) SWMU 33 - Building 869 Oil/Water Separator

13) SWMU 107 - Main Base Electrical Substation

14) SWMU 132 - Former Building 21 Drainage Pit

15) SWMU 118 - Building 21 Pesticide Holding Tank

16) AOC-A - Former Building 21 Entomology Shop

17) AOC-G - Atlas Electrical Substations

18) AOC-P - Building 301 Fuel Tank Leaks

POL-Contaminated Sites Where Further Investigation is Required:

1) **SWMU 39 - Building 1092 Oil/Water Separator**

2) **SWMU 127 - Building 1092 Waste Oil Tank**

SWMUs 39, 127 will not be considered for NFA until HAFB has completed the remediation (bioventing) work being done at the sites and has conducted confirmatory drilling, sampling and analysis of the contaminated soils, and submitted the results to HRMB for review.

3) **SWMU 123 - Building 704 Waste Oil Tank**

The Addendum to the December 1997 POL Report still shows that there is contamination at SWMU 123 [i.e., 4,100 ppm total recoverable petroleum hydrocarbons (TRPH), and 33 ppm benzene]. The RPMP recommends that HAFB consider either in situ bioremediation or excavation and disposal of the TRPH-contaminated soil. (This was proposed by HAFB in the October 1994 RFI Report, Section 4.4.5, on page 4-30 but has not been implemented in the December 1997 Addendum).

4) **SWMU 104 - Former Army Landfill**

Since SWMU 104 is undergoing long term ground water monitoring, HAFB shall continue to monitor the ground water for VOCs, and SVOCs on yearly basis until the sampling data indicate that the concentration of the constituents of concern pose no danger to human health and the environmental media.

17-A-80

AR 1109

21 APR 1998

MEMORANDUM FOR NEW MEXICO ENVIRONMENT DEPARTMENT
Attn: Mr. Cornelius Amindyas
Hazardous and Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe NM 87502

FROM: 49 CES/CEVR
550 Tabosa Avenue
Holloman AFB NM 88330-8458

SUBJECT: Submittal of 1999 Holloman AFB Long-Term Groundwater Monitoring Report

1. Attached is the *LONG-TERM GROUNDWATER MONITORING REPORT Fall 1997 Sampling Long-Term Monitoring Program, Holloman Air Force Base, New Mexico*, April 1998. Included with this document is Table ES-1 which contains a quick reference and summary of the findings and recommendations resulting from the Long-Term Monitoring (LTM) actions. Holloman AFB (HAFB) does recommend modifying the proposed 1999 LTM plan based on the results of the 1995 LTM and 1997 report results. HAFB will proceed with these recommendations unless otherwise directed by the New Mexico Environment Department (NMED). HAFB will not, however, discontinue any sampling or analysis activities at Site LF-01, Main Base Landfill, per agreement between HAFB, NMED-Hazardous and Radioactive Materials Bureau and NMED-Ground Water Protection and Remediation Bureau.

2. If you have any questions or require additional information, please contact Drew Lessard at (505) 475-5177.

SIGNED
HOWARD E. MOFFITT
Deputy Base Civil Engineer

Attachment:
LONG-TERM GROUNDWATER MONITORING REPORT Fall 1997 Sampling Long-Term Monitoring Program, Holloman Air Force Base, New Mexico

cc w/ Atch:
Julie Jacobs
New Mexico Environment Department
Ground Water Protection and Remediation Bureau
1190 St. Francis Drive
Santa Fe NM 87502

CEV Poland 20 Apr 98

State of New Mexico
ENVIRONMENT DEPARTMENT
Ground Water Quality Bureau
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-2918 phone
(505) 827-2965 fax

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
Secretary

FILE DE 21-B
AR 1142

CD
CEV
Poland
26 OCT 98

October 19, 1998

Mr. Howard E. Moffitt
Deputy Base Civil Engineer
49 CES/CEV
550 Tabosa Ave.
Holloman AFB, NM 88330-8458

Dear Mr. Moffitt:

The New Mexico Environment Department (NMED), Groundwater Quality Bureau (GWQB) has been granted a new Cooperative Agreement (CA) to implement the Defense State Memorandum of Agreement (DSMOA) program for the two-year period from July 1, 1998, through June 30, 2000. The Program will operate under the guidelines presented in the Department of Defense document titled "Working Together to Achieve Cleanup: A Guide to the Cooperative Agreement Process." According to the information on page 2-7 of that document, a semiannual report, rather than a quarterly report, will be compiled and submitted to all stakeholders. The purpose of this letter is to notify you of the change from quarterly to semiannual reporting.

According to the guidance document, the content of the semiannual report should include, "a description of the ways in which protection of human health and the environment has been advanced, including successes achieved and challenges encountered and their effects on cleanup initiatives in the state, and a description of adjustments to funding that occurred." The report should be sent out in early January 1999.

Reports submitted to the GWQB for regulatory review will continue to be reviewed in a timely manner and comments will be mailed directly to the individual facilities. The number-one priority once again will be to close sites. In fact, GWQB is currently in the process of writing a No Further Action letter for three sites at Holloman Air Force Base.

Also, the DSMOA program would like to continue to submit reports via e-mail. Please send your e-mail address to julie_jacobs@nmenv.state.nm.us or jennifer_parker@nmenv.state.nm.us, if you would like to receive your copy of the semiannual report through e-mail. Quarterly reports can also be found on the DENIX web site (http://www.denix.osd.mil).

AR #1156

1156 1

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2044 A Galisteo Street
P.O. Box 26110
Santa Fe, New Mexico 87502-6110
Telephone (505) 827-1557
Fax (505) 827-1544

GARY E JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

PAUL R RITZMA
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

January 17, 2001

Mr Howard Moffitt
Deputy Base Civil Engineer
49 CES/CEV
550 Tabosa Avenue
Holloman Air Force Base, NM 88330-8458

RE: REVIEW OF THE FINAL LONG-TERM GROUNDWATER MONITORING REPORT, JUNE 2000.
HOLLOMAN AIR FORCE BASE, EPA ID # NM6572124422-2
TASK NUMBER: HWB-HAFB 00-004

Dear Mr Moffitt

The Hazardous Waste Bureau (**HWB**) of the New Mexico Environment Department (**NMED**) has reviewed the Final Long-Term Groundwater Monitoring Report that Holloman Air Force Base (**HAFB**) submitted to the HWB on September 6, 2000 Following review of the above referenced document, HWB has made a determination that additional information is required prior to granting approval for No further action (**NFA**)

HAFB should therefore continue to monitor the subject groundwater wells at the current frequency as per HAFB 1988 HSWA Permit, Permit Condition L *(Determination of No Further Action)* Item 2, Page 18 which states that "A determination of NFA shall not preclude the Administrative Authority from requiring continued periodic monitoring of groundwater , when site specific circumstances indicate that release of hazardous waste constituents are likely to occur, if necessary to protect human health and the environment", as required by 20 4 1 500 NMAC, incorporating 40 CFR § 264 99

Please address the following comments

1) NMED recommends that sample analysis values be reported as a less than instrument detection limit, versus a non-detect (ND) reporting

2) Page 3-7, Table 3-3, NMED recommends continuing the LF-01 sampling program for all contaminants listed in the Table

3) Page 3-11, Table 3-5, NMED recommends continuing the LF-10 sampling program for the listed VOC's and metals NMED approves of the discontinuance of sampling for organochlorine pesticides

4) Page 3-15, Table 3-7, NMED recommends continuing the SD-08 sampling program for all contaminants listed in the Table

5) Page 3-20, Table 3-9, NMED recommends continuing the LF-19 sampling program for all VOC's, metals, and organochlorine pesticides listed in the Table Consideration should also be given to investigating the LF-19 site in an attempt to determine the cause of the manganese detected in monitoring well MW-19-01

6) Page 3-24, Table 3-11, NMED recommends continuing the LF-21 sampling program for VOC's, and metals listed in the Table NMED approves of the discontinuance of sampling for chlorinated herbicides and organochlorine pesticides NMED strongly advises HAFB to continue investigating the LF-21 site in an attempt to determine the cause of the TCE's detected in monitoring well MW-21-01

7) Page 3-28, Table 3-13, NMED recommends continuing the LF-22 sampling program for VOC's, all metals, and chlorinated herbicides listed in the Table NMED approves of the discontinuance of sampling for polychlorinated biphenyls and organochlorine pesticides However, HAFB should continue investigating the LF-22 site in an attempt to determine the cause of the chlorinated herbicides (MCPP and Pichloram) and manganese detected in monitoring well MW-22-01

8) Page 3-32, Table 3-15 NMED recommends continuing the LF-23 sampling program for VOC's, all metals, organochlorine pesticides and chlorinated herbicides listed in the Table NMED approves of the discontinuance of sampling for polychlorinated biphenyls, however, consideration should be given into investigating the LF-23 site in an attempt to determine the cause of the iron, 4-nitrophenol, and manganese detected in monitoring well MW-23-01

9) Page 3-42, Table 3-21, NMED recommends continuing the DP-30 and SD-33 sampling program for VOC's and all metals listed in the Table and submission of the data to NMED for review

10) Page 3-55, Paragraph 3 14 3, NMED concurs with the recommendation that additional samples be collected at 118-MW1601 to confirm detections of TCE and chloroform

11) Page 3-60, Table 3-31, HAFB should investigate possible scenarios to control the migration of the 1,2-dichloroethane and benzene detected in groundwater samples from MW-BX-01

12) Page 3-67, Table 3-35, NMED recommends that HAFB continue the LF-29 sampling program for VOC's and SVOC's listed in the Table NMED concurs with the recommendation that TOC elevations of LF-29 associated monitoring wells be re-surveyed.

If you have any questions please contact Robert Warder or me at the address above or by telephone at (505) 827-1557 x 1052 and (505) 827-1557 x 1030 respectively

Sincerely,

Cornelius A Amindyas
Project Leader
Holloman Air Force Base

CAA/rw

cc: James P Bearzi, Chief, NMED HWB
John E Kelling, Program Manager, NMED HWB
Robert S Dinwiddie, NMED HWB
Robert Warder, NMED HWB
Pam Allen, NMED HWB
Allen Chang, EPA Region 6 (6PD-N)
John Poland, HAFB
Court Lesmire, HAFB
Jose Gallegos, HAFB
File Red HAFB 01 and Reading

AR # 1177
1177

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH FIGHTER WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO

31 MAR 2003

MEMORANDUM FOR NEW MEXICO ENVIRONMENT DEPARTMENT
Attn: Mr. James P. Bearzi
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg 1
Santa Fe New Mexico 87505-6303

FROM: 49 CES/CD
550 Tabosa Ave
Holloman AFB NM 88330-8458

SUBJECT: Final Long-Term Groundwater Monitoring Report Request for Supplemental Information (RSI) Response

1. This letter with attachment is our formal response to subject RSI, dated 24 Feb 03 and received 04 Mar 03. The RSI was based on the 2001 Final Long-Term Groundwater Monitoring Report that Holloman submitted to the Hazardous Waste Bureau.

2. If you have any questions, please contact Mr. Dan Holmquist at (505) 572-5395.

Howard E. Moffitt
HOWARD E. MOFFITT
Deputy Base Civil Engineer

Attachment:
Responses to Comments from the New Mexico Environment Department (1 copy)

cc (w/Atch):

Cornelius Amindyas NMED-HWD
Hazardous Waste Bureau
4131 Montgomery NE
Albuquerque, NM 87109

Steve Jetter NMED-HWD
Hazardous Waste Bureau
4131 Montgomery NE
Albuquerque, NM 87109

Allen Chang
USEPA, Region 6 (6 PD-N)
1445 Ross Ave., Ste 1200
Dallas, TX 75202-2733

RESPONSES TO COMMENTS FROM THE NEW MEXICO ENVIRONMENT DEPARTMENT FINAL 2001 LONG-TERM GROUNDWATER MONITORING REPORT HOLLOMAN AIR FORCE BASE, NEW MEXICO JULY 2002

The information provided below are responses to the comments submitted by the New Mexico Environment Department (NMED) Hazardous Waste Bureau to Holloman Air Force Base (AFB) for the 2001 Final Long-Term Groundwater Monitoring (LTM) Report on February 24, 2003.

1. The contract-required detection limits (CRDLs) were provided in Appendix B of the Final Work Plan for the 2001 event *A list of the CRDLs will be provided to for inclusion within Appendix B of the report.*

2. The groundwater quality standards are presented in micrograms per liter but have been changed to milligrams per liter as indicated in the attached revised version of Table 2-1. *A replacement for Table 2-1 will be provided.*

3. Lead has been included in the revised version of Table 2-1 *A replacement for Table 2-1 will be provided.*

4. The standard for 1,2-dichloroethane has been revised as requested in Table 2-1 *A replacement for Table 2-1 will be provided*

5. Holloman AFB will be providing recommendations for the 11 sites that will no longer require monitoring after 2003 under the LTM in the report for the 2003 event

6. The SVE system at SS-02 and SS-05 was in operation during the 2001 sampling program *A replacement for page 4-1 will be provided.*

7. The detection limit values presented for nondetect results represent method reporting limits (MRLs) by individual analysis of methylene chloride The MRL is not always the same value and the CRDL based on sample dilution or matrix interference Sample dilution (10x) took place for the MW-02&05-05 because there were elevated levels of VOCs in the sample The MRL for methylene chloride in MW-02&05-03 should have been shown as <5 micrograms per milliliter (ug/L) The CRDL for methylene chloride is 5 ug/L and 10 ug/L for each o-xylene and m-,p-xylenes.

8 Further clarification is needed for this comment Based on the results of the 1999 and 2001 events, only well MW-02&05-05 has shown any signs of contamination Prior to 1999, the four wells included in the LTM showed only minor contamination, and where there was contamination, the levels have decreased

9 There is no discrepancy between MRLs reported for iron, but the data for metals was reported in ug/L not milligrams per liter (mg/L) as the table indicates A values of 1000 ug/L is equivalent to 1 mg/L which is the CRDL for iron. *A replacement for Table 5-2 will be provided*

10 The correct groundwater elevation for well MW-08-03/S10-MW7 is 4074 85 ft msl *Figure 6-2 will be corrected and provided as a replacement page.*

11 The SVE system at SS-17 was in operation during the 2001 sampling program *A replacement for page 4-1 will be provided.*

12. The discrepancy between MRLs reported for iron are due to the dilution that was required for analyzing the sample from well MW-19-03 within the calibration range of the instrument The

need for the 10x dilution was probably due to matrix interference caused by the elevated mineral content of high total dissolved solids groundwater in the vicinity of LF-19. The data for metals was reported in ug/L not milligrams per liter (mg/L) as the table indicates A value of 1000 ug/L is equivalent to 1 mg/L which is the CRDL for iron *A replacement for Table 9-2 will be provided*

13. According to Carol Benullis's notes and the response to NMED's comments on the 1999 report, selenium was requested by the state, but discussions between Court Fesmire, Jose Gallegos, Cornelius Amindyas, and Rob Warder indicated that selenium was not to be included The recommendation for LF-21 for 2001 included only analyzing for TCE, barium, iron and manganese because these analytes had been detected above CRDLs; and Carol's notes indicate the state wanted arsenic added In 1999 and 2001, no analytes exceeded New Mexico WQCC standards for groundwater.

14. The discrepancy between MRLs reported for chromium are due to the dilution that was required for analyzing the sample from well MW-21-04 within the calibration range of the instrument The need for the 10x dilution was probably due to matrix interference caused by the elevated mineral content of high total dissolved solids groundwater in the vicinity of LF-21. The data for metals was reported in ug/L not milligrams per liter (mg/L) as the table indicates. A value of 20 ug/L is equivalent to 0.02 mg/L which is the CRDL for chromium *A replacement for Table 10-2 will be provided.*

15 The discrepancy between MRLs reported for iron are due to the dilution that was required for analyzing the sample from well MW-22-03 within the calibration range of the instrument The need for the 10x dilution was probably due to matrix interference caused by the elevated mineral content of high total dissolved solids groundwater in the vicinity of LF-22 The data for metals was reported in ug/L not milligrams per liter (mg/L) as the table indicates. A value of 1000 ug/L is equivalent to 1 mg/L which is the CRDL for iron *A replacement for Table 11-2 will be provided*

16 All samples collected at LF-23 required a 10x dilution due to matrix interference caused by the elevated mineral content of high total dissolved solids groundwater in the vicinity of LF-23 The data for metals was reported in ug/L not milligrams per liter (mg/L) as the table indicates. *A replacement for Table 12-2 will be provided.*

17 Currently, no one on the project team knows of any documentation which describes the rationale used in the selection of wells to be included in the LTM

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH FIGHTER WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO

21 MAY 2004

MEMORANDUM FOR NEW MEXICO ENVIRONMENT DEPARTMENT
Attn: Mr. John Kieling
Program Manager
Permit Management Program
Hazardous Waste Bureau
2905 Rodeo Park Dr., East
Santa Fe, NM 87505-6303

NM ENVIRONMENT DEPT
RECEIVED
MAY 3 2004
DISTRICT 1 OFFICE

FROM: 49 CES/CC
550 Tabosa Ave
Holloman AFB NM 88330-8458

SUBJECT: Charactertization Requirements for Seven Solid Waste Management Units (SWMUs) at Holloman AFB, New Mexico

1. Representatives of your staff, the Air Force, Air Combat Command and Holloman AFB met on 21 Apr 04 to discuss and agree to additional characterization requirements for seven SWMUs on Holloman AFB. The attached summary identifies the general scope of work that was agreed to at the meeting. As was discussed at the meeting, no response from your office will constitute concurence with the proposed scope for each site and will allow Holloman to request funding to complete the scope of work.

2. If you have any questions, please contact Mr. Dan Holmquist at (505) 572-5395.

DAVID F. DeMARTINO, Lt Col, USAF
Commander, 49 CES

Attachment:
Summary of the 21 April 2004 NMED Site Visit to Holloman AFB

cc (w/Atch)

Mr. Cornelius Amindyas
Hazardous Waste Bureau
4131 Montgomery NE
Albuquerque, NM 87109

Mr. Steve Jetter
Hazardous Waste Bureau
4131 Montgomery NE
Albuquerque, NM 87109

Ms. Sandra Martin
Hazardous Waste Bureau
2905 Rodeo Park Dr., East
Santa Fe, NM 87505-6303

7001 2510 0005 2338 0188

Global Power for America

Summary of the 21 April 2004 New Mexico Environment Department (NMED) Site Visit to Holloman AFB and the Agreed Upon Additional Characterization Requirements for Seven Solid Waste Management Units (SWMUs) at Holloman Air Force Base, (HAFB) New Mexico

On April 21, 2004 representatives of NMED Hazardous Waste Bureau (Will Moats, Cornelius Amindyas, Steve Jetter and Bill McDonald) visited HAFB to discuss requirements for additional characterization of seven solid waste management units (SWMUs). The group also toured the sites to get a better idea of present conditions. Other attendees at the 21 April 2004 meeting and site visit were:

Jim Haggins (USAF Air Combat Command)
Daniel Holmquist (HAFB)
Daniel Scruggs (HAFB)
Tom Zink (US Army Corps of Engineers – Omaha)
Frank Gardner (Bhate Environmental Associates, Inc.)
Chuck Schick (Bhate Environmental Associates, Inc.)

In February 2004, HAFB submitted a statement of basis summary and the request for No Further Action (NFA) and subsequent removal of eighteen SWMUs from Table A.1 of the Holloman AFB Part B RCRA Permit. Immediately after the submittal, Will Moats and Cornelius Amindyas visited the base to visit seven of the aforementioned SWMUs. At the conclusion of the February 2004 visit, NMED informed HAFB that approval of the seven sites presented in the Statement of Basis for NFA and removal from the RCRA Part B Permit would only be considered after additional site characterization activities at each site. The following SWMUs were determined by NMED to require additional characterization:

SWMU 105	**LF-19 Golf Course Landfill**
SWMU 108	**LF-23 MOBSS Landfill Disposal Trench**
SWMU 101 &109	**LF-10 Old Main Base Landfill**
SWMU 115	**LF-22 West Area Landfill No. 1**
SWMU 116	**LF-21 West Area Landfill No. 2**
SWMU 113B	**DP-30/SD-33 Sludge Disposal Trenches**

Following is a brief description of each SWMU and the proposed scope of work for additional characterization. Further, HAFB requested and Will Moats (NMED) agreed that Long-Term Monitoring (LTM) of groundwater at these sites could be suspended pending the additional characterization.

SWMU 105 LF-19 Golf Course Landfill

The Golf Course Landfill (LF-19) is approximately 2 acres in size and is located due south of fairway No. 7 at the base Golf Course. The landfill accepted green wastes such as grass clippings and tree limbs from routine course maintenance. Documentation reviewed indicated that perhaps rat poison had been disposed of at the site. In 1992, a Remedial Investigation (RI)

was conducted at this site. Three groundwater monitoring wells were installed along the perimeter of the site. Long Term Groundwater Monitoring (LTM) was initiated at the site in 1995. During 10 years of LTM, no Volatile Organic Compounds (VOCs), pesticides or herbicides have been identified in groundwater. Only manganese (maximum concentration 0.597 mg/L) exceeds the New Mexico Water Quality Control Commission (WQCC) standards in one well.

During the February and April site visits, NMED has indicated that additional characterization to assess subsurface conditions is required before NFA can be considered at this site. The general scope of work agreed upon by NMED and HAFB for this site includes:

1. Characterization trenching to identify the contents of the landfill. If hazardous material are encountered, they will be isolated and removed from the site.
2. Documentation of the material encountered in the trenches.
3. Sampling and analysis of soil samples collected from beneath the waste placement and above the water table.
4. Backfill the trenches, remove surface debris, and restore the surface of the site as necessary.
5. Submit the characterization data and observations to NMED in report form including a summary of previous characterization data..
6. Suspend LTM activities at LF-19.

SWMU 108 LF-23 MOBSS Landfill Disposal Trench

The MOBSS Landfill is 2 to 3 acres in size and located west of the Solar Observatory. The landfill was active from 1976 to 1979 and was used to dispose of construction debris, concrete and asphalt. However, [redacted] and [redacted] content. In 1992, an RI was conducted at the site. Four groundwater monitoring wells were installed along the perimeter of the site. LTM was initiated at the site in 1995. During 10 years of LTM, no VOCs, pesticides, herbicides or Polychlorinated Biphenyl (PCBs) were detected in groundwater samples. Two metals, cadmium and manganese, were identified in the RI groundwater sampling. However, during the LTM, only one metal, selenium (maximum 96.9 µg/L) exceeded NMWQCC standard.

During the February and April site visits, NMED has indicated that additional characterization to assess subsurface conditions is required before NFA can be considered at this site. The general scope of work agreed upon by NMED and HAFB for this site includes:

1. Characterization trenching to identify the contents of the landfill. If hazardous materials are encountered, they will be isolated and removed from the site.
2. Documentation of the material encountered in the trenches.
3. Sampling and analysis of soil samples collected from beneath the waste placement and and above the water table.
4. Backfill the trenches, remove surface debris, and restore the surface of the site as necessary.

5. Submit the characterization data and observations to NMED in report form including a summary of previous characterization data.
6. Suspend LTM activities at LF-19.

SWMU 101 &109 LF-10 Old Main Base Landfill

SWMUs 101 & 109 (collectively known as the Old Main Base Landfill) occupy approximately 20 acres and are located north of the main base and east of the Civil Engineer complex. Presently, a communication facility is located on the landfill. The landfill was operational from 1942 to 1958 and may have accepted small quantities of hazardous constituents such as oils, solvents and pesticides along with domestic refuse. An RI was conducted at the site in 1989. Trash and debris were identified in soil borings. A dark green liquid was encountered in at least one boring (presumed to be leachate). Analysis of the material, however, did not reveal hazardous constituents. Seven groundwater monitoring wells and seven soil borings were installed along the perimeter of the site. Soil samples did not contain significant amounts (i.e., more than 1.0 mg/Kg) of VOCs and Resource Conservation and Recovery Act (RCRA) metal concentrations did not exceed base background levels. No VOCs and pesticides were identified in groundwater samples except from one well. It has since been determined that these constituents are related to the immediately adjacent SWMU 82 where pesticides were routinely applied to trash trucks for insect control. RCRA metals were identified in groundwater samples, but within base background levels. LTM was initiated at the site in 1995 at four of the seven wells. During 10 years of LTM, no VOCs, pesticides, herbicides or PCBs were detected in groundwater samples. Two metals, selenium and manganese were identified during the LTM. However, one metal, manganese (maximum 348 µg/L), exceeded the NMWQCC standard.

During the February and April site visits, NMED has indicated that additional characterization to assess subsurface conditions is required before NFA can be considered at this site. The general scope of work agreed upon by NMED and HAFB for this site includes:

1. Characterization trenching to identify the contents of the landfill. If hazardous materials are encountered, they will be isolated and removed from the site.
2. Documentation of the material encountered in the trenches.
3. Sampling and analysis of soil samples collected from beneath the waste placement and above the water table.
4. Backfill the trenches, remove surface debris, and restore the surface of the site as necessary.
5. Submit the characterization data and observations to NMED in report form including a summary of previous characterization data (RI).
6. Suspend LTM activities at LF-10.

SWMU 115 LF-22 West Area Landfill No. 1

SWMU 115, the West Area Landfill No. 1, is located near the Solar Observatory and is approximately 3 acres in size. The landfill was active from 1974 to 1978 and used to dispose of construction debris, plastic sheeting, cardboard and empty cans. However, interviews with former base employees indicted that perhaps disposal of drums may have taken place at the site. In 1992, an RI was conducted at the site. Four groundwater monitoring wells were installed along the perimeter of the site. LTM was initiated at the site in 1995. During 10 years of LTM,

no VOCs, PCBs, pesticides or herbicides have been identified. The maximum concentrations of arsenic (16.1 µg/L) barium (20.7 µg/L) and manganese (65.7 µg/L) detected during 10 years of monitoring did not exceed NMWQCC or federal standards.

During the February and April site visits, NMED has indicated that additional characterization to assess subsurface conditions is required before NFA can be considered at this site. The general scope of work agreed upon by NMED and HAFB for this site includes:

1. Characterization trenching to identify the contents of the landfill. If hazardous materials are encountered, they will be isolated and removed from the site.
2. Documentation of the material encountered in the trenches.
3. Sampling and analysis of soil samples collected from beneath the waste placement an above the water table.
4. Backfill the trenches, remove surface debris, and restore the surface of the site as necessary.
5. Submit the characterization data and observations to NMED in report form including a summary of previous characterization data (RI).
6. Suspend LTM activities at LF-22.

SWMU 116 LF-21 West Area Landfill No. 2

SWMU 116, the West Area Landfill No. 2, is approximately 2 acres in size and located east of the Solar Observatory (Building 910). The landfill was active during the 1970s and its use was discontinued in 1977. Base records indicate that items placed in the landfill included cardboard, tree trimmings and construction debris. However, one former base employee indicated that perhaps some drum disposal had occurred at the site.

In 1992, an RI was conducted at the site. Four groundwater monitoring wells were installed along the perimeter of the site. LTM was initiated at the site in 1995. During 10 years of LTM, no PCBs or herbicides have been detected in groundwater samples. Two metals, arsenic (maximum 11 µg/L) and cadmium (maximum 24 µg/L), have exceeded NMWQCC standards. One VOC, trichloroethene (TCE), has been identified in the up-gradient well (maximum 15 µg/L). The source of the TCE is believed to be from a source north of the landfill. Budgeting and work plans for addressing the TCE have been budgeted for FY05.

During the February and April site visits, NMED has indicated that additional characterization to assess subsurface conditions is required before NFA can be considered at this site. The general scope of work agreed upon by NMED and HAFB for this site includes:

1. Characterization trenching to identify the contents of the landfill. If hazardous materials are encountered, they will be isolated and removed from the site.
2. Documentation of the material encountered in the trenches.
3. Sampling and analysis of soil samples collected from beneath the waste placement and above the water table.
4. Backfill the trenches, remove surface debris, and restore the surface of the site as necessary.

5. Submit the characterization data and observations to NMED in report form including a summary of previous characterization data (RI).
6. Suspend LTM activities at LF-21.
7. Investigate the source and extent of TCE discovered in the up gradient monitoring well.

SWMU 113B DP-30/SD-33 Sludge Disposal Trenches

Sites DP-30 & SD-33 were open pit disposal trenches used for cooking oil, and grease and grit from oil water separators and sludge from remote septic tanks. Material from clogged sewer lines was also placed in the pits. The pits were in use from approximately 1972 through 1990.

Right Unit?

In 1992, an RI was conducted at the site. Several soil borings were advanced into the trenches and four groundwater monitoring wells were installed. Analysis of soil samples identified oil and grease (TRPH 418.1) at concentrations ranging between 35 mg/Kg to 82,000 mg/Kg. VOCs identified included minor amounts of benzene, toluene, ethylbenzene, TCE and Tetrachloroethene. Minor amounts of pesticides, PCBs (19 mg/Kg) and herbicides were also identified in the soil samples along with metals lead, selenium and mercury (although the mercury was not quantified above the detection limit).

Four groundwater monitoring wells were installed along the perimeter of the site. LTM was initiated at the site in 1995. During 10 years of LTM, no pesticides, herbicides or PCBs were positively identified in groundwater samples. VOCs identified during the LTM include chloroform (maximum 2.6 µg/L), 1,1-dichloroethane (maximum 27 µg/L), and TCE (maximum 150 µg/L). Metals identified include arsenic, barium and selenium, but only arsenic (maximum 23.3 µg/L) exceeded the federal standard (but not the WQCC standard).

During the February and April site visits, NMED has indicated that additional action is required before NFA can be considered at this site. The general scope of work agreed upon by NMED and HAFB for this site includes:

1. Characterization of sludge and soil contaminated with oil and grease to determine if it is characteristically hazardous (TCLP analysis).
2. Excavation of the contaminated soil and treatment in the nearby landfarm (if it is determine to be nonhazardous).
3. Collection and analysis of soil samples from the bottom and sides of the excavation to document remediation.
4. Backfill the trenches and site restoration.
5. Submit the data, and evidence of remediation to NMED in report form.
6. Suspend LTM activities at DP-30/SD-33.

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 428-2500
Fax (505) 428-2567
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

DERRITH WATCHMAN-MOORE
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

August 10, 2004

Ms. Deborah Hartell
Chief
Environmental Flight
49 CES/CD
550 Tabosa Avenue
Holloman Air Force Base, NM 88330-8458

SUBJECT: HAFB LETTER OF MAY 21, 2004, REGARDING CHARACTERIZATION REQUIREMENTS FOR SEVEN SOLID WASTE MANAGEMENT UNITS HOLLOMAN AIR FORCE BASE NM6572124422 HBW-HAFB-04-022

Dear Ms. Hartell:

The New Mexico Environment Department (NMED) has received the subject letter which concerns additional characterization work needed for Solid Waste Management Units (SWMUs) 105 (LF-19 Golf Course Landfill), 108 (LF-23 MOBSS Landfill Disposal Trench), 101/109 (LF-10 Old Main Base Landfill), 115 (LF-22 West Area Landfill # 1: PCB Disposal Area), 116 (LF-21 West Area Landfill # 2), and 113B (DP-30/SD-33 Sludge Disposal Trenches/Fire Training Area). The NMED is in agreement with most, but not all of the proposed work. Based on our review of this letter, the NMED has the following comments and requirements. Some of the requirements are based on decisions made by the NMED since the April 4, 2004, visit to HAFB.

1. NMED staff did not agree to the assertion that no response from the NMED constitutes concurrence with the proposed scope of work. NMED staff did agree in the meeting to respond to the subject letter after its receipt by the Department. This letter is NMED's response.

2. NMED will be reviewing in detail the LTM ground-water monitoring data for each SWMU. Holloman Air Force Base (HAFB) may cease at least temporarily ground-water sampling at the subject SWMUs, with the exceptions of SWMUs 113B and 116. After completion of the additional characterization work for these SWMUs, the NMED will decide if further characterization is warranted, including any other ground-water monitoring that must be done by HAFB.

3. Specific sampling details are not included in the letter and must be addressed in a RCRA Facility (RFI) work plan for each SWMU. Such work plans must be reviewed and approved by the NMED before the work is carried out. The plans must contain details as to the history of each SWMU, potential contaminants of concern (PCOC), depths and location of characterization trenches, sampling locations (including depths), analytical parameters and methods, quality controls, and any other details as determined by the NMED as necessary to properly investigate each SWMU.

4. Regarding SWMU 108, item #6, of HAFB's letter, the NMED believes that HAFB meant to state "Suspend LTM activities at LF-23" instead of "Suspend LTM activities at LF-19". Additionally, a geophysical survey would be useful to search for any potential burial locations at this SWMU.

5. Extensive characterization of SWMU 101/109 is required to determine the exact boundaries of the landfill, to determine the nature and extent of any releases of contaminants from the landfill, and to characterize the landfill's contents. At minimum, HAFB is required to dig test pits, sample and analyze soil from test pits and/or soil borings, and must conduct geophysical, methane/landfill gas, and passive soil-gas surveys. The NMED may require a corrective measures study for the landfill following completion and approval of the characterization activities.

6. Regarding SWMU 116, a geophysical survey is needed to search for any buried waste at this site; this must be done in addition to trenching. In addition, a ground-water investigation plan to determine the source of TCE thought to lie upgradient from SWMU 116, and to determine the nature and extent of this contamination, must be submitted to the NMED for approval. The ground-water monitoring plan must include quarterly sampling of the ground water.

7. Regarding SWMU 113B, samples intended for characterization purposes must be analyzed for total levels of contaminants, not by the TCLP method. Any waste or releases that represent an unacceptable risk to human health or the environment must be remediated. If any excavated waste or contaminated soil is found to be hazardous, such waste may not be landfarmed as you correctly stated in your letter. Additionally, as mentioned previously HAFB must continue ground-water monitoring at SWMU 113B. The source of solvents and any other contaminants in the ground water must be determined, and the nature and extent of the contamination fully defined. HAFB must also submit to NMED for approval a ground-water monitoring plan for SWMU 113B that includes quarterly sampling of the ground water at this SWMU.

Other than for SWMU 101/109, HAFB must submit to the NMED for approval the RFI work plan for each SWMU within 90 days of receipt of this letter. The RFI work plan for SWMU 101/109 shall be submitted within 120 days from receipt of this letter. The ground-water investigation plan for SWMU 113B shall be submitted within 90 days of receipt of this letter. Finally, the ground-water monitoring plan for the characterization of the TCE contamination near SWMU 116 shall be submitted within 90 days of receipt of this letter.

Please contact Mr. Cornelius Amindyas of my staff at (505)-284-8617 if you have questions regarding this matter.

Sincerely,

John E. Kieling
Manager
Permits Management Program

JEK:ca/wpm

cc: J.Bearzi, NMED HWB
C.Amindyas, NMED HWB
W.Moats, NMED HWB
L.King, EPA
D.Holmquist, HAFB
D.Scruggs, HAFB

File: HAFB 2004 and Reading

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 428-2500
Fax (505) 428-2567
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

DERRITH WATCHMAN-MOORE
DEPUTY SECRETARY

February 9, 2005

Ms. Debbie Hartell
Chief
Environmental Flight
49 CES/CEV
550 Tabosa Ave.
Holloman AFB, NM 88330-8458

RE: ADDITIONAL INVESTIGATION REQUIREMENTS AT SITES - SS-02&05, SD-08, SS-39
HOLLOMAN AIR FORCE BASE
EPA ID# NM6572124422
HWB-HAFB-04-009

Dear Ms. Hartell:

The New Mexico Environment Department (NMED) has reviewed the 2003 Long-Term Groundwater Monitoring Report and older investigation reports for the above referenced sites. Based on this review the NMED has additional concerns and will require additional ground water investigations at these sites. The NMED's current policy (May 15, 1995) regarding the treatment of ground water contamination at Holloman AFB states, in part, that soil and ground water contaminant plumes must be adequately characterized and monitoring wells defining the plumes must be sampled at least annually. NMED interprets "monitoring wells defining the plumes" to include wells located within the plume, particularly in the area of highest contamination, not just the wells defining outside the perimeter of the plume. NMED does not believe the ground water monitoring at the referenced sites conforms to this policy.

The following provides a brief reasoning for requiring the additional work at each site.

<u>Site SS-02/05 (SWMU AOC-T)</u>

This site is currently undergoing a voluntary corrective measures to remove contaminated soils a part of the final remedy and site closure. As part of site closure a final risk assessment must be

performed. The risk assessment will need to look at the ground water exposure pathway in relation to potential vapors impacts under current and future land use scenarios. Currently only one cross-gradient well, MW-02&5-05, within the contaminant plume is being sampled.

NMED believes additional ground water sampling from throughout the contaminant plume is required to support the risk assessment and eventual site closure. Therefore, the following actions must be implemented:

1. A two-year groundwater-sampling program should be initiated. Samples should be collected on a quarterly or semi-annual basis for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs).

2. Ground water samples should be collected from MW-02&5-02. This well is located in the source area with historically the highest concentrations and would provide information on the affects of the soil excavation had on the ground water plume.

3. At least one additional well should be installed approximately 100 feet east of the excavation to better define the ground water plume. The only true down gradient well, MW-02&5-06, is located over 400 feet from the source area. As most petroleum plume are < 400 feet in length, especially at sites with flat gradients, this well is not real useful for monitoring plume characteristics but is better suited as a sentinel well to monitor plume migration. A second well should also be considered to the southeast of MW-02&5-02 based on the historic ground water flow direction.

4. Sampling and review of historical data from other site wells that have not been part of the LTM monitoring program should be performed to ensure that ground water conditions have not changed since the original investigations were performed. Wells such as MW-02&5-01, MW-02&5-07, and S1-MW3 should be included in inital sampling event.

Site SD-08 (SWMU 4 and SWMU 82)

The review of the current and historic ground water potentiometric surface maps presented in the LTM reports indicates a south/southwest ground water flow direction. Based on the location of SWMU 82 (source area) presented in the recently submitted no further action statement of basis (NFA SOB, November 2004), all of the monitoring wells sampled as part of the LTM program are either up gradient or cross-gradient from the known source area. Therefore, site ground water conditions cannot be adequately assessed. In addition, based on the information presented in the NFA SOB the drain field was not adequately characterized.

The following actions must be implemented:

1. As stated in NMED review of the NFA SOB (February 2005), the location of the SWMU 4 drain field must be positively identified and additional characterization must be performed.

2. Monitoring wells must be installed in the former drain field and at or down gradient of the wash rack. Ground water shall be sampled for VOCs, SVOCs, metals, and organochlorine pesticides.

3. Samples from these new wells should be collected on a quarterly or semi-annual basis over a two-year period.

Site SS-39 (SWMUs 165, 177, 179, 181)

As part of the LTM review, the NMED also looked at the original site investigation material presented in the *Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units*, September 1997 report. Based on the review of the original characterization data, it appears that all monitoring wells are installed up gradient of the TCE plume as determined by Geoprobe sampling locations. Ground water samples collected from several Geoprobe locations showed TCE concentrations between 324 *ug/L* and 2730 *ug/L* in locations down gradient of the LTM sampling locations. Additional ground water characterization work was performed in 1998 that defined the ground water plume but no permanent monitoring wells were installed. See the attached map. Also, according to the site summary presented in the HAFB's September 1995 Decision Document, tetrachloroethene (PCE) concentration of 95 mg/kg was detected in the soils around the drainage sumps at Building 1176. This is above the NMED's residential risk based soil screening levels of 9.83 mg/kg.

Therefore, the following actions are required:

1. An in-depth review of previous investigations should be performed and summarized in the work plan. An investigation of the current soil and ground water conditions shall be performed based on the analysis of the historical data.

2. Ground water monitoring wells shall be installed in area of highest contaminant concentrations and at down gradient locations. The distance between well(s) shall be no more than 200 feet, unless approved by NMED. The down gradient extent of the plume shall be defined where the concentration of TCE in the ground water is less than 5 mg/L. The wells shall be installed at the shallowest depth possible to yield representative ground water samples.

3. A vertical extent well shall be installed in the area of highest contaminant concentrations.

4. Initially, samples shall be analyzed for VOCs, SVOCs, RCRA metals, and perchlorate.

5. Samples from these new wells should be collected on a quarterly or semi-annual basis over a two-year period.

Additional requirements for these sites may be required based on the historical information provided in the work plans.

Work plans for the above requirements must be reviewed and approved by the NMED before the work is performed. The work plans shall include detailed summaries of the operational history and investigational history of each site, potential contaminants of concern, proposed monitoring well locations and construction details, analytical parameters and methods, quality controls and any other details as determined by the NMED as necessary to properly investigate each site. The work plans shall be submitted within 90 days from receipt of this letter.

If you have any questions, please contact me at (505) 845-5932.

Sincerely,

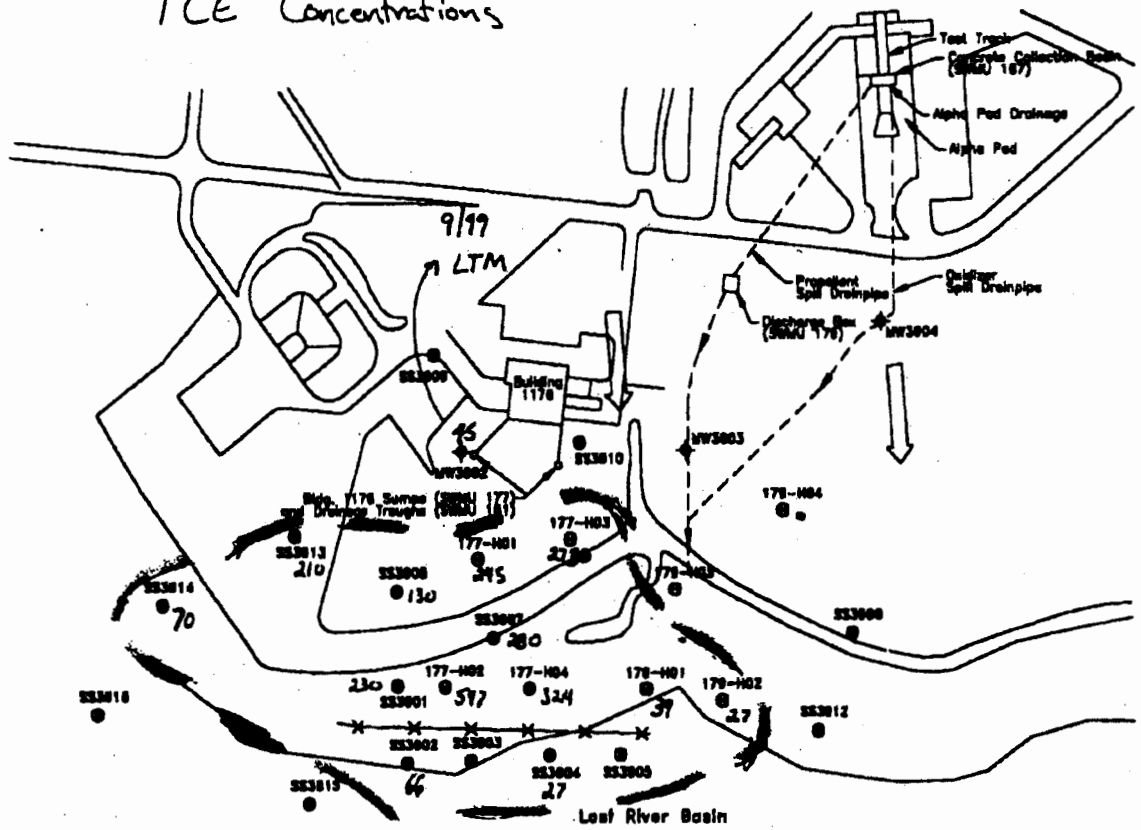
Steve Jetter
Permits Management Program

cc: James Bearzi, NMED HWB
John Kieling, NMED HWB
Cornelius Amindyas, NMED HWB
James Harris, EPA-Region 6
Dan Holmquist, HAFB
File: Reading and HAFB-HSWA 2005

SS-39 SWMU 177 & 179

TCE Concentrations

Look in
- Phase II, Table 2 RFI Report Radian 1994
  or
- Phase II, Table 2, RFI Report Sept 97



SS3011

LEGEND

- Monitoring Well
- Previous Groundwater Sampl Location (1993)
- DPT Groundwater Sample Location 5/98
- Fence
- Groundwater Flow Direction (November, 1991)

Figure 1. SS-39 SITE MAP WITH DPT GROUNDWATER SAMPLING LOCATIC

APPENDIX F

DECISION DOCUMENTS FOR SITES LF-19, LF-21, LF-22, AND LF-23

DECISION DOCUMENTS

INVESTIGATION, STUDY, AND RECOMMENDATION FOR 29 WASTE SITES HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for

49 CES/CEV
Holloman Air Force Base, NM

Prepared by:

Radian Corporation
8501 North Mopac Blvd.
P.O. Box 201088
Austin, Texas 78720-1088

Under Contract No. DACW45-89-D-0515 with

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

September 1994

PURPOSE OF DOCUMENT

A. The decision documents present a summary of site background, the no-action alternative, site risks, and community participation for 15 Installation Restoration Program (IRP) sites. The 15 sites included in this document are recommended for sit close-out on the basis of a remedial investigation (RI) and a risk assessment (RA). This document was prepared for, and in cooperation with, the Base Environmental Office: 49 CES/CEV, 550 Tabosa Avenue, Holloman, AFB, New Mexico, 505/479-3931.

B. The decision documents are required as part of the Comprehensive Environmental Responsibility, Compensation and Liability Act (CERCLA).

C. These decision documents provide the rationale for the "no-action" decision at 15 IRP sites.

INTRODUCTION TO DECISION DOCUMENTS

Holloman AFB under the guidance of the U.S. Environmental Protection Agency, Region VI (U.S. EPA, Region VI) and the New Mexico Environment Department (NMED) presents these *Decision Documents* as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). These *Decision Documents* summarize information provided in the *Proposed Plans* (July 1993), and data found in the *Remedial Investigation (RI) Report - Investigation Study and Recommendation for 29 Waste Sites* (October 1992) and the draft final *Risk Assessment Report for the Remedial Investigation - Investigation Study and Recommendation for 29 Waste Sites* (June 1992). Holloman AFB conducts their environmental restoration program through the U.S. Air Force Installation Restoration Program (IRP). The Administrative Record, which contains information on which the selection of the response action was based, is available at the following locations:

Base Library
955 First Street
Holloman AFB, NM 888310-8037

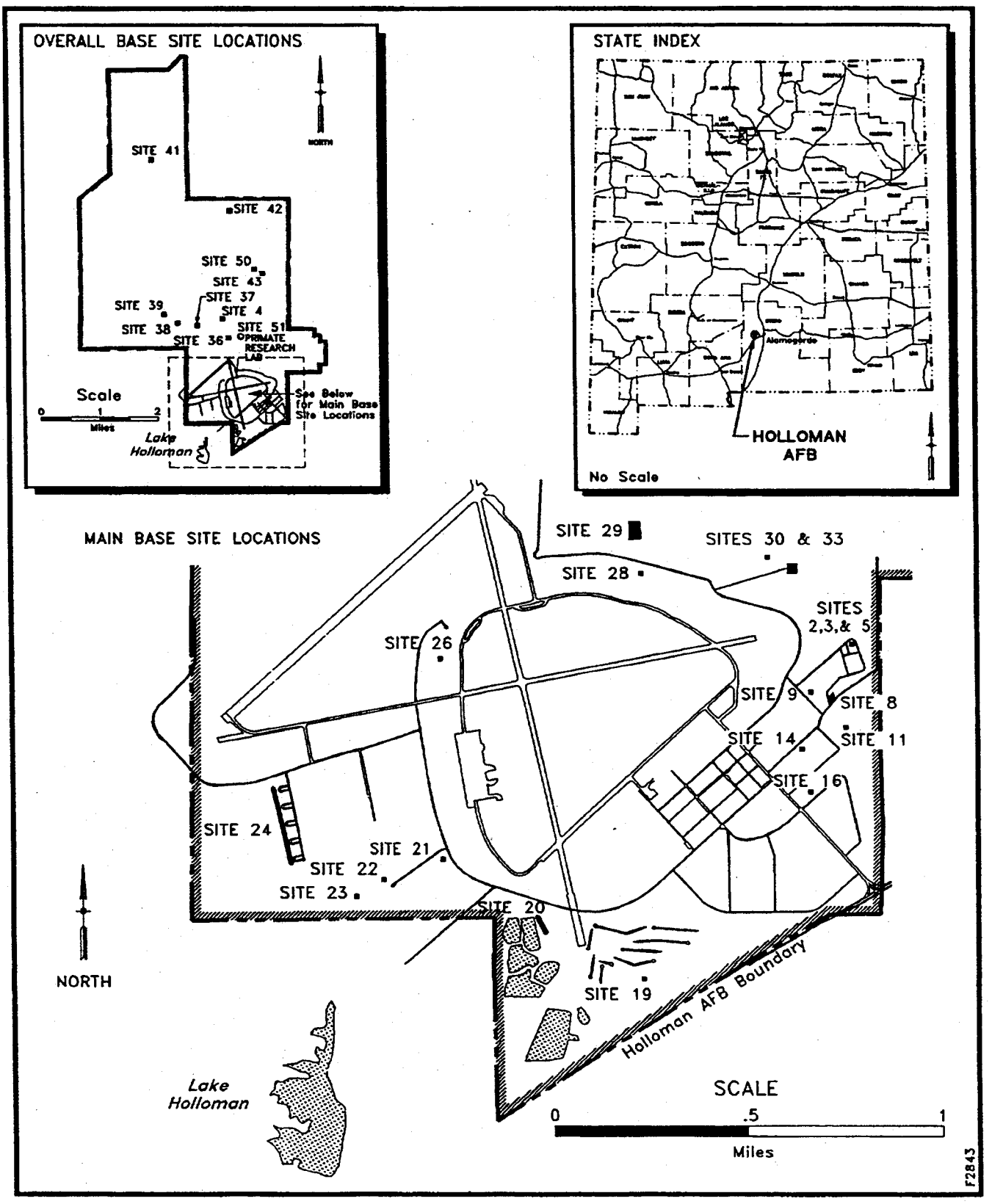
Alamogordo Public Library
920 Oregon
Alamogordo, NM 88310

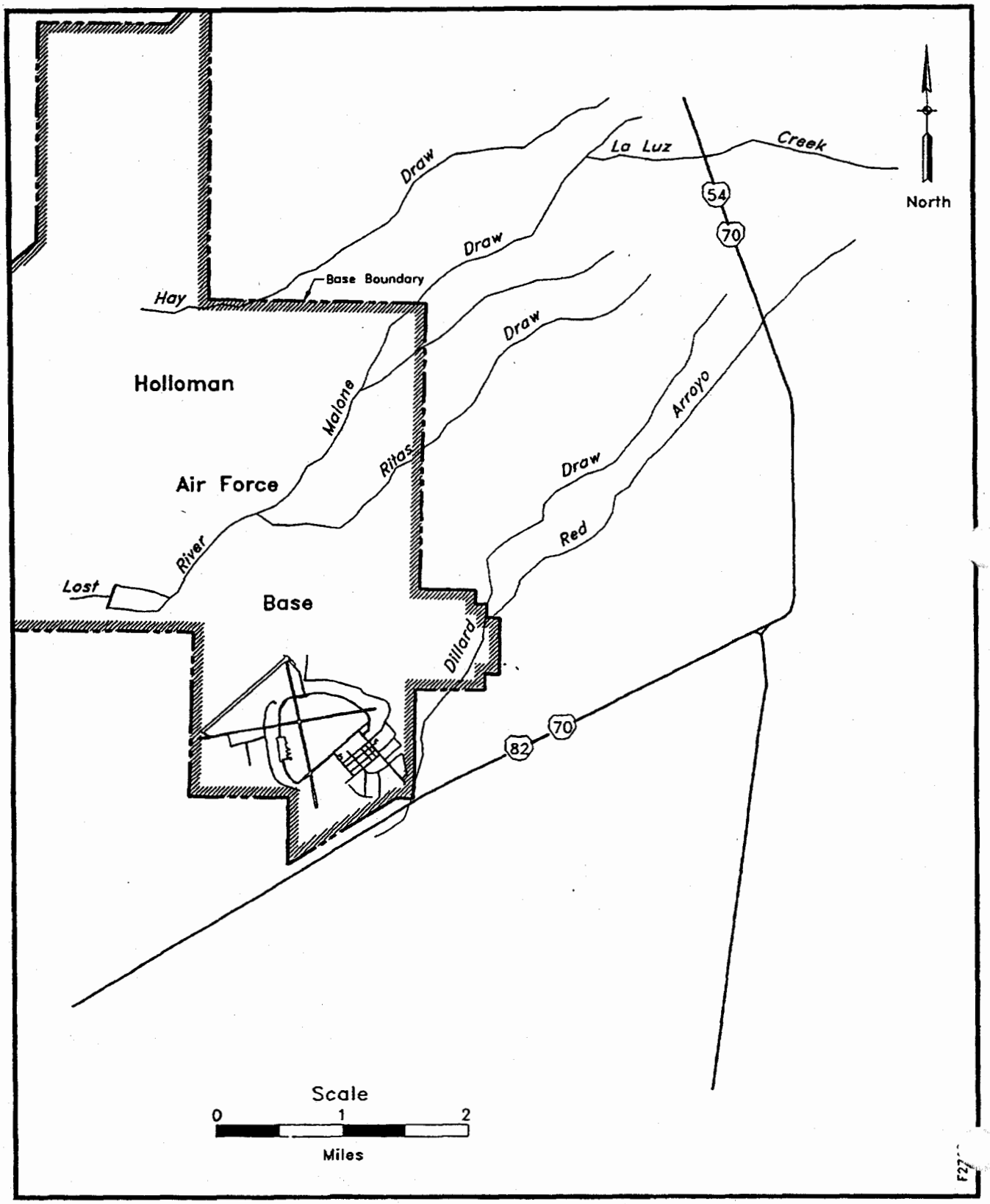
Holloman AFB has a permit from the U.S. EPA, Region VI under the Resource Conservation and Recovery Act (RCRA) and the Hazardous and Solid Waste Amendments (HSWA)—Permit No. NM 6572124422. The sites included in these documents are also considered solid waste management units (SWMUs) in Holloman AFB's HSWA permit. The attached Table provides a list of all the IRP sites and respective SWMU numbers included in these document. The following two figures illustrate the location of Holloman AFB sites and the location of the arroyos that run through the Base.

For the RI, evaluation of the data to determine the no action alternative involved completion of a quantitative risk assessment, and a comparison of results to health-based action levels and base-wide background concentrations for naturally occurring constituents (e.g., metal). Risk assessment was conducted using the guidelines provided in the *Risk Assessment Guidance for Superfund* (U.S. EPA, 1989). Action levels were based on the methodology and criteria in the proposed 40 CFR Part 264 Subpart S. Action levels derived according to these criteria represent reasonable estimates of levels in media at or below which

Table 1

IRP Site Name	SWMU Name	SWMU Description
Site 9	SWMU 42	Bldg. 1 Waste Accumulation Area
Site 11	SWMU 107	Main Base Substation PCB Disposal Area
Site 19	SWMU 105	Golf Course Landfill
Site 21	SWMU 116	West Area Landfill #2
Site 22	SWMU 115	West Area Landfill #1 PCB Disposal Area
Site 23	SWMU 108	MOBSS Landfill Disposal Trench
Site 26	AOC-D	Building 882 Spills
Site 28	SWMU 212	Building 824 Waste Accumulation Area
Site 37	AOC-L	Early Missile Test Site
Site 38	SWMU 137	Building 1166 Test Track Drainfield
Site 41	SWMU 192	Coco Blockhouse Disposal Well
Site 42	SWMU 111	Radioactive Waste Disposal Area
Site 43	AOC-G	Atlas Substation PCB Spill


OVERALL BASE SITE LOCATIONS
NORTH
SITE 41
SITE 42
SITE 50
SITE 43
SITE 37
SITE 39
SITE 4
SITE 38
SITE 51
SITE 36
PRIMATE RESEARCH LAB
Scale
0 1 2
Miles
See Below for Main Base Site Locations
Lake Holloman
STATE INDEX
Alamogordo
HOLLOMAN AFB
No Scale
MAIN BASE SITE LOCATIONS
SITE 29
SITES 30 & 33
SITE 28
SITES 2,3,& 5
SITE 26
SITE 9
SITE 8
SITE 14
SITE 11
SITE 16
SITE 24
SITE 21
SITE 22
SITE 23
SITE 20
SITE 19
Holloman AFB Boundary
NORTH
Lake Holloman
SCALE
0 .5 1
Miles
F2843


Draw
La Luz
Creek
North
54
70
Draw
Base Boundary
Hay
Draw
Holloman
Malone
Arroyo
Ritas
Air Force
Draw
Red
River
Lost
Base
Dillard
70
82
Scale
0
1
2
Miles

GLOSSARY

All of the following discussions of the decision documents for Sites 9, 11, 19, 21, 22, 23, 26, 28, 37, 38, 41, 42, 43, 50, and 51 use similar terms and acronyms. To eliminate redundancy in the reference to these shared terms and acronyms, the glossary shown below gives a complete list of the acronyms used through the proposed plans.

- AFB—Air Force Base
- CERCLA—Comprehensive Environmental Response, Compensation and Liability Act
- EQ—Environmental Quotient
- HI—Hazard Index
- IRP—Installation Restoration Program
- NMED—New Mexico Environment Department
- NM WQCC—New Mexico Water Quality Control Commission
- PCBs—Polychlorinated Biphenyls
- RA—Risk Assessment
- RCRA—Resource Conservation and Recovery Act
- RI—Remedial Investigation
- U.S. EPA—U.S. Environmental Protection Agency

corrective action is unlikely to be necessary. The background levels were established during two separate studies at Holloman AFB: the RI Report (October, 1992) and *Base-wide Background Study* (December 1993). Cleanup of PCB-contaminated wastes is guided by the regulations outlined in the 40 CFR Part 261, Subpart G.

As part of the closure of each site, a survey plat of the boundaries will be completed by a certified land surveyor. This will be incorporated into the Base Comprehensive Plan (BCP) and Real Property records. The BCP is a stand alone document that contains factual information on the present conditions and land use at the Base and a conceptual presentation of future development plans. This supports decision-making in ongoing programming activities. The BCP is coordinated with other land use management initiatives such as the Holloman AFB Management Action Plan and the GIS database. A BCP tab exists for IRP sites and existing land use restrictions.

Furthermore, all construction activities must be coordinated and approved by Holloman AFB Environmental Flight prior to initiation. As a branch of the Federal government, Holloman AFB must comply with the procedures outlined in the National Environmental Protection Act (NEPA). Proposed projects at Holloman AFB must go through the Environmental Impact Analysis Process (EIAP), which includes a review of former or closed IRP sites that may impact the project. Through this process there is another mechanism for ensuring that changes in land use are considered during all future projects on Base.

IRP Site 19

Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is not Required

Site Name and Location

IRP Site 19 (RCRA SWMU 105)
Golf Course Landfill
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose

This decision document presents the selected remedial action for the referenced site chosen in accordance with CERCLA, as amended by SARA. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy

The remedial investigation and risk assessment conducted for the site indicated that no action is necessary to protect human health and the environment. As part of the no action remedy, surface debris will be removed, a plat of survey will be produced, and long-term monitoring will be conducted at the site.

Declaration Statement

The remedial investigation and risk assessment conducted for the site indicated that conditions at the site do not require further action to ensure the protection of human health and the environment. Because no hazardous substances will remain on-site above health-based levels, a five-year review is not necessary.

If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Judith Espinosa, Cabinet Secretary
New Mexico Environment Department

Date

John F. Miller, Jr.
Brigader General, USAF
Commander

Date

Decision Summary

Site Name, Location and Description

IRP Site 19 (RCRA SWMU 105) is the Golf Course Landfill site located due south of Fairway No. 7 and approximately 800 ft north of the Holloman AFB boundary (see figure).

The near-surface geology at Holloman AFB consists of interbedded sands, silts, and clays. Soils are low to moderately permeable and mildly alkaline. Groundwater occurs from 5 to 40 ft below the surface. Local and regional groundwater flow direction is controlled by the southwest-trending arroyos. In the southern portion of Holloman AFB, regional groundwater flow is to the southwest, following the Dillard Draw surficial drainage system. In the northern portion of Holloman AFB, groundwater flow is to the west, following Ritas Draw, Malone Draw, and Lost River drainages. The general topography for the area is gently sloping from the northeast toward the southwest, with a small drainage ditch cutting across the landfill from the northeast to the southwest.

The unconfined aquifer beneath Holloman AFB exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption based on NMWQCC 82-1, as amended through August 18, 1992, Parts 3-100 through 3-103. Based on the *Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy* (EPA, 1986), the unconfined aquifer beneath Holloman AFB is a Class III-B aquifer and is classified as non-potable.

Site History and Enforcement Activities

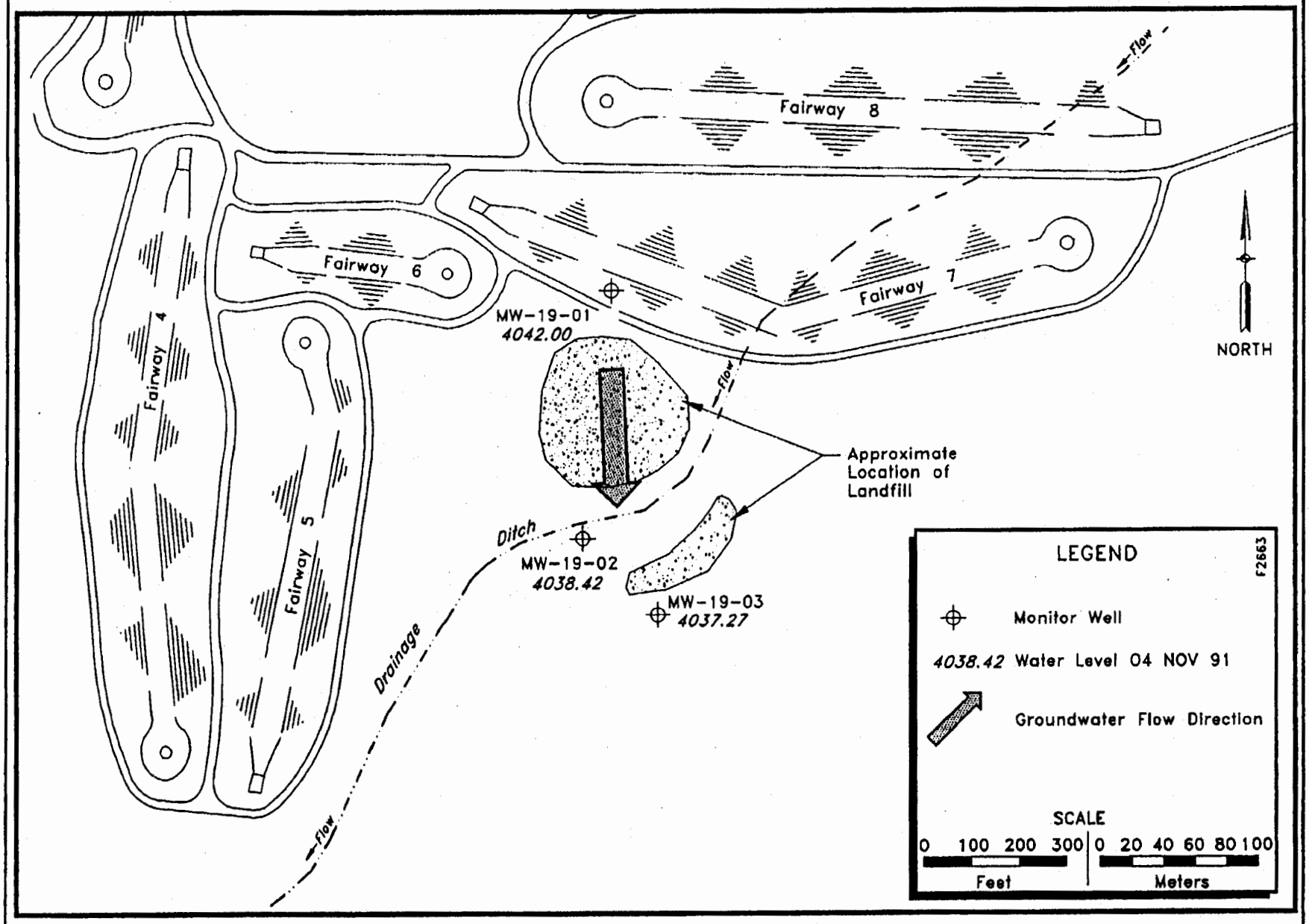
Records indicated that the landfill was operated for roughly 10 years (from 1968 to 1978), and was used primarily as a disposal site for golf course grass clippings. However, it was reported that unused rodenticide was also disposed at the site. The existence of the "landfill" has been confirmed and is primarily a disposal site distributed across a 2-acre area. No other landfills are known to exist in the golf course area.

A record search for Site 19 was conducted by the engineering firm CH2M Hill between December 1982 and August 1983. Radian Corporation performed the RI during 1991 and 1992. No remedial actions have been performed at the site.

The site is also included as a solid waste management unit (SWMU) on Holloman AFB's HSWA permit from the U.S. EPA, Region VI. A RCRA Facility Assessment (RFA) was conducted by AT Kearney in 1987 and the RI conducted by Radian Corporation during 1991 and 1992 met all of the requirements of the RCRA Facility Investigation (RFI).

Highlights of Community Participation

Copies of the *Remedial Investigation Report-Investigation, Study and Recommendation for 29 Waste Sites* (October, 1992) and the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (June, 1992) which contain the site were released to the public January 24, 1993. The reports were made available to the public in the administrative record located at the Holloman AFB Library and the Alamogordo Public Library. The notice of availability was published in the *Alamogordo Daily News* on January 24, 1993.


Fairway 8
Flow
Fairway 6
Fairway 7
Fairway 4
Fairway 5
MW-19-01
4042.00
Flow
NORTH
Approximate
Location of
Landfill
Ditch
MW-19-02
4038.42
MW-19-03
4037.27
Drainage
Flow
LEGEND
Monitor Well
4038.42 Water Level 04 NOV 91
Groundwater Flow Direction
SCALE
0 100 200 300
Feet
0 20 40 60 80 100
Meters

A public comment period was held from July 1993 through August 1993. A public meeting was held at the Alamogordo Civic Center on 26 August 1993. Representatives from Holloman AFB and the USACE (Omaha District) were present at the meeting to answer any questions pertaining to the site. No comments were received during the review period.

This decision document presents the selected remedial action for the site, chosen in accordance with CERCLA, as amended by SARA. The decision for this site is based on the administrative record.

Scope and Role of the Response Action

The Remedial Investigation (RI) and Risk Assessment (RA) conducted for the site indicated that no action is necessary to protect human health and the environment under CERCLA.

Summary of Site Characteristics

In July 1991, Holloman AFB conducted a RI to identify the types, quantities, and locations of contaminants at the site. A summary of the field investigation and results of the RI are presented below.

Groundwater

Three groundwater monitoring wells were installed at the site to determine whether a release had occurred. One round of groundwater samples was taken and analyzed by a certified laboratory for volatile organic compounds, organochlorine pesticides and PCBs, organophosphorus pesticides, chlorinated herbicides, total metals, anions, and total dissolved solids. With the exception of chloride, all water quality parameters were detected at concentrations below the established background levels for Holloman AFB. However, the groundwater quality parameters for groundwater beneath Holloman AFB naturally exceed the state and federal regulatory criteria. (Water quality parameters include total dissolved solids, chloride, sulfate, fluoride, nitrate-nitrite, and total phosphorous.) Therefore, the concentration of chloride observed (present due to evaporite deposits) does not contribute to the degradation of the aquifer. Cadmium was the only metal concentration detected in a downgradient monitoring well at a level above the established background level for the Holloman AFB. Historical data indicate that waste containing cadmium as a constituent was not disposed of at the site. Therefore, it is uncertain whether cadmium concentrations reflect a contaminant release to the groundwater.

Summary of Site Risks

A RA was conducted to estimate the potential consequences to human health and the environment that could result if contamination at this site is not remediated. The RA consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., skin, ingestion, or inhalation); 3) toxicity assessment or discussion of hazards and dose-response relationships associated with each contaminant; and 4) quantification of potential carcinogenic and noncarcinogenic risks. A detailed description of the RA is contained in the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (June 1992).

Human Health Risks

The human health risks evaluated for this site were based on the possible exposure of off-base residents to contaminants in the groundwater reaching an agricultural well. This exposure does not currently exist; however, the hypothetical scenario was evaluated to ensure a conservative assessment of potential risks associated with this site.

Generally, a total carcinogenic risk of 10^{-6} for each potential chemical contaminant is considered acceptable. This is equivalent to a one-in-a-million excess cancer risk from exposure to that chemical. A cumulative total (sum of risk from all chemicals) must be at or below 10^{-5} (or a one-in-one-hundred-thousand excess cancer risk). The only contaminants present at the site that cause potential concern are antimony, cadmium, and lead. Since the contaminants of potential concern do not have any cancer factors, the carcinogenic risks are unable to be calculated. Carcinogenic risk characterization of the site indicates that adverse human health effects are unlikely.

For a noncarcinogenic risk to be acceptable, the sum of the Hazard Index (HI) may not exceed a value of 1. The HI is the ratio of the chemical intake to a reference dose (the acceptable dose). The HI for the site is well below the value of 1, making the noncarcinogenic risk for off-base residential exposure within the acceptable range. Therefore, adverse health effects are not expected to result from exposure.

Environmental Risks

Environmental risk was evaluated using an Environmental Quotient (EG). The EQ calculates the potential ecological risks associated with the contaminants of concern through the ingestion of soil and/or contaminated plants. EQs above a value of 1 represent the possibility of adverse environmental effects occurring from the intake of contaminants. No adverse ecological effects are expected to occur at sites with an EQ of less than 1. The EQ for the site was calculated at a value of 1.2×10^{-3} (or 0.0012), which indicates adverse environmental effects are unlikely to occur.

Description of the Selected Alternative

The remedial investigation and risk assessment conducted for the site indicated that no action is necessary to protect human health and the environment.

As part of the no action remedy and site close-out procedures, the following three conditions will be met:

- The completion of a RCRA-required plat of survey which will locate the site in relation to a permanent benchmark. The plat will be provided to the U.S. EPA regional administrator and the Holloman AFB zoning authority. The surveying will be completed by a professional land surveyor, and the plat will state the obligation of Holloman AFB to restrict disturbance of the site.

- Surface debris will be removed from the site. Following removal of the debris, a composite sample will be collected from areas that contained debris. If stained or disturbed soil is observed, a discrete sample will be collected from that location. The soil samples will be analyzed using EPA methods SW8240, SW8080, SW8150, SW8140, and metals.

A continued groundwater monitoring program was recommended in the *Remedial Investigation Report - Investigation, Study and Recommendation for 29 Waste Sites* (October 1992). This additional sampling is to ensure the safety of the surrounding population and the environment. Groundwater samples will be collected and analyzed for volatile organics, organochlorine pesticides and PCBs, organophosphorus pesticides, chlorinated herbicides, and total metals once every 2 years for 10 years to ensure that any potential future release from the site does not go undetected. A long-term monitoring work plan will be submitted by Holloman AFB for approval by the NMED.

To determine whether further investigation is warranted, analytical results will be compared with triggering criteria. Proposed RCRA Subpart S action levels (Federal Register Vol 55, No. 145, pp. 30798-30884) will be used as triggering criteria. Proposed RCRA Subpart S action levels are to-be-considered standards presented in the discussion of applicable, relevant, and appropriate requirements in Appendix B of the RI report. If the analytes are detected at concentrations above the triggering criteria, the site will be considered for further investigation.

In the RI, lead was detected at concentrations above the proposed RCRA Subpart S action levels. However, the *Risk Assessment Report for the Remedial Investigation -Investigation, Study and Recommendation of 29 Waste Sites* (June 1992) found that these constituents do not pose a threat to human health or the environment. Results of the RA are discussed further in the next section. For these constituents, concentrations one order of magnitude greater than the proposed RCRA Subpart S action levels will be used as triggering criteria.

Following each of the five rounds of the continued groundwater monitoring program, a report will be prepared. The report will include a comparison of the results with the triggering criteria, conclusions, and recommendations. If triggering criteria are not exceeded, the recommendation will be to sample again every 2 years until the 10 years have passed. If triggering criteria are exceeded, the wells will be resampled to confirm the results and the NMED will be notified. If resampling does not confirm the results, the conclusion will be that no release has occurred and a request will be made to return to the continued groundwater monitoring program until the 10 years have passed. If resampling verifies that concentrations exceed the established triggering criteria, the conclusion will be that a release may have occurred. Following verification of a potential release, the risks posed to human health or the environment will be reevaluated using the procedures presented in the RA report.

Responsiveness Summary

The Proposed Plan for the site was released for public comment in July 1993. The Proposed Plan identified no action as the preferred remedial alternative. The no action alternative included long-term groundwater monitoring and the production of a plat of survey for the site. The NMED requested that Holloman AFB remove surface debris and conduct limited sampling as a requirement of site closure. No comments were submitted during the public review period; therefore no significant changes to the preferred remedial action, as it was presented in the Proposed Plan, were necessary.

IRP Site 21

Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is not Required

Site Name and Location

IRP Site 21 (RCRA SWMU 116)
West Area Landfill No. 2
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose

This decision document presents the selected remedial action for the referenced site chosen in accordance with CERCLA, as amended by SARA. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy

The remedial investigation and risk assessment conducted for the site indicated that no action is necessary to protect human health and the environment. As part of the no action remedy, surface debris will be removed from the site, a plat of survey will be produced for the site, and long-term monitoring will be conducted at the site.

Declaration Statement

The remedial investigation and risk assessment conducted for the site indicated that conditions at the site do not require further action to ensure the protection of human health and the environment. Because no hazardous substances will remain on-site above health-based levels, a five-year review is not necessary.

If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Judith Espinosa, Cabinet Secretary New Mexico Environment Department	Date
John F. Miller, Jr. Brigader General, USAF Commander	Date

Decision Summary

Site Name, Location and Description

IRP Site 21 (RCRA SWMU 116) is the West Area Landfill No. 2 site located east of the Solar Observatory, Building 910 (see figure) at Holloman AFB.

The near-surface geology at Holloman AFB consists of interbedded sands, silts, and clays. Soils are low to moderately permeable and mildly alkaline. Groundwater occurs from 5 to 40 ft below the surface. Local and regional groundwater flow direction is controlled by the southwest-trending arroyos. In the southern portion of Holloman AFB, regional groundwater flow is to the southwest, following the Dillard Draw surficial drainage system. In the northern portion of Holloman AFB, groundwater flow is to the west, following Ritas Draw, Malone Draw, and Lost River drainages.

The unconfined aquifer beneath Holloman AFB exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption based on NMWQCC 82-1, as amended through August 18, 1992, Parts 3-100 through 3-103. Based on the *Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy* (EPA, 1986), the unconfined aquifer beneath Holloman AFB is a Class III-B aquifer and is classified as non-potable.

Site History and Enforcement Activities

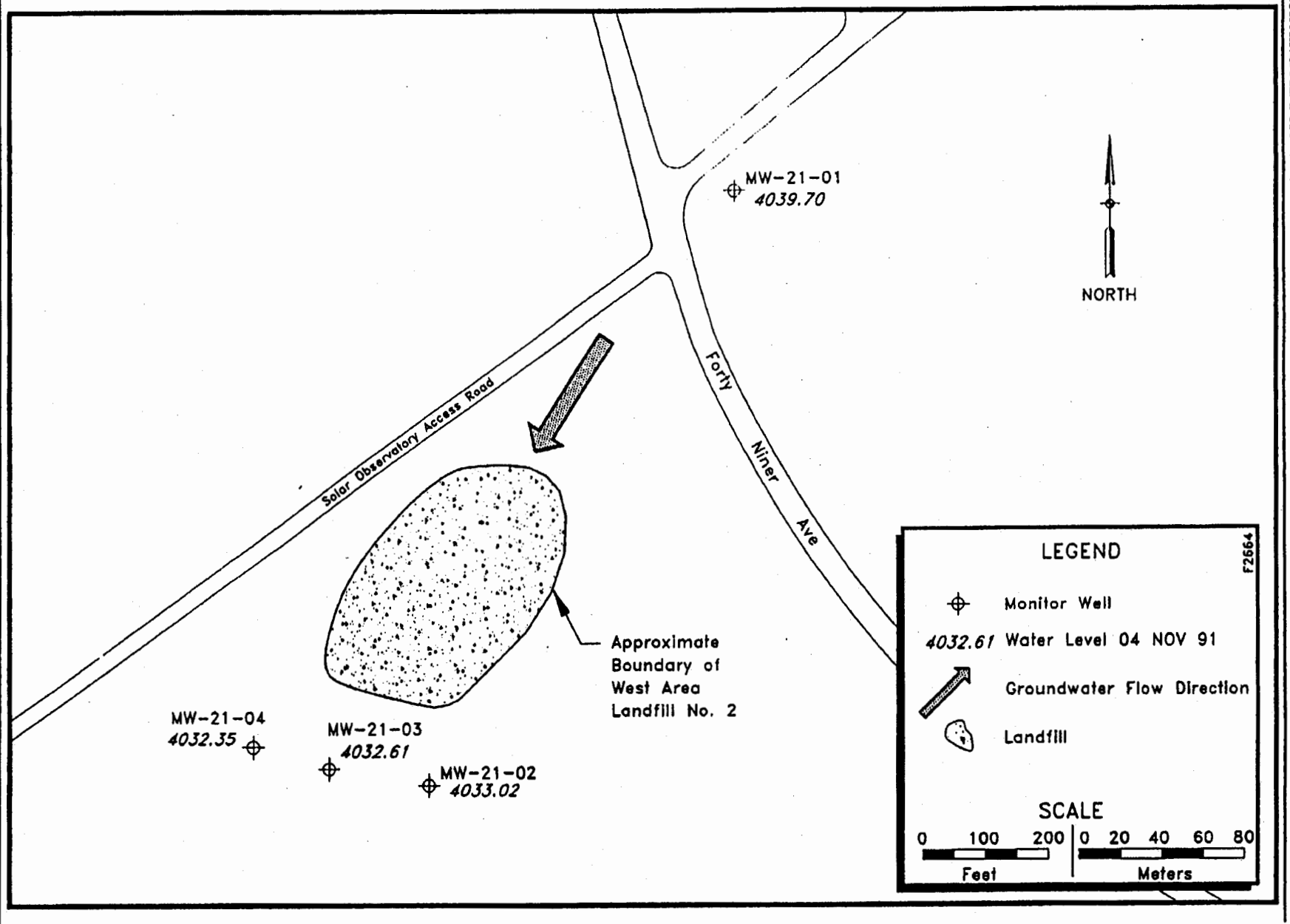
The landfill was primarily a dump site covering 1 to 2 acres. Bioenvironmental Engineering records at Holloman AFB indicate that waste materials contained at the site included paper bags, food cans, boxes, boards, and tree limbs. One interviewee of Holloman AFB indicated that some 55-gal drums were observed during the active period of the landfill. It was active from the early 1970s (assumed) until 1977. Disposal operations were stopped after the site was identified as an unapproved landfill.

A record search for Site 21 was conducted by the engineering firm CH2M Hill between December 1982 and August 1983. Radian Corporation performed the RI during 1991 and 1992. No remedial actions have been performed at the site.

The site is also included as a solid waste management unit (SWMU) on Holloman AFB's HSWA permit from the U.S. EPA, Region VI. A RCRA Facility Assessment (RFA) was conducted by AT Kearney in 1987 and the RI conducted by Radian Corporation during 1991 and 1992 met all of the requirements of the RCRA Facility Investigation (RFI).

Highlights of Community Participation

Copies of the *Remedial Investigation Report-Investigation, Study and Recommendation for 29 Waste Sites* (October, 1992) and the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (June, 1992) which contain the site were released to the public January 24, 1993. The reports were made available to the public in the administrative record located at the Holloman AFB Library and the Alamogordo Public Library. The notice of availability was published in the *Alamogordo Daily News* on January 24, 1993.


MW-21-01
4039.70
NORTH
Solar Observatory Access Road
Forty Niner Ave
Approximate Boundary of West Area Landfill No. 2
MW-21-04
4032.35
MW-21-03
4032.61
MW-21-02
4033.02
LEGEND
Monitor Well
4032.61 Water Level 04 NOV 91
Groundwater Flow Direction
Landfill
SCALE
0 100 200
Feet
0 20 40 60 80
Meters
FZ664

A public comment period was held from July 1993 through August 1993. A public meeting was held at the Alamogordo Civic Center on 26 August 1993. Representatives from Holloman AFB and the USACE (Omaha District) were present at the meeting to answer any questions pertaining to the site. No comments were received during the review period.

This decision document presents the selected remedial action for the site, chosen in accordance with CERCLA, as amended by SARA. The decision for this site is based on the administrative record.

Scope and Role of the Response Action

The Remedial Investigation (RI) and Risk Assessment (RA) conducted for the site indicated that no action is necessary to protect human health and the environment under CERCLA.

Summary of Site Characteristics

In July 1991, Holloman AFB conducted a RI to identify the types, quantities, and locations of contaminants at the site. A summary of the field investigation and results of the RI are presented below.

Groundwater

Four groundwater monitoring wells were installed at the site to determine whether a release of contaminants to the groundwater had occurred. One round of groundwater samples was taken and analyzed by a certified laboratory for volatile organic compounds, total metals, organophosphorus pesticides, organochlorine pesticides and PCBs, chlorinated herbicides, anions, and total dissolved solids. All water quality parameters were detected at concentrations below the established background levels for Holloman AFB. (Water quality parameters include total dissolved solids, chloride, sulfate, fluoride, nitrate-nitrite, and total phosphorous.) Cadmium was the only metal concentration detected in a downgradient monitoring well at a level above the established background level for Holloman AFB. However, it is uncertain whether cadmium concentrations reflect a contaminant release to the groundwater. Furthermore, benzene was detected in a downgradient well above the established action level, so the presence of this analyte may indicate that a possible release has occurred.

Summary of Site Risks

A RA was conducted to estimate the potential consequences to human health and the environment that could result if contamination at this site is not remediated. The RA consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., skin, ingestion, or inhalation); 3) toxicity assessment or discussion of hazards and dose-response relationships associated with each contaminant; and 4) quantification of potential carcinogenic and noncarcinogenic risks. A detailed description of the RA is contained in the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (June 1992).

Human Health Risks

The human health risks evaluated for this site were based on the possible exposure of off-base residents to contaminants in the groundwater reaching an agricultural well. This exposure does not currently exist; however, the hypothetical scenario was evaluated to ensure a conservative assessment of potential risks associated with this site.

Generally, a total carcinogenic risk of 10^{-6} for each potential chemical contaminant is considered acceptable. This is equivalent to a one-in-a-million excess cancer risk from exposure to that chemical. A cumulative total (sum of risk from all chemicals) must be at or below 10^{-5} (or a one-in-one-hundred-thousand excess cancer risk). Carcinogenic risk characterization of the site indicate that adverse human health effects are unlikely.

For a noncarcinogenic risk to be acceptable, the sum of the Hazard Index (HI) may not exceed a value of 1. The HI is the ratio of the chemical intake to a reference dose (the acceptable dose). The HI for the site is 0.0004 to 0.0002 which is well below the value of 1, making the noncarcinogenic risk for off-base residential exposure within the acceptable range. Therefore, adverse health effects are not expected to result from exposure.

Environmental Risks

Environmental risk was evaluated using an Environmental Quotient (EQ). The EQ calculates the potential ecological risks associated with the contaminants of concern through the ingestion of soil and/or contaminated plants. EQs above a value of 1 represent the possibility of adverse environmental effects occurring from the intake of contaminants. No adverse ecological effects are expected to occur at sites with an EQ of less than 1. The EQ for the site was calculated at a value of 3×10^{-5} (or 0.00003), which indicates adverse environmental effects are unlikely to occur.

Description of the Selected Alternative

The remedial investigation and risk assessment conducted for the site indicated that no action is necessary to protect human health and the environment.

As part of the no action remedy and site close-out procedures, the following three conditions will be met:

- The completion of a RCRA-required plat of survey which will locate the site in relation to a permanent benchmark. The plat will be provided to the U.S. EPA regional administrator and the Holloman AFB zoning authority. The surveying will be completed by a professional land surveyor, and the plat will state the obligation of Holloman AFB to restrict disturbance of the site.

- Surface debris will be removed from the site. Following removal of the debris, a composite sample will be collected from areas that contained debris. If stained or disturbed soil is observed, a discrete sample will be collected from that location. The soil samples will be analyzed using EPA methods SW8240, SW8080, SW8150, SW8140, and metals.

A continued groundwater monitoring program was recommended in the *Remedial Investigation Report - Investigation, Study and Recommendation for 29 Waste Sites* (October 1992). This additional sampling is to ensure the safety of the surrounding population and the environment. Groundwater samples will be collected and analyzed for volatile organics, organochlorine pesticides and PCBs, organophosphorus pesticides, chlorinated herbicides, and total metals once every 2 years for 10 years to ensure that any potential future release from the site does not go undetected. A long-term monitoring work plan will be submitted by Holloman AFB for approval by the NMED.

To determine whether further investigation is warranted, analytical results will be compared with triggering criteria. Proposed RCRA Subpart S action levels (Federal Register Vol 55, No. 145, pp. 30798-30884) will

be used as triggering criteria. Proposed RCRA Subpart S action levels are to-be-considered standards presented in the discussion of applicable, relevant, and appropriate requirements in Appendix B of the RI report. If the analytes are detected at concentrations above the triggering criteria, the site will be considered for further investigation.

In the RI, lead was detected at concentrations above the proposed RCRA Subpart S action levels. However, the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation of 29 Waste Sites* (June 1992) found that these constituents do not pose a threat to human health or the environment. Results of the RA are discussed further in the next section. For these constituents, concentrations one order of magnitude greater than the proposed RCRA Subpart S action levels will be used as triggering criteria.

Following each of the five rounds of the continued groundwater monitoring program, a report will be prepared. The report will include a comparison of the results with the triggering criteria, conclusions, and recommendations. If triggering criteria are not exceeded, the recommendation will be to sample again every 2 years until the 10 years have passed. If triggering criteria are exceeded, the wells will be resampled to confirm the results and the NMED will be notified. If resampling does not confirm the results, the conclusion will be that no release has occurred and a request will be made to return to the continued groundwater monitoring program until the 10 years have passed. If resampling verifies that concentrations exceed the established triggering criteria, the conclusion will be that a release may have occurred. Following verification of a potential release, the risks posed to human health or the environment will be reevaluated using the procedures presented in the RA report.

Responsiveness Summary

The Proposed Plan for the site was released for public comment in July 1993. The Proposed Plan identified no action as the preferred remedial alternative. The no action alternative included long-term groundwater monitoring and the production of a plat of survey for the site. The no action alternative was amended by NMED to include removal of surface debris and limited soil sampling. No comments were submitted during the public review period; therefore no significant changes to the preferred remedial action, as it was presented in the Proposed Plan, were necessary.

IRP Site 22

Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is not Required

Site Name and Location

IRP Site 22 (RCRA SWMU 115)
West Area Landfill No. 1
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose

This decision document presents the selected remedial action for the referenced site chosen in accordance with CERCLA, as amended by SARA. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy

The remedial investigation and risk assessment conducted for the site indicated that no action is necessary to protect human health and the environment. As part of the no action remedy, surface debris will be removed from the site, a plat of survey will be produced for the site, and long-term monitoring will be conducted at the site.

Declaration Statement

The remedial investigation and risk assessment conducted for the site indicated that conditions at the site do not require further action to ensure the protection of human health and the environment. Because no hazardous substances will remain on-site above health-based levels, a five-year review is not necessary.

If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Judith Espinosa, Cabinet Secretary New Mexico Environment Department	Date
John F. Miller, Jr. Brigader General, USAF Commander	Date

Decision Summary

Site Name, Location and Description

IRP Site 22 (RCRA SWMU 115) is the West Area Landfill No. 1 site located in an arroyo near the Solar Observatory, Building 910, on Holloman AFB (see figure).

The near-surface geology at Holloman AFB consists of interbedded sands, silts, and clays. Soils are low to moderately permeable and mildly alkaline. Groundwater occurs from 5 to 40 ft below the surface. Local and regional groundwater flow direction is controlled by the southwest-trending arroyos. In the southern portion of Holloman AFB, regional groundwater flow is to the southwest, following the Dillard Draw surficial drainage system. In the northern portion of Holloman AFB, groundwater flow is to the west, following Ritas Draw, Malone Draw, and Lost River drainages.

The unconfined aquifer beneath Holloman AFB exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption based on NMWQCC 82-1, as amended through August 18, 1992, Parts 3-100 through 3-103. Based on the *Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy* (EPA, 1986), the unconfined aquifer beneath Holloman AFB is a Class III-B aquifer and is classified as non-potable.

Site History and Enforcement Activities

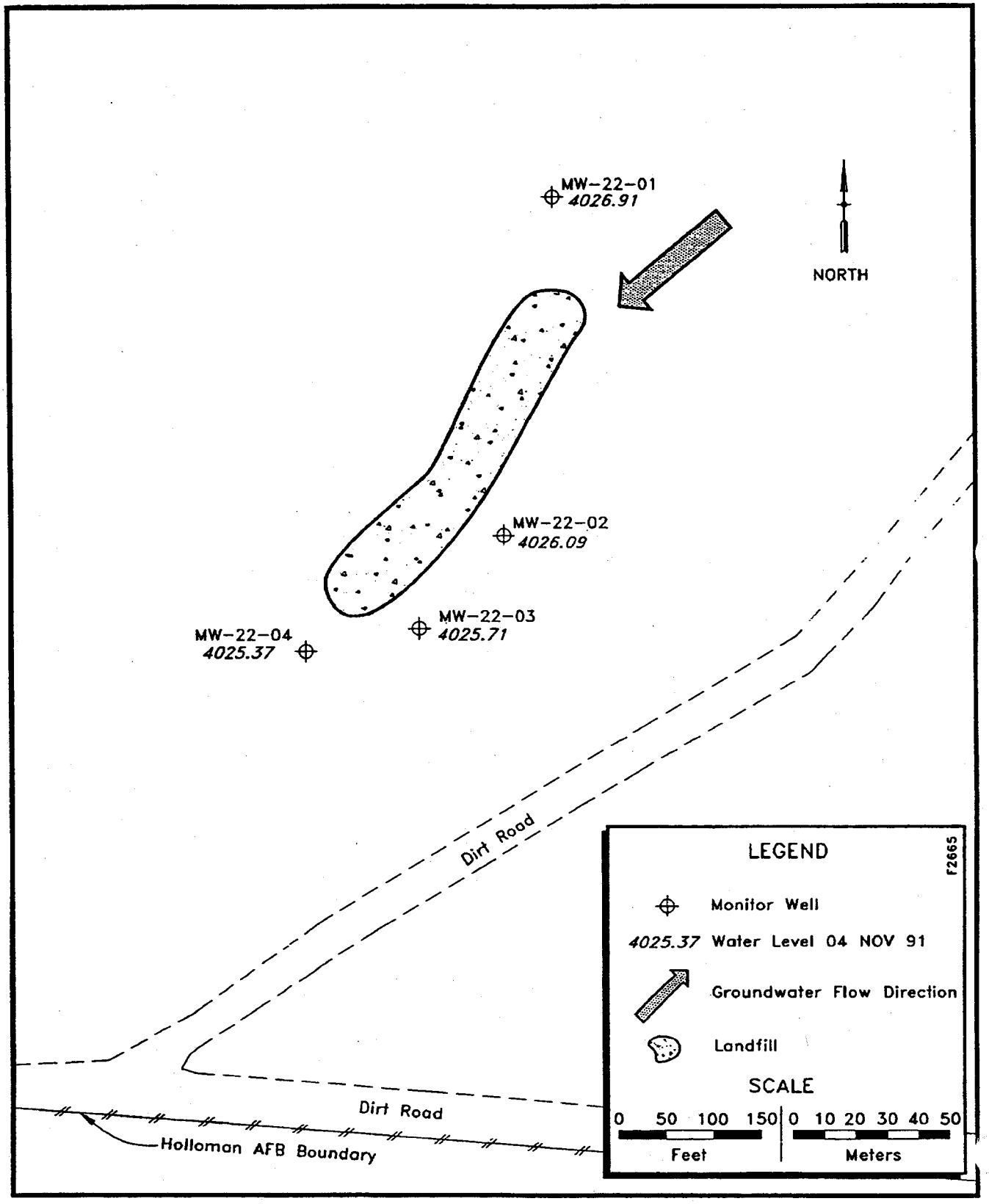
The landfill was primarily a dump covering 2 to 3 acres and was used from 1974 to 1978. Bioenvironmental Engineering records of the Base indicate that items such as plastic sheets, boxes, and empty cans were the types of solid wastes disposed of at the site. Some 55-gal. drums were reportedly observed during the active period of the landfill. Disposal operations were stopped after the location was identified as an unapproved landfill.

A record search for Site 22 was conducted by the engineering firm CH2M Hill between December 1982 and August 1983. Radian Corporation performed the RI during 1991 and 1992. No remedial actions have been performed at the site.

The site is also included as a solid waste management unit (SWMU) on Holloman AFB's HSWA permit from the U.S. EPA, Region VI. A RCRA Facility Assessment (RFA) was conducted by AT Kearney in 1987 and the RI conducted by Radian Corporation during 1991 and 1992 met all of the requirements of the RCRA Facility Investigation (RFI).

Highlights of Community Participation

Copies of the *Remedial Investigation Report-Investigation, Study and Recommendation for 29 Waste Sites* (October, 1992) and the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (June, 1992) which contain the site were released to the public January 24, 1993. The reports were made available to the public in the administrative record located at the Holloman AFB Library and the Alamogordo Public Library. The notice of availability was published in the *Alamogordo Daily News* on January 24, 1993.


MW-22-01
4026.91
NORTH
MW-22-02
4026.09
MW-22-03
4025.71
MW-22-04
4025.37
Dirt Road
Dirt Road
Holloman AFB Boundary
LEGEND
F2665
Monitor Well
4025.37 Water Level 04 NOV 91
Groundwater Flow Direction
Landfill
SCALE
0 50 100 150
Feet
0 10 20 30 40 50
Meters

A public comment period was held from July 1993 through August 1993. A public meeting was held at the Alamogordo Civic Center on 26 August 1993. Representatives from Holloman AFB and the USACE (Omaha District) were present at the meeting to answer any questions pertaining to the site. No comments were received during the review period.

This decision document presents the selected remedial action for the site, chosen in accordance with CERCLA, as amended by SARA. The decision for this site is based on the administrative record.

Scope and Role of the Response Action

The Remedial Investigation (RI) and Risk Assessment (RA) conducted for the site indicated that no action is necessary to protect human health and the environment under CERCLA.

Summary of Site Characteristics

In July 1991, Holloman AFB conducted a RI to identify the types, quantities, and locations of contaminants at the site. A summary of the field investigation and results of the RI are presented below.

Groundwater

Four groundwater monitoring wells were installed at the site to determine whether a release of contaminants to the groundwater had occurred. One round of groundwater samples was taken and analyzed by a certified laboratory for volatile organic compounds, total metals, organophosphorus pesticides, organochlorine pesticides and PCBs, chlorinated herbicides, anions, and total dissolved solids. All water quality parameters were detected at concentrations below the established background levels for Holloman AFB. (Water quality parameters include total dissolved solids, chloride, sulfate, fluoride, nitrate-nitrite, and total phosphorous.)

The pesticides 4,4-DDE and alpha-BHC were detected in one downgradient monitoring well; no pesticides were detected in the other monitoring wells. Cadmium was the only metal concentration detected in a downgradient monitoring well at a level above the established background level for Holloman AFB. However, it is uncertain whether cadmium concentrations reflect a contaminant release to the groundwater.

Summary of Site Risks

A RA was conducted to estimate the potential consequences to human health and the environment that could result if contamination at this site is not remediated. The RA consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., skin, ingestion, or inhalation); 3) toxicity assessment or discussion of hazards and dose-response relationships associated with each contaminant; and 4) quantification of potential carcinogenic and noncarcinogenic risks. A detailed description of the RA is contained in the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (June 1992).

Human Health Risks

The human health risks evaluated for this site were based on the possible exposure of off-base residents to contaminants in the groundwater reaching an agricultural well. This exposure does not currently exist; however, the hypothetical scenario was evaluated to ensure a conservative assessment of potential risks associated with this site.

Generally, a total carcinogenic risk of 10^{-6} for each potential chemical contaminant is considered acceptable. This is equivalent to a one-in-a-million excess cancer risk from exposure to that chemical. A cumulative total (sum of risk from all chemicals) must be at or below 10^{-5} (or a one-in-one-hundred-thousand excess cancer risk). For a noncarcinogenic risk to be acceptable, the sum of the Hazard Index (HI) may not exceed a value of 1. The HI is the ratio of the chemical intake to a reference dose (the acceptable dose).

Groundwater modeling indicates that there are no contaminant concentrations available for human exposure; thus, adverse human health effects are unlikely for this site.

Environmental Risks

Environmental risk was evaluated using an Environmental Quotient (EQ). The EQ calculates the potential ecological risks associated with the contaminants of concern through the ingestion of soil and/or contaminated plants. EQs above a value of 1 represent the possibility of adverse environmental effects occurring from the intake of contaminants. No adverse ecological effects are expected to occur at sites with an EQ of less than 1. The EQ for the site was calculated at a value of 4.6×10^{-6} (or 0.0000046), which indicates adverse environmental effects are unlikely to occur.

Description of the Selected Alternative

The remedial investigation and risk assessment conducted for the site indicated that no action is necessary to protect human health and the environment.

As part of the no action remedy and site close-out procedures, the following three conditions will be met:

- The completion of a RCRA-required plat of survey which will locate the site in relation to a permanent benchmark. The plat will be provided to the U.S. EPA regional administrator and the Holloman AFB zoning authority. The surveying will be completed by a professional land surveyor, and the plat will state the obligation of Holloman AFB to restrict disturbance of the site.

- Surface debris will be removed from the site. Following removal of the debris, a composite sample will be collected from areas that contained debris. If stained or disturbed soil is observed, a discrete sample will be collected from that location. The soil samples will be analyzed using EPA methods SW8240, SW8080, SW8150, SW8140, and metals.

A continued groundwater monitoring program was recommended in the *Remedial Investigation Report - Investigation, Study and Recommendation for 29 Waste Sites* (October 1992). This additional sampling is to ensure the safety of the surrounding population and the environment. Groundwater samples will be collected and analyzed for volatile organics, organochlorine pesticides and PCBs, organophosphorus pesticides, chlorinated herbicides, and total metals once every 2 years for 10 years to ensure that any potential future release from the site does not go undetected. A long-term monitoring plan will be submitted by Holloman AFB for approval by the NMED.

To determine whether further investigation is warranted, analytical results will be compared with triggering criteria. Proposed RCRA Subpart S action levels (Federal Register Vol 55, No. 145, pp. 30798-30884) will be used as triggering criteria. Proposed RCRA Subpart S action levels are to-be-considered standards presented in the discussion of applicable, relevant, and appropriate requirements in Appendix B of the RI

report. If the analytes are detected at concentrations above the triggering criteria, the site will be considered for further investigation.

In the RI, lead was detected at concentrations above the proposed RCRA Subpart S action levels. However, the *Risk Assessment Report for the Remedial Investigation -Investigation, Study and Recommendation of 29 Waste Sites* (June 1992) found that these constituents do not pose a threat to human health or the environment. Results of the RA are discussed further in the next section. For these constituents, concentrations one order of magnitude greater than the proposed RCRA Subpart S action levels will be used as triggering criteria.

Following each of the five rounds of the continued groundwater monitoring program, a report will be prepared. The report will include a comparison of the results with the triggering criteria, conclusions, and recommendations. If triggering criteria are not exceeded, the recommendation will be to sample again every 2 years until the 10 years have passed. If triggering criteria are exceeded, the wells will be resampled to confirm the results and the NMED will be notified. If resampling does not confirm the results, the conclusion will be that no release has occurred and a request will be made to return to the continued groundwater monitoring program until the 10 years have passed. If resampling verifies that concentrations exceed the established triggering criteria, the conclusion will be that a release may have occurred. Following verification of a potential release, the risks posed to human health or the environment will be reevaluated using the procedures presented in the RA report.

Responsiveness Summary

The Proposed Plan for the site was released for public comment in July 1993. The Proposed Plan identified no action as the preferred remedial alternative. The no action alternative included long-term groundwater monitoring and the production of a plat of survey for the site. The no action alternative was modified by NMED to include the removal of surface debris and limited soil sampling. No comments were submitted during the public review period; therefore no significant changes to the preferred remedial action, as it was presented in the Proposed Plan, were necessary.

IRP Site 23

Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is not Required

Site Name and Location

IRP Site 23 (RCRA SWMU 108)
MOBSS Landfill
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose

This decision document presents the selected remedial action for the referenced site chosen in accordance with CERCLA, as amended by SARA. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy

The remedial investigation and risk assessment conducted for the site indicated that no action is necessary to protect human health and the environment. As part of the no action remedy, surface debris will be removed from the site, a plat of survey will be produced for the site, and long-term monitoring will be conducted at the site.

Declaration Statement

The remedial investigation and risk assessment conducted for the site indicated that conditions at the site do not require further action to ensure the protection of human health and the environment. Because no hazardous substances will remain on-site above health-based levels, a five-year review is not necessary.

If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Judith Espinosa, Cabinet Secretary
New Mexico Environment Department

Date

John F. Miller, Jr.
Brigader General, USAF
Commander

Date

Decision Summary

Site Name, Location and Description

IRP Site 23 (RCRA SWMU 108) is the MOBSS Landfill site located in a borrow pit west of the Solar Observatory, Building 910, on Holloman AFB (see figure).

The near-surface geology at Holloman AFB consists of interbedded sands, silts, and clays. Soils are low to moderately permeable and mildly alkaline. Groundwater occurs from 5 to 40 ft below the surface. Local and regional groundwater flow direction is controlled by the southwest-trending arroyos. In the southern portion of Holloman AFB, regional groundwater flow is to the southwest, following the Dillard Draw surficial drainage system. In the northern portion of Holloman AFB, groundwater flow is to the west, following Ritas Draw, Malone Draw, and Lost River drainages.

The unconfined aquifer beneath Holloman AFB exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption based on NMWQCC 82-1, as amended through August 18, 1992, Parts 3-100 through 3-103. Based on the *Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy* (EPA, 1986), the unconfined aquifer beneath Holloman AFB is a Class III-B aquifer and is classified as non-potable.

Site History and Enforcement Activities

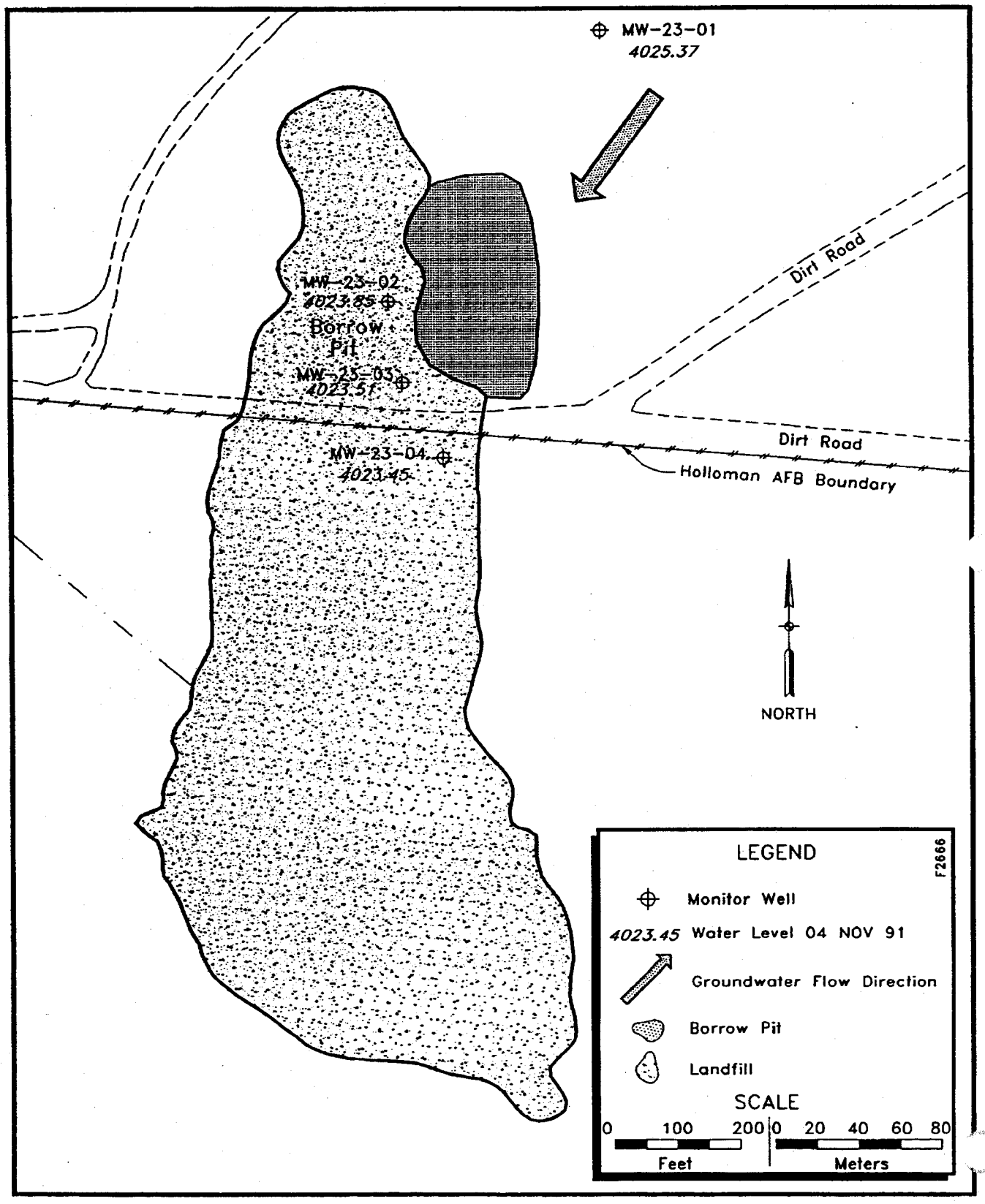
The landfill received a variety of waste from 1976 to 1979. Cans of diazinon and dibromochloromethane and 55-gal. drums of unknown contents, as documented in previous reports, were observed at the disposal site. During the reconnaissance, asphalt, construction debris, a concrete vault, a trailer, two or three empty 55-gal. drums, four or five 1-gal. metal buckets of roofing tar, and other materials were found at the dump site.

A record search for Site 23 was conducted by the engineering firm CH2M Hill between December 1982 and August 1983. Radian Corporation performed the RI during 1991 and 1992. No remedial actions have been performed at the site.

The site is also included as a solid waste management unit (SWMU) on Holloman AFB's HSWA permit from the U.S. EPA, Region VI. A RCRA Facility Assessment (RFA) was conducted by AT Kearney in 1987 and the RI conducted by Radian Corporation during 1991 and 1992 met all of the requirements of the RCRA Facility Investigation (RFI).

Highlights of Community Participation

Copies of the *Remedial Investigation Report-Investigation, Study and Recommendation for 29 Waste Sites* (October, 1992) and the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (June, 1992) which contain the site were released to the public January 24, 1993. The reports were made available to the public in the administrative record located at the Holloman AFB Library and the Alamogordo Public Library. The notice of availability was published in the *Alamogordo Daily News* on January 24, 1993.


MW-23-01
4025.37
MW-23-02
4023.85
Borrow Pit
MW-23-03
4023.51
MW-23-04
4023.45
Dirt Road
Dirt Road
Holloman AFB Boundary
NORTH
LEGEND
F2666
Monitor Well
4023.45 Water Level 04 NOV 91
Groundwater Flow Direction
Borrow Pit
Landfill
SCALE
0 100 200
Feet
0 20 40 60 80
Meters

A public comment period was held from July 1993 through August 1993. A public meeting was held at the Alamogordo Civic Center on 26 August 1993. Representatives from Holloman AFB and the USACE (Omaha District) were present at the meeting to answer any questions pertaining to the site. No comments were received during the review period.

This decision document presents the selected remedial action for the site, chosen in accordance with CERCLA, as amended by SARA. The decision for this site is based on the administrative record.

Scope and Role of the Response Action

The Remedial Investigation (RI) and Risk Assessment (RA) conducted for the site indicated that no action is necessary to protect human health and the environment under CERCLA.

Summary of Site Characteristics

In July 1991, Holloman AFB conducted a RI to identify the types, quantities, and locations of contaminants at the site. A summary of the field investigation and results of the RI are presented below.

Groundwater

Four groundwater monitoring wells were installed at the site to determine whether a release of contaminants to the groundwater had occurred. One round of groundwater samples was taken and analyzed by a certified laboratory for volatile organic compounds, total metals, organophosphorus pesticides, organochlorine pesticides and PCBs, chlorinated herbicides, anions, and total dissolved solids. With the exceptions of chloride and total phosphorous, all water quality parameters were detected at concentrations below the established background levels for Holloman AFB. (Water quality parameters include total dissolved solids, chloride, sulfate, fluoride, nitrate-nitrite, and total phosphorous.) Chloride and total phosphorus were detected slightly above the established background levels. However, the groundwater quality parameters for Holloman AFB naturally exceed the state and federal regulatory criteria.

Lead was the only metal concentration detected in a downgradient monitoring well at a level above the established background level for Holloman AFB. It is uncertain whether lead concentrations reflect a contaminant release to the groundwater. The pesticide delta-BHC was detected in downgradient wells, with the presence indicating that a possible release of contaminants may have occurred to the environment. These two wells are located in a borrow pit that fills with runoff water during rainfall events. Surface water runoff may have affected groundwater quality in the borrow pit by introducing pesticides commonly used in past Base operations. The lack of detected constituents for the other parameters, particularly for other pesticides and herbicides, suggests that the MOBSS Landfill has had little impact on the local groundwater.

Summary of Site Risks

A RA was conducted to estimate the potential consequences to human health and the environment that could result if contamination at this site is not remediated. The RA consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., skin, ingestion, or inhalation); 3) toxicity assessment or discussion of hazards and dose-response relationships associated with each contaminant; and 4) quantification of potential carcinogenic and noncarcinogenic risks. A detailed description of the RA is contained in the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (June 1992).

Human Health Risks

The human health risks evaluated for this site were based on the possible exposure of off-base residents to contaminants in the groundwater reaching an agricultural well. This exposure does not currently exist; however, the hypothetical scenario was evaluated to ensure a conservative assessment of potential risks associated with this site.

Generally, a total carcinogenic risk of 10^{-6} for each potential chemical contaminant is considered acceptable. This is equivalent to a one-in-a-million excess cancer risk from exposure to that chemical. A cumulative total (sum of risk from all chemicals) must be at or below 10^{-5} (or a one-in-one-hundred-thousand excess cancer risk). For a noncarcinogenic risk to be acceptable, the sum of the Hazard Index (HI) may not exceed a value of 1. The HI is the ratio of the chemical intake to a reference dose (the acceptable dose).

Groundwater modeling indicates that there are no contaminant concentrations available for human exposure; thus, adverse human health effects are unlikely for this site.

Environmental Risks

Environmental risk was evaluated using an Environmental Quotient (EQ). The EQ calculates the potential ecological risks associated with the contaminants of concern through the ingestion of soil and/or contaminated plants. EQs above a value of 1 represent the possibility of adverse environmental effects occurring from the intake of contaminants. No adverse ecological effects are expected to occur at sites with an EQ of less than 1. The EQ for the site was calculated at a value of 8.2×10^{-6} (or 0.0000082), which indicates adverse environmental effects are unlikely to occur.

Description of the Selected Alternative

The remedial investigation and risk assessment conducted for the site indicated that no action is necessary to protect human health and the environment.

As part of the no action remedy and site close-out procedures, the following three conditions will be met:

- The completion of a RCRA-required plat of survey which will locate the site in relation to a permanent benchmark. The plat will be provided to the U.S. EPA regional administrator and the Holloman AFB zoning authority. The surveying will be completed by a professional land surveyor, and the plat will state the obligation of Holloman AFB to restrict disturbance of the site.

- Surface debris will be removed from the site. Following removal of the debris, a composite sample will be collected from areas that contained debris. If stained or disturbed soil is observed, a discrete sample will be collected from that location. The soil samples will be analyzed using EPA methods SW8240, SW8080, SW8150, SW8140, and metals.

A continued groundwater monitoring program was recommended in the *Remedial Investigation Report - Investigation, Study and Recommendation for 29 Waste Sites* (October 1992). This additional sampling is to ensure the safety of the surrounding population and the environment. Groundwater samples will be collected and analyzed for volatile organics, organochlorine pesticides and PCBs, organophosphorus pesticides, chlorinated herbicides, and total metals once every 2 years for 10 years to ensure that any potential future release from the site does not go undetected. A long-term monitoring plan will be submitted by Holloman AFB for approval by the NMED.

To determine whether further investigation is warranted, analytical results will be compared with triggering criteria. Proposed RCRA Subpart S action levels (Federal Register Vol 55, No. 145, pp. 30798-30884) will be used as triggering criteria. Proposed RCRA Subpart S action levels are to-be-considered standards presented in the discussion of applicable, relevant, and appropriate requirements in Appendix B of the RI report. If the analytes are detected at concentrations above the triggering criteria, the site will be considered for further investigation.

In the RI, lead was detected at concentrations above the proposed RCRA Subpart S action levels. However, the *Risk Assessment Report for the Remedial Investigation -Investigation, Study and Recommendation of 29 Waste Sites* (June 1992) found that these constituents do not pose a threat to human health or the environment. Results of the RA are discussed further in the next section. For these constituents, concentrations one order of magnitude greater than the proposed RCRA Subpart S action levels will be used as triggering criteria.

Following each of the five rounds of the continued groundwater monitoring program, a report will be prepared. The report will include a comparison of the results with the triggering criteria, conclusions, and recommendations. If triggering criteria are not exceeded, the recommendation will be to sample again every 2 years until the 10 years have passed. If triggering criteria are exceeded, the wells will be resampled to confirm the results. If resampling does not confirm the results, the conclusion will be that no release has occurred and a request will be made to return to the continued groundwater monitoring program until the 10 years have passed. If resampling verifies that concentrations exceed the established triggering criteria, the conclusion will be that a release may have occurred. Following verification of a potential release, the risks posed to human health or the environment will be reevaluated using the procedures presented in the RA report.

Responsiveness Summary

The Proposed Plan for the site was released for public comment in July 1993. The Proposed Plan identified no action as the preferred remedial alternative. The no action alternative included long-term groundwater monitoring and the production of a plat of survey for the site. The no action alternative was modified by NMED to include the removal of surface debris and limited soil sampling. No comments were submitted during the public review period; therefore no significant changes to the preferred remedial action, as it was presented in the Proposed Plan, were necessary.

APPENDIX G

DP-30/SD-33 AND SS-39 DECISION DOCUMENTS

Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is Required

Site Names and Location
IRP Sites DP-30 & SD-33 (RCRA SWMU 113B)
Grease Trap Disposal Pits Site and
Cooking Grease Disposal Pits Site
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced sites, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
The remedial investigation and risk assessment conducted for the sites indicated that, although waste will remain on site, no action is necessary to protect human health or the environment. As part of the no action remedy, a long-term groundwater monitoring program will be initiated.

Declaration Statement
The remedial investigation and risk assessment conducted for the sites indicate that conditions at the site do not require further action to ensure the protection of human health and the environment. Because waste will remain on site, a review will be conducted within five years after commencement of the selected remedy to ensure that the remedy continues to provide adequate protection of human health and the environment.

If new evidence becomes available and suggests the need for further action, the site closeout decision may be reversed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Date: 9/29/95

Bruce Carlson
Brigadier General, USAF Commander

Date: 3 Nov 95

Decision Summary

Site Name and Location

IRP Sites DP-30 and SD-33, the Grease Trap Disposal Pits site and the Cooking Grease Disposal Pits site, respectively, are located between the skeet range and the fire training area, north of Sabre Road in the eastern portion of the Base. The topography of the site is generally flat, and the ground is sparsely covered with vegetation. Five of the former pits are identifiable by linear depressions in the surface soil. Figure 1-1 shows the location of the site at Holloman AFB, and Figure 2-1 shows the site layout.

Soils at the site consist of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Regional groundwater flow direction is controlled by southwest-trending arroyos, and is to the southwest, following the Dillard Draw drainage system (see Figure 1-2). Groundwater occurs at approximately 20 ft bgl at the sites, and flows southeast toward Dillard Draw.

The unconfined aquifer beneath Holloman AFB exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. On the basis of the *Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy* (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as a Class III-B aquifer and is considered nonpotable.

Site History and Enforcement Activities

Since 1972, wastes from grease traps, oil/water separators, grit from the wastewater treatment plant, oil/water separator sludge, possible uncontrolled dumpings, and occasional sewage from the Primate Research Institute were disposed of at the site.

Sites DP-30 and SD-33 were identified as potential contaminant sources during an IRP records search conducted in 1983. As a result, the sites were included in a Phase I RI conducted in 1991. Results of the investigation indicated that contamination was present in the soils and groundwater beneath the site. On the basis of a preliminary risk-based screen, a feasibility study was recommended to quantitatively evaluate risks posed by the site and recommend further action. Holloman AFB evaluated site-specific exposure pathways and determined that the waste does not pose an unacceptable risk to human health and the environment. Holloman AFB also determined that removing the waste would increase the potential exposure risks to workers during excavation, transportation, and disposal. Therefore, Holloman AFB recommended no further action at the site, and long-term monitoring of groundwater beneath the site. Both U.S. EPA Region VI and the NMED concurred with the recommendation in an approval letter for the *RCRA Phase II Facility Investigation Work Plan* (Holloman AFB, 1993) received by Holloman AFB in January 1994.

These sites also are listed as SWMU 113B on the Hazardous and Solid Waste Amendments permit issued to Holloman AFB by U.S. EPA Region VI. The site was included in a RCRA facilities assessment in 1987. The investigation performed for the sites met the requirements of the IRP and RCRA program.

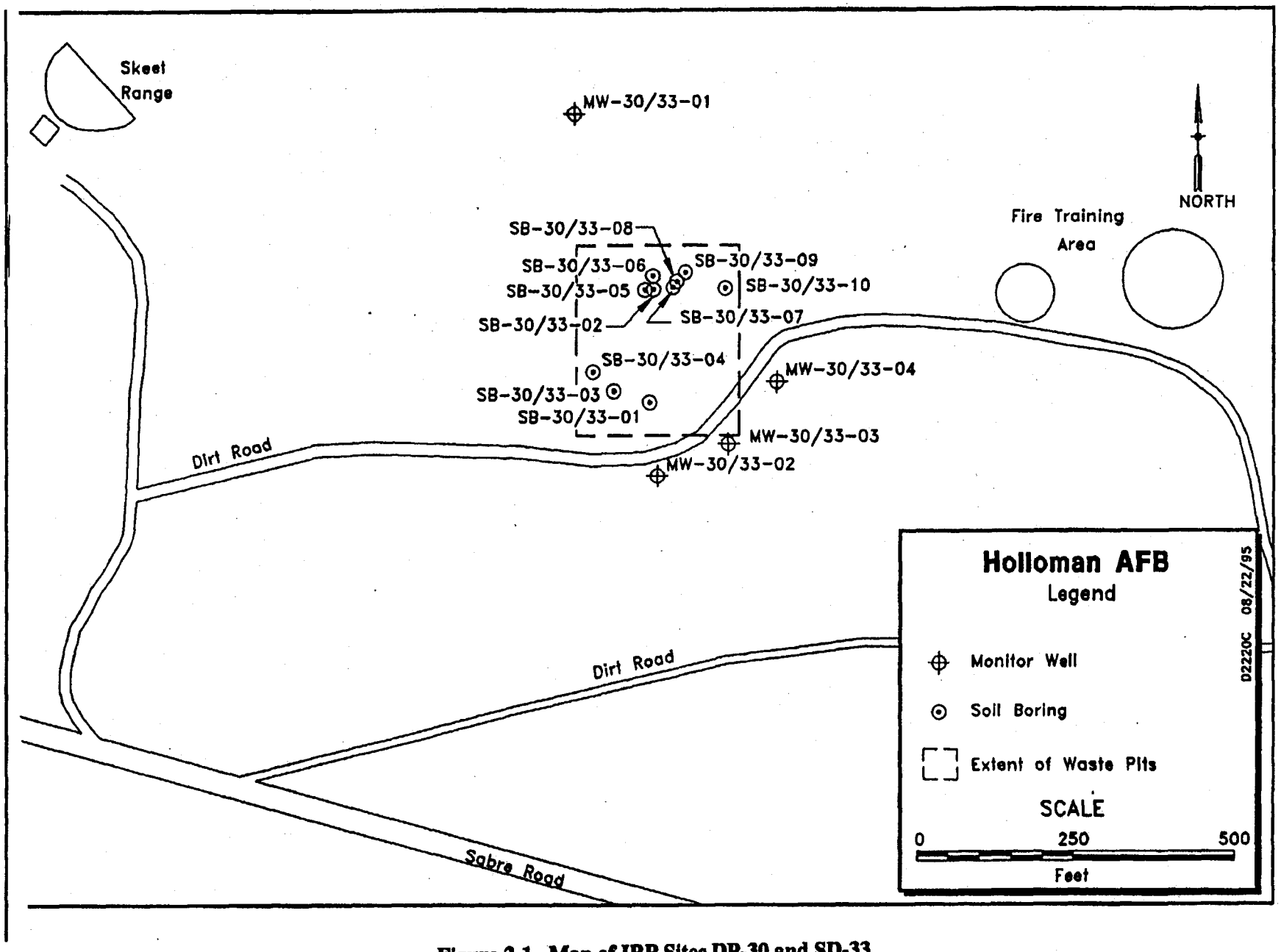


Figure 2-1. Map of IRP Sites DP-30 and SD-33

Highlights of Community Participation

Copies of the following reports which contain information pertaining to the site are available to the public through the administrative record located at the Holloman AFB and Alamogordo Libraries:

- *Remedial Investigation Report—Investigation, Study and Recommendation for 29 Waste Sites* (HAFB, 1992a);
- *Risk Assessment Report for the Remedial Investigation—Investigation, Study and Recommendation for 29 Waste Sites* (HAFB, 1992b); and
- *Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Draft Final* (HAFB, 1995).

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. At least one week prior to the meeting date, announcements of the meeting are published in the local newspaper and/or area radio stations. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

The Phase I RI and the risk assessment conducted for the site indicate that no action is necessary at Sites DP-30 or SD-33 to protect human health and the environment under CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. However, because waste will remain on site, a long-term monitoring program will be conducted at the site to ensure the effectiveness of the selected remedy.

Summary of Site Characteristics

The IRP records search, conducted in 1983, indicated that contamination, as a result of past waste disposal practices, may be present at the site. The presence of contamination was confirmed during a Phase I RI conducted in 1991. A summary of the field investigation is presented below.

Soil

Eleven trenches were excavated in the area of the five observable depressions. A total of 10 pits were discovered during trenching activities. The pits are approximately 40 to 50 ft long and between 2 and 3 ft wide.

One soil boring was drilled in each pit. The depths of the former pits at the soil boring locations varied between 2.5 and 9 ft bgl. The pits are covered by 1 to 3 ft of silty sands and sandy silts.

Soil and wastes samples were collected from the 10 soil borings. The samples were analyzed for VOCs, total metals, pesticides, PCBs, oil and grease, gross alpha/beta radioactivity, SVOCs, and chlorinated herbicides. A number of analytes were detected at concentrations above RCRA action levels in the waste samples.

Beryllium was detected at concentrations above action levels in both soil and waste samples, but all concentrations were less than established background concentrations for Holloman AFB. Lead was detected at concentrations above background level in waste samples (ranging from 68 to 2400 mg/kg) and one soil sample (59 mg/kg). PCB-1254 was detected above action levels in waste samples (ranging from 1.2 to 19 mg/kg) and at significantly lower concentrations (0.13 and 0.21 mg/kg) in two underlying soil samples. Two, organochlorine pesticides, dieldrin, and heptachlor epoxide were detected at elevated concentrations in waste samples (dieldrin, 0.14 mg/kg; and heptachlor epoxide, 0.94 mg/kg).

Groundwater

Four groundwater monitor wells were installed at the site. Groundwater samples were collected and analyzed by a certified laboratory for VOCs, total metals, pesticides, PCBs, oil and grease, gross alpha/beta radionuclides, chlorinated herbicides, anions, and total dissolved solids. Concentrations of beryllium, lead, and selenium exceeded background levels established for Holloman AFB.

Summary of Site Risks

A preliminary risk screen was conducted at Sites DP-30 & SD-30 as part of the Phase I RI. The screen indicated that further assessment was necessary to quantify site-specific pathways and risks posed by the waste. Holloman AFB determined that because the sites are located in a remote area and the waste is buried beneath the surface, no complete exposure pathways are present. Therefore, the site does not pose an unacceptable risk to human health or the environment. The U.S. EPA Region VI and the NMED concurred with the conclusion in an approval letter for the *RCRA Phase II Facility Investigation Work Plan* (Holloman AFB, 1993) received by Holloman AFB in January 1994.

Description of the Selected Alternative

The Phase I RI and associated risk assessment conducted for Sites DP-30 and SD-33 indicate that, although waste will remain on site, no action is necessary to protect human health and the environment. Holloman AFB determined that removing the waste would increase the potential exposure risks to workers during excavation, transportation, and disposal.

As part of the no action remedy and site closeout procedures, a long-term groundwater monitoring program will be initiated to ensure that the remedy continues to provide adequate protection of human health and environment. A long-term monitoring program will be submitted by Holloman AFB for approval by the NMED.

In an approval letter for the *RCRA Phase II Facility Investigation Work Plan* (Holloman AFB, 1993), both the U.S. EPA Region VI and the NMED concurred with the selected remedy.

Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.

Declaration

Statutory Preference for Treatment as a Principal Element is not Applicable and a Five-Year Review is not Required

Site Name and Location
IRP Site SS-39 (RCRA SWMUs 165, 177, 179, and 181)
Missile Fuel Spill Site
Holloman Air Force Base, New Mexico

Statement of Basis and Purpose
This decision document presents the selected remedial action for the referenced site, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. This decision is based on the administrative record file for this site.

The State of New Mexico concurs on the remedy.

Description of the Selected Remedy: No Action
Site investigations and a risk assessment conducted for the site indicated that no action is necessary to protect human health and the environment.

Declaration Statement
The remedial investigation and associated risk assessments conducted for the site indicate that conditions at the site do not require action to ensure the protection of human health and the environment. Because no hazardous substances will remain on site above health-based levels, a five-year review is not necessary.

If new evidence suggesting the need for further action becomes available, the site closeout decision may be changed. Likewise, future changes in land use, environmental regulations, or environmental laws may reverse the closeout decision.

Not Signed

Mark Weidler, Cabinet Secretary
New Mexico Environment Department

Date

Bruce Carlson
Brigadier General, USAF Commander

Date

Decision Summary

Site Name and Location

IRP Site SS-39, the Fuel Missile Spill Area, is located approximately 3.5 miles northwest of the Main Base near Building 1176. The site consists of the two outfall areas from the oxidizer and propellant spill drain pipes, south of the Test Track and the drainage troughs and sumps located near Building 1176. Figure 1-1 shows the location of the site at Holloman AFB, and Figure 2-1 shows the site layout.

The site occupies an area of approximately 15 acres. Site topography is relatively flat, and the area is sparsely vegetated. Soils at the site consists of interbedded sands, silts, and clays. The soils are low to moderately permeable and mildly alkaline. Regional groundwater flow at Holloman AFB is to the southwest and is controlled by southwest-trending arroyos (see Figure 1-2). At Site SS-39, groundwater occurs approximately 20 ft bgl and flows to the south toward the Lost River drainage basin.

The unconfined aquifer beneath the site, as well as the remainder of Holloman AFB, exceeds the New Mexico Human Health Standards for total dissolved solids and sulfate concentrations and has been designated as unfit for human consumption based on NM WQCC 82-1, as amended through August 18, 1991, Parts 3-100 through 3-103. Based on the *Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy* (EPA, 1986), the unconfined aquifer beneath Holloman AFB is classified as a Class III-B aquifer and is considered non-potable.

Site History and Enforcement Activities

Facilities at Site SS-39 were involved in fueling, detanking, and routine maintenance of test sleds. Fueling activities for test sleds were completed on the track at the Alpha Pad before each sled launch. Before being removed from the track, sleds were emptied of fuels, and the fuels were then transferred to storage containers. The sleds were then taken to Building 1176, where any remaining fuel was purged from the engines. Fuels used at the test track included the following: unsymmetrical dimethyldradazine (UDMH), aniline, JP-4 (jet fuel), inhibited red fuming nitric acid (IRFNA), inhibited white fuming nitric acid (IWFNA), liquid oxygen (LOX), JPX (1:1 JP-4 and UDMH), dyes, solid rocket propellants, and possibly other compounds. Fuel spills were uncommon due to stringent safety precautions, though interviews with past employees have indicated that natural, topographic drainage trenches and drainage troughs could have received wastes. Solvents, such as trichloroethane, were commonly used in sled maintenance activities.

In 1983, Site SS-39 was identified as a potential contaminant source during an IRP records search. As a result, the site was included in a Phase I RI completed in 1992. Results of the Phase I RI indicated that the site cadmium in soil posed a potential risk to black-tailed jackrabbits. , and that groundwater downgradient of the site contained TCE. After reviewing the Phase I RI report, the U.S. EPA Region VI requested additional soil and groundwater data. A Phase II RFI was completed in 1994, which delineated soil and groundwater contamination.

The site is listed as SWMUs 165, 177, 179, and 181 on the Hazardous and Solid Waste Amendment permit issued to Holloman AFB by U.S. EPA Region VI. These SWMUs were included in a RCRA facilities assessment in 1987. The investigations and studies performed for the site met the requirements of the IRP and RCRA program.

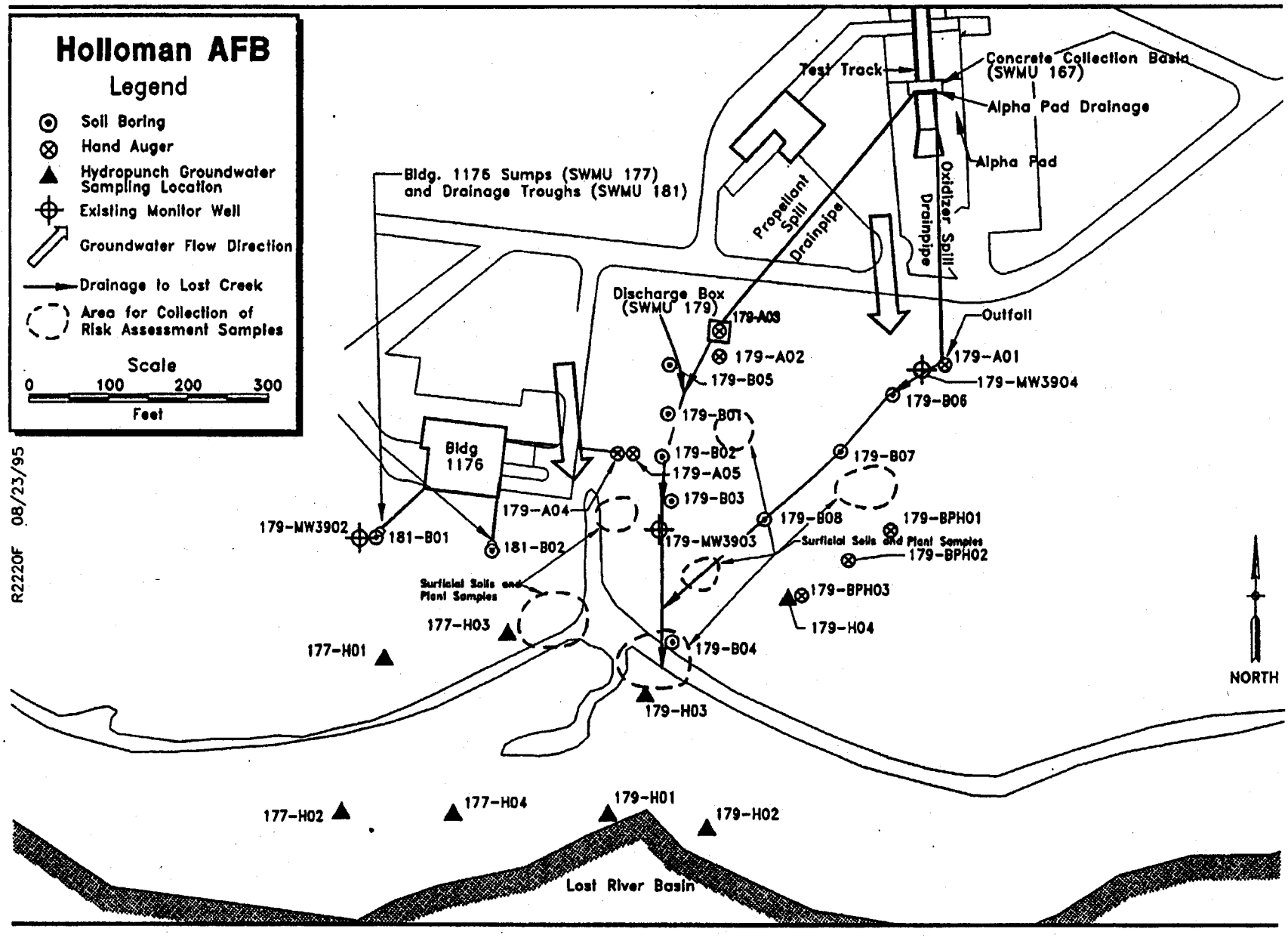


Figure 2-1. Map of IRP Site SS-39

Highlights of Community Participation

Copies of the following reports which contain information pertaining to the site are available to the public through the administrative record located at the Holloman AFB and Alamogordo Libraries:

- *Remedial Investigation Report—Investigation, Study and Recommendation for 29 Waste Sites* (HAFB, 1992a);
- *Risk Assessment Report for the Remedial Investigation—Investigation, Study and Recommendation for 29 Waste Sites* (HAFB, 1992b); and
- *Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Draft Final* (HAFB, 1994).

Public meetings are held semiannually by Holloman AFB to announce the availability of reports and present issues pertaining to the IRP sites on the Base. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) are present at these meetings to address public comments. No comments were received regarding the site at these meetings.

This decision document presents the selected remedial action for the site as chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Scope and Role of the Response Action

The site investigations and the risk assessment conducted for the Site SS-39 indicate that no action is necessary to protect human health and the environment under CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan.

Summary of Site Characteristics

The IRP record search, conducted in 1983, indicated that fuels, metals, and solvents may be present at the site. To determine the presence or absence of contamination at the site, Holloman AFB conducted a Phase I RI in 1991 and a Phase II RFI in 1994. A summary of the field investigations is presented below.

Soil

During the Phase I RI, five surface soil samples and two soil borings were collected at the site. The samples were analyzed by a certified laboratory for VOCs, total metals, and petroleum hydrocarbons. Results indicate that in the area of the oxidizer and propellant drainpipe outfalls, arsenic, beryllium, and lead were detected above established background levels in several samples. The highest concentrations of these metals were 28 mg/kg, 0.58 mg/kg, and 1300 mg/kg, respectively. VOCs, predominantly chlorinated compounds (tetrachloroethene, 95 mg/kg) were detected in soils around the drainage sumps at Building 1176.

During the Phase II RFI, 8 soil borings and 5 hand auger borings were drilled in drainage ditches downstream of the site. All borings were drilled to groundwater and samples were collected at 2-ft intervals. Samples were analyzed for SVOCs and metals. No SVOCs or metals were detected at concentrations above RCRA action levels.

Groundwater

Four groundwater monitor wells were installed during the Phase I RI. One round of samples was collected from these wells. Samples were analyzed by a certified laboratory for VOCs, metals, anions, and total dissolved solids. Concentrations of TCE (0.24 mg/L), carbon tetrachloride (0.0058 mg/L), and TCE (0.059 mg/L), were detected in groundwater samples from wells near Building 1176, indicating that VOCs had migrated from the sumps to groundwater. Lead was detected at a concentration (0.019 mg/L) above the established background level in one groundwater sample.

Groundwater samples were analyzed for VOCs, but no groundwater constituents, including unconventional fuels, exceeded RCRA action levels. TCE was detected at concentrations (<38.8 µg/L) in the groundwater samples collected downgradient of Building 1176.

During the Phase II RFI groundwater samples were collected from 15 temporary sampling locations installed using a direct push technology rig, and from two existing monitor wells. All samples were analyzed for VOCs. Several halogenated VOCs were detected at concentrations at or below detection limits; however, many were not confirmed so their presence is uncertain. TCE concentrations detected on-site monitor wells decreased by an order of magnitude 200 ft downgradient of the site.

Summary of Site Risks

As part of the Phase I RI, a risk assessment was conducted to estimate the potential consequences to human health and the environment that could result if contamination at the site is not remediated. The risk assessment consisted of four basic steps: 1) data analysis and selection of chemicals of concern; 2) identification of exposure pathways and receptors (i.e., dermal contact, ingestion, or inhalation); 3) toxicity assessment of each contaminant; and 4) quantification of potential carcinogenic, noncarcinogenic, and ecological risks. A detailed description of the risk assessment is contained in the *Risk Assessment Report for the Remedial Investigation-Investigation, Study and Recommendation for 29 Waste Sites* (Holloman AFB, 1992b).

Human Health Risk

The human health risks evaluated for the site were based on potential occupational exposure to site contaminants via inhalation.

Generally, a total carcinogenic risk of less than $1x10^{-6}$ for each chemical contaminant is considered acceptable. This is equivalent to a one-in-a-million excess cancer risk from exposure to that chemical at the site. In addition, the combined carcinogenic risk from all chemical contaminants must be equal to or less than $1x10^{-4}$, a one-in-one-ten-thousand excess cancer risk. Noncarcinogenic risk is assessed on the basis of a hazard index, which is the ratio of potential daily chemical intake to an acceptable dose. For a noncarcinogenic risk to be acceptable, the hazard index should not exceed a value of 1.0.

The carcinogenic risk estimated for the occupational exposure scenario was $1x10^{-17}$. This value indicates that adverse effects are unlikely.

Ecological Risk

Ecological risk was evaluated using an ecological quotient, which estimates the potential ecological risks associated with contaminants of concern, primarily through ingestion of soil and/or contaminated plants by native biota. An ecological quotient of less than 1 indicates a low probability of adverse effects; a value between 1 and 10 indicates that there is a possibility of adverse ecological effects.

The Phase I RI risk assessment determined that an ecological quotient of 7.1, which indicates a potential ecological risk, existed from the site. This conclusion was based on modeled uptake of lead and cadmium for soil and beryllium, lead, and zinc in the surface water of Lost River.

The risk assessment performed in conjunction with the Phase II RFI used collected plant, jackrabbit tissue, and surface water samples to remove the uncertainty associated with the uptake models. Comparison of plant and jackrabbit tissue samples with concentrations known to cause adverse effects indicated a low potential for adverse ecological effects to terrestrial organisms. An aquatic environment quotient of 0.3 indicated that no adverse effects are expected as a result of the site.

Description of the Selected Alternative

The remedial investigations and associated risk assessments conducted for the site indicated that no action is necessary to protect human health and the environment.

Responsiveness Summary

Restoration Advisory Board meetings were held semiannually to present information about the site to the public. Representatives from Holloman AFB and the U.S. Army Corps of Engineers (Omaha District) were present at these meetings to answer questions pertaining to the site. No comments were received during the meetings; therefore, no significant changes to the selected remedial action, as presented, were necessary.

APPENDIX H

BORING LOGS, DRILLING LOGS, AND WELL COMPLETION REPORTS

APPENDIX H.1

LF-10

LF-10

BORING LOGS

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-516 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/7/88 8:30 DATE/TIME END 12/7/88 12:00 DRILL CREW Flair/Monroe*/Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 30 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671672.4475 E 554894.5856 WATER DURING DRILLING 11'

WATER AT COMPLETION 12.5' Caved 28' DELAYED WATER LEVEL Water @ 8' caved to 18' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement/1 bag bentonite

DEPTH FT	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Tan sandy SILT (ML)	7/14/9	.3		
	SS		Brown silty SAND (SM)				
		M		7/8/9	.3		
	SS	M		9/14/11	.4		
5			Tan sandy SILT (ML)				
	SS	M	Brown silty CLAY w/gypsum crystals (CL)	3/3/5	.3		
	SS	M	Tan silty SAND w/clay seams (SM)	4/6/9	.3		
	SS	M		2/1/1	.3		
10	SS	M		9/6/27	.3		
	SS	W	-3" wet seam	17/32/37	.3		
	SS	M	Brown silty CLAY w/gypsum crystals	7/12/18	.3		
15	SS	M	-sand increasing (CL)	7/19/31	.4	Windshift during sampling	
	SS	M	Brown clayey silty SAND (SC)	6/6/5	.4	Background raised to .4	
	SS	W	Brown silty sandy CLAY (CL)	7/19/27	.4		
	SS	W/M	Brown sandy CLAY w/gypsum crystals (CL)	12/13/16	.4		
20	SS	M		7/12/19	.4		
	SS	M	Brown & gray sandy CLAY w/gypsum crystals (CL)	14/18/25	.4		
	SS	M	Gray sandy CLAY w/gypsum crystals (CL)	12/12/23	.4		
25	SS	M		12/18/24	.4		
			Brown & gray clayey SAND w/gypsum crystals (SC)				

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
IC - IND CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-516 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/7/88 8:30 DATE/TIME END 12/7/88 12:00 DRILL CREW Flair/Monroe*/Luraschi * Geologist

DRILLING METHOD: AUGER 0 FT TO 30.0' FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3½" I.D./HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671672.4475 E 554894.5856 WATER DURING DRILLING 11'

WATER AT COMPLETION Caved to 28' 12.5' DELAYED WATER LEVEL Water @ 8' caved to 18' on 12/15/88.

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown & gray clayey SAND w/gypsum crystals (SC)	28/28/32	.4		
	SS	M	Gray sandy CLAY (CL)	16/32/45	.4		
	SS	W		17/28/39	.4		
30			Boring Terminated @ 30 feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THIN CORE

D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-517 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/5/88 8:00 DATE/TIME END 12/5/88 10:15 DRILL CREW Flair/Monroe*/Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 30 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA** SURFACE COVER Gravel/Topsoil

G.S. ELEV. Not Required BORING COORDINATES N 671522.3846 E 554868.2140 WATER DURING DRILLING 13'

WATER AT COMPLETION 11' open to 30' DELAYED WATER LEVEL Water @ 7.5' caved 21' on 12/15/88

DATE GROUTED 12/15/89 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Tan sandy SILT (SM)	4/3/3	.3		
	SS	M	Brown clayey silty SAND w/organic stains (SM)	2/3/5	.2		
	SS	M		6/15/11	.3		
5	SS	M	Tan clayey silty SAND (SM)	7/11/8	.2		
	SS	M	Tan clayey sandy SILT (ML)	18/16/26	.6		
	SS	M	sand increasing	13/13/10	.4		
10	SS	M		12/16/20	.4		
	SS	M	Brown sandy CLAY w/gypsum crystals (CL)	7/19/22	.2		
	SS	W	Tan clayey sandy SILT (SM)	10/23/26	.2		
15	SS	W	Brown sandy CLAY w/gypsum crystals (CL)	15/17/24	.2		
	SS	M		14/19/23	.2		
	SS	M	wet seam 6" - 8"	12/16/26	.2		
	SS	W		13/19/27	.2		
20	SS	M		10/17/20	.2		
	SS	M		7/9/19	.2		
	SS	M	Gray sandy CLAY w/gypsum crystals (CL)	9/12/21	.2		
25	SS	M		9/13/22	.2		

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TWO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-517 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/5/88 8:00 DATE/TIME END 2/6/88 10:15 DRILL CREW Flair/Monroe*/Luraschi *Geologist

DRILLING METHOD: AUGER 0 FT TO 30 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA ** SURFACE COVER Gravel/Topsoil

G.S. ELEV Not Required BORING COORDINATES N 671522.3846 E 554868.2140 WATER DURING DRILLING 13'

WATER AT COMPLETION open to 30' 11' DELAYED WATER LEVEL Water @ 7.5' caved to 21' on 12/15/88

DATE GROUTED 12/15/89 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
		M	Gray & tan silty CLAY w/gypsum crystals (CL)				
	SS			9/13/21	.2		
	SS	M		10/16/22	.2		
	SS	M		13/26/28	.6		
30			Boring terminated @ 30' feet				
			** Hollow Core Auger				
			NOTE: Drill and sample to 7½ feet when cathead rope broke on 12/5/88. Finish boring on 12/6/88.				
35							
40							
45							
50							

SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER SAMPLER
RC - ROCK CORE
TC - THIN CORE

D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-518 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/6/88 12:00 DATE/TIME END 12/6/88 2:00 DRILL CREW Flair/Monroe*/Luraschi *Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA ** SURFACE COVER Topsoil

G.S. ELEV Not required BORING COORDINATES N 671551.6164 E 554773.0256 WATER DURING DRILLING 13'

WATER AT COMPLETION Open 31.5' DELAYED WATER LEVEL Water @ 9' caved to 29' on 12/15/88 11.5'

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Tan sandy SILT w/2" layer of rusted trash (possible car part) (SM)	3/2/3	.8		
			Brown silty SAND (SM)				
	SS	M	Tan sandy SILT (ML)	3/6/6	.2		
5							
	SS	M		5/12/4	.2		
			wet seam				
	SS	M		2/12/16	.2		
10							
	SS	M	Brown sandy CLAY w/gypsum crystals (CL)	9/13/18	.2		
		M					
	SS	W	Gray sandy SILT (SM)	12/11/16	.2		
15							
	SS	W	Brown silty CLAY (CL)	9/14/24	.3		
	SS	M	Gray & brown silty CLAY w/ gypsum crystals (CL)	12/24/27	.3		
20							
	SS	M		12/27/28	.2		
	SS	M	Brown silty CLAY w/gypsum crystals (CL)	9/16/27	.2		
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-518 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/6/88 12:00 DATE/TIME END 12/6/88 2:00 DRILL CREW Flair/Monroe*/Luraschi *Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Topsoil

G.S. ELEV. Not Required BORING COORDINATES N 671551.6164 E 554773.0256 WATER DURING DRILLING 13'

WATER AT COMPLETION 11.5' Open 31.5' DELAYED WATER LEVEL Water @ 9', caved to 29' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown silty CLAY w/gypsum (CL)	11/17/28	.2		
	SS	M		12/12/17	.2		
30	SS	M		11/15/19	.2		
			Boring terminated @ 31.5 feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THIN CORE

D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-519 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/7/88 2:30 DATE/TIME END 12/7/88 4:00 DRILL CREW Flair/Monroe*/Luraschi * Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA ** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671692.2829 E 554797.0891 WATER DURING DRILLING 10.5'

WATER AT COMPLETION Caved 28.0' DELAYED WATER LEVEL Water @ 8', caved to 20' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Tan sandy SILT (SM)	12/4/6	.3		
	SS	M		9/4/2	.4		
			Brown silty SAND w/organics (SM)				
5	SS	M	Tan silty SAND (SM)	6/8/1	.3		
	SS	M	Brown silty CLAY w/gypsum crystals (CL)	12/10/14	.3		
10	SS	M	Tan SAND (SP)	15/23/28	.3		
	SS	M	Brown silty CLAY w/gypsum crystals (CL)	9/14/21	.4		
15	SS	W	Tan silty SAND (SM)	4/6/7	.1		
	SS	M	Brown silty CLAY w/gypsum (CL)	12/17/22	.4		
20	SS	M		15/19/32	.3		
	SS	M	Gray silty CLAY w/gypsum crystals (CL)	16/21/30	.3		
25							

SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TWO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-519 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/7/88 2:30 DATE/TIME END 12/7/88 4:00 DRILL CREW Flair/Monroe*/Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671692.2829 E 554797.0891 WATER DURING DRILLING 10.5'

WATER AT COMPLETION Caved 28.0 12.5' DELAYED WATER LEVEL Water @ 8', caved to 20' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Gray silty CLAY w/gypsum crystals (CL)	17/27/32	.3		
	SS	M	Gray silty SAND (SM)	16/33/32	.3		
30	SS	W	Brown silty SAND (SM)	14/32/42	.3		
			Boring terminated @ 31.5 Feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS = SPLIT SPOON
ST = SHELBY TUBE
PB = PITCHER BARREL
RC = ROCK CORE
TC = THIN CORE

D = DRY (VERY LITTLE MOISTURE)
M = MOIST (SOME MOISTURE)
W = WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 6DC-520 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/16/88 2:00 DATE/TIME END 12/18/88 9:00 DRILL CREW Flair, Monroe*, Luraschi

DENNISON 0 FT TO 7.5 FT. * Geologist

DRILLING METHOD: AUGER 7.5 FT TO 20 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA ** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671598.3980 E 554833.6964 WATER DURING DRILLING N/A

WATER AT COMPLETION N/A DELAYED WATER LEVEL Water within 2 feet of surface on 12/20/ Water added to boring during Dennison Co

DATE GROUTED 12/20/88 MATERIAL(S) & QUANTITY 3 bags cement, 1/3 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	DC		Brown & tan silty clayey SAND (SC)				
	DC						Sampled to a depth of about 5 feet on 12/16/88. Finished boring on 12/18/88
5	DC		Brown silty SAND w/landfill material				
10							
			Dennison Refusal @ 13.0 feet				
15							
20			Dennison Refusal @ 20.0 feet				
			Boring terminated at 20.0 feet				
			** Hollow Core Auger				
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TWO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-521 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/9/88 8:45 DATE/TIME END 12/9/88 11:30 DRILL CREW Flair/Monroe */Lurasch
* Geologist

DRILLING METHOD: AUGER 0 FT TO 30 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671885.2025 E 555200.1747 WATER DURING DRILLING 9'

WATER AT COMPLETION 11' Open 30.0' DELAYED WATER LEVEL Water @ 9', caved to 26' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Gravel surface cover Tan silty SAND w/gravel (SM)	7/11/10	.3		
	SS	M		6/7/8	.2		
	SS	M		7/10/11	3.0		
5	SS	M	Brown silty sandy CLAY w/gypsum crystals (CL)	6/8/8	.2		
	SS	M		5/28/29	.2		
	SS	M/W	Tan silty clayey SAND (SC) wet seam 6"	36/31/33=5"	.2		
10	SS	M/W	3" wet seam	41/18/13	.2		
	SS	W	clay increasing	9/16/29	.2		
	SS	W/M		14/21/23	.2		
15	SS	M		10/14/16	.2		
	SS	W/M	Tan sandy CLAY (CL)	6/6/7	.2		
	SS	M	Brown & tan sandy CLAY w/gypsum crystals (CL)	10/16/16	.4		
	SS	M		12/18/21	.4		
20	SS	M	Brown & gray sandy CLAY w/gypsum crystals (SM)	8/22/26	1.4		
	SS	M		10/15/19	1.6		
	SS	M	Gray silty CLAY w/gypsum crystals (CL) Gray sandy CLAY (CL)	15/16/26	1.4		
25	SS	W		18/21/26	1.6		

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TWO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-521 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/9/88 8:45 DATE/TIME END 12/9/88 11:30 DRILL CREW Flair/Monroe */Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 30.0 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA ** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671885.2025 E 555200.1747 WATER DURING DRILLING 9'

WATER AT COMPLETION 11' open 30.0' DELAYED WATER LEVEL Water @ 9', caved to 26' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Gray sandy CLAY (CL)				
	SS	M	Tan & gray clayey SAND (SC)	15/16/21	1.4		
	SS	M	Tan & gray clayey SAND (SC)	15/21/27	1.6		
	SS	M		17/21/26	1.4		
30			Boring terminated @ 30. feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS = SPLIT SPOON
ST = SHELBY TUBE
PB = PITCHER BARREL
RC = ROCK CORE
TC = TWO CORE

D = DRY (VERY LITTLE MOISTURE)
M = MOIST (SOME MOISTURE)
W = WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-522 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/9/88 1:30 DATE/TIME END 12/9/88 4:00 DRILL CREW Flair/Monroe*/Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671757.4424 E 555172.2342 WATER DURING DRILLING 12.5'

WATER AT COMPLETION Caved 27.5' 13' DELAYED WATER LEVEL Water @ 9.5', caved to 24' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown CLAY w/gravel (CL)	10/11/10	.3		
			Brown & tan silty clayey SAND (SC)				
	SS	M		5/9/12	.2		
5	SS	M	iron staining	4/3/4	2.8		
	SS	M		4/4/4	1.6		
10	SS	M	Brown clayey SAND w/gypsum crystals (SC)	37/25/18	1.4		
	SS	W	6" wet seam	9/20/38	1.4		
15	SS	M	Brown sandy CLAY (CL)	4/5/6	.9		
	SS	M		8/7/9	1.0		
20	SS	W		7/11/21	1.0		
			Brown silty SAND (SM)				
	SS	M	Brown sandy CLAY w/gypsum crystals (CL)	18/31/21	1.0		
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TRIO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-522 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 1:30 12/9/88 DATE/TIME END 4:00 12/9/88 DRILL CREW Flair/Monroe*/Luraschi

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671757.4424 E 555172.2342 WATER DURING DRILLING 12.5'

WATER AT COMPLETION 13.0' Caved 27.5' DELAYED WATER LEVEL Water @ 9.5', caved to 24' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown silty CLAY w/gypsum cyrstals (CL)	14/16/24	1.0		
			Gray sandy CLAY w/gypsum (CL)				
	SS	M					
		W/M	- 6" wet seam/gypsum increasing	15/19/52	1.0		
30	SS	W	Gray silty SAND (SM)	47/53=5"	1.0		
			Boring terminated @ 31.5 feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PETCHER BARREL
RC - ROCK CORE
TC - THIN CORE

D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-523 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/10/88 9:00 DATE/TIME END 12/10/88 1:30 DRILL CREW Flair/Monroe*/Luraschi * Geologist

DRILLING METHOD: AUGER 0 FT TO 30 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA ** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671793.8794 E 555029.4085 WATER DURING DRILLING 13'

WATER AT COMPLETION 13.5' open to 30' DELAYED WATER LEVEL Water @ 7.5' caved to 28' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	5" Gravel	8/6/4	14		
			Tan clayey silty SAND (SC)				
	SS	M	Clay decreasing	8/11/9	32		
	SS	M		8/7/7	34		
5			Brown silty SAND (SM)				
	SS	M	2" layer of trash	1/1/2	240		
	SS	M	4" Landfill material	1/1/1	146		
	SS						
		M	Landfill material	1/2/3	152		
10	SS	M		3/4/15	200		
			Brown silty CLAY w/gypsum crystals (CL)				
	SS	M		20/28/30	2.2		
			Tan silty SAND (SM)				
	SS	M	Brown silty CLAY w/gypsum (CL)	20/21/33	1.8		
		M/W					
15	SS		Tan clayey SAND (SC)	15/70/32			
	SS	M		17/42/39	.9		
			Tan silty SAND (SM)				
	SS	M	Tan sandy clayey SILT (ML)	17/33/29	1.4		
	SS	W	-Sand increasing	16/30/34	1.6		
20							
	SS	M		15/20/24	1.6		
	SS	M	Brown silty CLAY w/gypsum cyrstals (CL)	11/29/30	1.8		
	SS	M/W		23/21/30	1.8		
25	SS	W		33/42/25=2"	2.8		

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THO CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-523 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/10/88 9:00 DATE/TIME END 12/10/88 1:30 DRILL CREW Flair/Monroe*/Luraschi *Engineer

DRILLING METHOD: AUGER 0 FT TO 30.0 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3½" I.D./HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671793.8794 E 555029.4085 WATER DURING DRILLING 13'

WATER AT COMPLETION 13.5' open to 30' DELAYED WATER LEVEL Water @ 7.5' caved to 28' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Brown silty CLAY w/gypsum (CL)				
	SS	W		12/8/20	1.6		
	SS	W	Gray clayey SAND (SC)	30/36/34@5"	.9		
	SS	W		34/38/45@4"	1.0		
30			Boring terminated @ 30 feet ** Hollow Core Auger				
35							
40							
45							
50							

SS = SPLIT SPOON
ST = SHELBY TUBE
PS = PITCHER SAMPLER
RC = ROCK CORE
TC = THIN CORE

D = DRY (VERY LITTLE MOISTURE)
M = MOIST (SOME MOISTURE)
W = WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-524 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/11/88 10:00 DATE/TIME END 12/11/88 1:30 DRILL CREW Flair/Monroe*/Luraschi *Engineer

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA ** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671926.9614 E 555028.1419 WATER DURING DRILLING 13'

WATER AT COMPLETION 13.5' caved to 26' DELAYED WATER LEVEL Water @ 11' caved to 26' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	8" Gravel	9/12/17	.1		
			Tan silty SAND w/gravel (SM)				
			Brown & tan silty SAND w/gravel (SM)				
	SS	M		12/14/5	.1		
5							
	SS	M	Tan silty SAND (SM)	4/2/2	.1		
			Trash encountered (nylon rope)				
	SS	M		14/17/14	.1		
10							
	SS	M		4/7/40	.1		
			Brown silty CLAY w/gypsum cyrstals (CL)				
			Brown silty SAND (SM)				
	SS	M		63/37=5"	6.0		
15				3" Spoon for Extra Sample			
	SS	W/M	Tan clayey SAND (SC)	17/30/34	.1		
	SS	W/M		50/50	.1		
20							
	SS	M		53/24/23	.1		
			Brown sandy CLAY (CL)				
	SS	M	Brown & gray SILT w/gypsum crystals (ML)	14/24/17	.1		
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PETCHER BARREL
RC - ROCK CORE
TC - THO CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-524 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/11/88 10:00 DATE/TIME END 12/11/88 1:30 DRILL CREW Flair/Monroe*/Luraschi
*Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671926.9614 E 555028.1419 WATER DURING DRILLING 13'

WATER AT COMPLETION 13.5' Caved 26' DELAYED WATER LEVEL Water @ 11' caved to 26' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 Bags Cement / 1 bag Bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown sandy CLAY w/gypsum crystals (CL)	10/11/15	.1		
	SS	M		6/8/14	.1		
30	SS	M		6/9/11	.1		
			Boring terminated @ 31.5 feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS = SPLIT SPOON
ST = SHELBY TUBE
PB = PETCHER BARREL
RC = ROCK CORE
TC = THIN CORE

D = DRY (VERY LITTLE MOISTURE)
M = MOIST (SOME MOISTURE)
W = WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 6DC-525 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/20/88 9:30 DATE/TIME END 12/20/88 2:00 DRILL CREW Flair, Monroe*, Lurasc
DENNISON 0 FT. TO 6.5 FT. * Geologist

DRILLING METHOD: AUGER 6.5 FT TO 30.0 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA ** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671837.9061 E 555132.0207 WATER DURING DRILLING N/A

WATER AT COMPLETION N/A DELAYED WATER LEVEL Water within 2 feet of surface on 12/21 Water added to boring during Dennison C

DATE GROUTED 12/21/88 MATERIAL(S) & QUANTITY 6 bags cement, 2/3 bags bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Brown silty sandy CLAY w/gravel (CL)				
	DC		Tan silty SAND (SM)				
5	DC						
	DC		Brown sandy CLAY w/gypsum crystals (CL)				
	SS		Gray silty SAND (SM)	12/36/51=4½"			
10	SS		Tan silty SAND (SM)	48/52=3"			
			Brown clayey SAND w/gypsum crystals (SC)	14/19/17			
	SS		Tan silty SAND (SM)				
15	SS			17/21/25			
			Brown clayey SAND (SC)				
	SS			9/5/7			
			Brown sandy CLAY (CL)				
20	SS		Brown & tan silty CLAY w/gypsum crystals (CL)	9/20/19			
	SS			12/14/18			
			Gray clayey SILT (ML)				
25	SS		Gray silty CLAY w/gypsum crystals (CL)	8/12/17			

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THIN CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 6DC-525 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/20/88 9:30 DATE/TIME END 12/20/88 2:00 DRILL CREW Flair, Monroe*, Luraschi
* Geologist

DRILLING METHOD: AUGER 6.5 FT TO 30.0 FT, ROTARY - FT TO - FT DENNISON 2 FT TO 6.5 FT. DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA ** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 671837.9061 E 555132.0207 WATER DURING DRILLING N/A

WATER AT COMPLETION N/A DELAYED WATER LEVEL Water within 2 feet of surface on 12/21/88
Water added to boring during Dennison Core

DATE GROUTED 12/21/88 MATERIAL(S) & QUANTITY 6 bags cement, 2/3 bags bentonite

DEPTH FT	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Gray sandy CLAY w/gypsum crystals				
	SS		(CL)	19/23/29			
	SS			27/63/10=2"			
30			Boring terminated at 30.0 feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THIN CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-526 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/12/88 7:30 DATE/TIME END 12/12/88 10:00 DRILL CREW Flair/Monroe*/Lurasch
* Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA ** SURFACE COVER Topsoil & Grave

G.S. ELEV. Not Required BORING COORDINATES N 672166.4416 E 555029.3602 WATER DURING DRILLING 13'

WATER AT COMPLETION 9' Caved 29.5 DELAYED WATER LEVEL Water @ 7', caved to 20' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 Bags Cement / 1 Bag Bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown & tan silty SAND (SM)	3/3/5	2.3		
	SS	M		6/10/10	17.2		
5	SS	M	Tan silty SAND (SM)	5/40/35=5"	3.6		
	SS	M	Tan & brown silty SAND (SM)	14/20/24	.6		
10	SS	M		25/43/3=5"	.4		
	SS	W	Tan SAND (SP)	40/60=3"	.4		
15	SS	W	Brown silty CLAY w/gypsum crystals (CL)	13/14/29	.6		
	SS	M		8/20/50	1.4		
20	SS	W/M	Brown & tan silty SAND (SM)	25/46/31=5"	1.8		
	SS	W	Gray sandy CLAY w/gypsum crystals (CL)	17/60/23=2"	.6		
25			Gray silty SAND w/gypsum crystals (SM)				

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TWO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-526 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/12/88 7:30 DATE/TIME END 12/12/88 10:00 DRILL CREW Flair/Monroe*/Luraschi *Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Topsoil & gravel

G.S. ELEV. Not Required BORING COORDINATES N 672166.4416 E 555029.3602 WATER DURING DRILLING 13'

WATER AT COMPLETION Caved 29.5' DELAYED WATER LEVEL Water @ 7', caved to 20' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown silty SAND (SM)	70/30=1"	.4		
	SS	M	Brown & tan sandy CLAY w/gypsum crystals (CL)	17/21/22	.6		
30	SS	M	Tan & gray clayey SAND (SC)	25/40/35=3"	.4		
			Boring terminated @ 31.5 feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS = SPLIT SPOON
ST = SHELBY TUBE
PC = PITCHER SAMPLER
RC = ROCK CORE
TC = TWO CONE

D = DRY (VERY LITTLE MOISTURE)
M = MOIST (SOME MOISTURE)
W = WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-527 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/12/88 11:00 DATE/TIME END 12/12/88 1:30 DRILL CREW Flair/Monroe */Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA ** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 672063.7490 E 555005.8622 WATER DURING DRILLING 10'

WATER AT COMPLETION 9.5' Open 31.5' DELAYED WATER LEVEL Water @ 7.5', caved to 21' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	8" Gravel	3/5/7	.4		
			Brown silty SAND w/layers of landfill material (SM)				
	SS	M		1/10/21	.4		
5							
	SS	M	Brown silty SAND (SM)	10/30/45	.4		
	SS	M	Tan silty SAND (SM)	28/72	11		
10							
	SS	M	Gray clayey SAND (SC)	10/17/24	4.6		
	SS	M		10/11/14	3.4		
15							
	SS	W	Gray silty SAND w/gypsum crystals (SM)	12/30/39	4.0		
	SS	M	Brown & gray silty CLAY (CL)	15/16/29	3.2		
20							
	SS	M	Brown clayey SAND (SC)		3.6		
	SS	M	Gray clayey SILT (ML)	12/17/35	3.2		
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TRIO CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-527 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/12/88 11:00 DATE/TIME END 12/12/88 1:30 DRILL CREW Flair/Monroe*/Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 672063.7490 E 555005.8622 WATER DURING DRILLING 10'

WATER AT COMPLETION 9.5' Open 31.5' DELAYED WATER LEVEL Water @ 7.5', caved to 21' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Gray clayey SILT (ML)	18/50/31=2"	4.2		
	SS	W	Brown & tan silty SAND (SM)	30/60/10=½"	4.0		
30	SS			66/34=2"	4.0		
			Boring terminated @ 31.5 feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PETCHER BARREL
TC - [illegible]
TC - [illegible]

D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-528 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/12/88 2:50 DATE/TIME END 12/12/88 4:00 DRILL CREW Flair/Monroe*/Luraschi * Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 672100.2565 E 554809.0250 WATER DURING DRILLING 8'

WATER AT COMPLETION Caved 24.5' DELAYED WATER LEVEL Water @ 8.5', caved to 10' on 12/15/88 9.0'

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	4" Gravel	5/10/8	3.0		
			Brown silty SAND (SM)				
	SS	M	Tan silty SAND (SM)	5/5/6	3.0		
5	SS	M		15/26/31	3.0		
	SS	W		14/24/39	3.0		
10	SS	W	Brown silty SAND w/gypsum crystals (SM)	11/21/25	4.0		
	SS	W	Tan silty SAND w/menthol smell (SM)	5/13/19	7.0		
15	SS	W		82/18=2"	10		
	SS	M		15/17/32	40		
20	SS	W	Brown silty SAND (SM)	40/60=4	35		
	SS	M	Brown & gray sandy CLAY w/gypsum (CL)	25/16/14	60		
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TWO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-528 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/12/88 2:50 DATE/TIME END 12/12/88 4:00 DRILL CREW Flair/Monroe*/Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 672100.2565 E 554809.0250 WATER DURING DRILLING 8'

WATER AT COMPLETION Caved 24.5' 9.0' DELAYED WATER LEVEL Water @ 8.5', caved to 10' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag benonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	W/M	Brown silty SAND (SM)	15/17/21	55		
			Gray sandy CLAY w/gypsum crystals (CL)				
	SS	W		21/68/11=½"	80		* See Note Below
30	SS	W		52/48=5"	40		
			Boring terminated @ 31.5 Feet				
			*No sample taken for PSI, all of sample given to EPS for analytical purposes.				
35			** Hollow Core Auger				
40							
45							
50							

SS = SPLIT SPOON
ST = SHELBY TUBE
PB = PETCHER BARREL
RC = ROCK CORE
TC = THIN CORE

D = DRY (VERY LITTLE MOISTURE)
M = MOIST (SOME MOISTURE)
W = WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-529 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/11/88 2:30 DATE/TIME END 12/11/88 4:30 DRILL CREW Flair/Monroe*/Luraschi * Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME 55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 672211.7698 E 554843.1721 WATER DURING DRILLING 8'

WATER AT COMPLETION Caved 29.0 9.0' DELAYED WATER LEVEL Water @ 8', caved to 29' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	6" Gravel	7/7/7	.3		
			Brown clayey SAND (SC)				
	SS	M	Tan sandy SILT (ML)	8/9/8	.2		
5	SS	M	Sand decreasing	5/5/8	.2		
	SS	W	Brown silty SAND (SM)	6/20/35	.2		
10	SS	W	Tan silty SAND (SM)	13/24/37	.3		
	SS	W		25/48/27=3"	.2		
15	SS	W		100=6'	.2		
	SS	M	Brown silty CLAY w/gypsum crystals (CL)	18/28/36	.4		
20	SS	W	Brown silty SAND (SM)	15/30/40	.9		
	SS	M	Gray silty SAND (SM)	7/7/9	12.8		
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TRIP CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO 8A25-529 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/11/88 2:30 DATE/TIME END 12/11/88 4:30 DRILL CREW Flair/Monroe*/Luraschi * Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

G.S. ELEV Not Required BORING COORDINATES N 672211.7698 E 554843.1721 WATER DURING DRILLING 8'

WATER AT COMPLETION Caved 29.0 9.0' DELAYED WATER LEVEL Water @ 8', caved to 29' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Gray silty SAND (SM)	20/25/21	4.0		
			Brown & tan silty CLAY w/gypsum (CL)				
	SS	W	Tan silty SAND (SM)	50/50=4"	4.5		
30	SS			24/26/31	3.0		
			Boring terminated @ 31.5 feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS = SPLIT SPOON
ST = SHELBY TUBE
PB = PITCHER BARREL
RC = ROCK CORE
TC = TWO CORE

D = DRY (VERY LITTLE MOISTURE)
M = MOIST (SOME MOISTURE)
W = WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 6DC-530 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/19/88 8:30 DATE/TIME END 12/19/88 6:30 DRILL CREW Flair, Monroe*, Luraschi
* Geologist

DRILLING METHOD: DENNISON 0 FT TO 6.5 FT. AUGER 6.5 FT TO 31.5 FT, ROTARY _ FT TO _ FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3½" I.D./HCA SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 672145.6372 E 554924.1398 WATER DURING DRILLING

WATER AT COMPLETION N/A DELAYED WATER LEVEL Water within 2 feet of surface on 12/20
Water added to boring during Dennison C

DATE GROUTED 12/20/88 MATERIAL(S) & QUANTITY 6 bags cement, 2/3 bag bentonite powder

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Dennison Refusal @ 3 inches				
			Brown clayey SAND (SC)				
5	DC						
	DC						
10			Dennison Refusal @ 10.0 feet				
15			Dennison Refusal @ 15.0 feet				
	SS			35/60/5=½"			
	SS		Brown clayey SAND w/cemented sand layers and clay seams (SC)	13/60/27=2"			
20	SS		Brown silty CLAY w/gypsum cyrstals (CL)	24/40/36=3"			
			Brown silty SAND (SM)				
	SS		Tan & gray clayey SAND (SC)	27/50/23=3"			
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TRIP CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 6DC-530 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/19/88 8:30 DATE/TIME END 12/19/88 6:30 DRILL CREW Flair, Monroe*, Luraschi

DRILLING METHOD: AUGER DENNISON 0 FT. TO 6.5 FT 6.5 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55 * Geologist

AUGER/BIT SIZE(S) & INTERVAL(S) 3½" I.D./HCA SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES N 672145.6372 E 554924.1398 WATER DURING DRILLING N/A

WATER AT COMPLETION N/A DELAYED WATER LEVEL Water within 2 feet of surface on 12/20/8 Water added to boring during Dennison Co

DATE GROUTED 12/20/88 MATERIAL(S) & QUANTITY 6 bags cement, 2/3 bags bentonite powder

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS		Tan & gray clayey SAND (SC)	24/36/40			
			Gray clayey SILT (ML)				
	SS		Brown clayey SAND w/gypsum crystals (SC)	25/26/35			
30	SS		Gray sandy CLAY (CL)	18/87/27			
			Boring terminated at 31.5 feet				
35							
40							
45							
50							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PETCHER BARREL
RC - ROCK CORE
TC - THIN CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-531 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/13/88 12:45 DATE/TIME END 12/13/88 3:00 DRILL CREW Flair/Monroe*/Luraschi *Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3½" I.D. / HCA** SURFACE COVER Topsoil

G.S. ELEV. Not Required BORING COORDINATES N 672391.1435 E 554915.6843 WATER DURING DRILLING 8.5'

WATER AT COMPLETION 8.0' Open 31.5' DELAYED WATER LEVEL Water @ 9', caved to 29' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown silty SAND (SM)	1/3/5	.4		
			Tan silty SAND (SM)				
	SS	M		12/13/13	.4		
5							
	SS	M		18/24/41	.4		
	SS	M	Gray SAND (SP)	14/16/16	.4		
10			Gray & tan silty CLAY w/gypsum (CL)				
	SS	W	Gray SAND 8" iron stained sand (SP)	11/21/19	.4		
	SS	M	Gray sandy CLAY w/iron stains (CL)	3/4/14	.4		
15	SS	W/M	Gray silty SAND (SM)	70/30=1"	.4		
			Brown silty CLAY w/gypsum (CL)				
	SS	W/M	Tan silty SAND (SM)	50/32/18=3"	.4		
20	SS	W		11/24/40	.4		
	SS	W		30/32/68	.4		
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TWO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-531 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/13/88 12:45 DATE/TIME END 12/13/88 3:00 DRILL CREW Flair/Monroe*/Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA ** SURFACE COVER Topsoil

G.S. ELEV. Not Required BORING COORDINATES N 672391.1435 E 554915.6843 WATER DURING DRILLING 8.5'

WATER AT COMPLETION Open 31.5' 8.0' DELAYED WATER LEVEL Water @ 9', caved to 29' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	W	Brown & gray silty SAND (SM)	80/20=¼"	.4		
	SS	M	Gray silty SAND (SM)	49/51=3"	.5		
30	SS	M	Brown sandy CLAY w/gypsum crystals (CL)	60/21/10=1"	.4		
			Boring terminated @ 31.5 feet ** Hollow Core Auger				
35							
40							
45							
50							

SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THIN CORE

D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-532 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/13/88 8:45 DATE/TIME END 12/13/88 11:15 DRILL CREW Flair/Monroe*/Lurasch * Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Topsoil

G.S. ELEV. Not Required BORING COORDINATES N 672163.8984 E 554676.7649 WATER DURING DRILLING 8'

WATER AT COMPLETION Caved 26' DELAYED WATER LEVEL Water @ 9.5', caved to 10' on 12/15/88 8.0'

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown & tan SAND (Apparent Fill) (SP)	11/10/8	.4		
	SS	M	Brown clayey SAND (SC)	5/7/6	.4		
5	SS	M	Tan silty SAND (SM)	16/17/18	.4		
	SS	W		17/27/24	.6		
10	SS	W	Brown & tan clayey SAND (SC)		140		
	SS	W	Discolored contaminated soil (drove extra spoon for E.P.S. Samples) Tan SAND w/odor (SP)	14/16/14 27/36/37	400.		
15	SS	W	Tan & gray sandy CLAY w/odor (CL)	27/73	500		75-100 ppm from open bore hole
	SS	M/W	Brown silty CLAY w/gypsum crystals (CL)	14/14/20	150		
20	SS	M	Brown silty clayey SAND (SC)	30/50/20=2"	130		No sample
	SS	W	Gray & brown silty CLAY w/odor & sand seams (CL)	76/24=5"	100		
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THO CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. 8A25-532 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/13/88 8:45 DATE/TIME END 12/13/88 11:15 DRILL CREW Flair/Monroe*/Luraschi *Geologist

DRILLING METHOD: AUGER 0 FT TO 31.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Topsoil

G.S. ELEV. Not Required BORING COORDINATES N 672163.8984 E 554676.7649 WATER DURING DRILLING 8'

WATER AT COMPLETION 8' caved 26.5 DELAYED WATER LEVEL Water @ 9.5', caved to 10' on 12/15/88

DATE GROUTED 12/15/88 MATERIAL(S) & QUANTITY 6 bags cement / 1 bag bentonite

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Gray silty CLAY w/gypsum crystals (CL)	8/17/27	100		
	SS	M	Tan & gray silty SAND (SM)	24/17/27	190		
30	SS	M		22/18/31	110		
			Boring terminated @ 31.5 feet				
			** Hollow Core Auger				
35							
40							
45							
50							

SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THIN CORE

D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW1 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 11/29/88 10:12 DATE/TIME END 11/29/88 2:00 DRILL CREW Flair/Luraschi/Monroe* * Geologist

DRILLING METHOD: AUGER 0 FT TO 21.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA* SURFACE COVER Gravel

TOC ELEV. 4087.66 BORING COORDINATES N 672256 E 555046 WATER DURING DRILLING 6.5'

WATER AT COMPLETION 9' DELAYED WATER LEVEL Monitor well installed in boring Water @ 10.7' below T.O.C on 2/11/89 8:

DATE GROUTED N/A MATERIAL(S) & QUANTITY See Monitcr Well Material List

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	D	Tan & brown sandy SILT w/gravel @ surface (ML)	5/5/7	0		
	SS	D	Tan clayey SILT w/sand seams (ML)	3/1/WH	.1		
5	SS	M/W	Dark gray landfill material (i.e. paper, trash, green sludge)	WH/1/1	.1		
	SS	M	Possible ash layer	14/50/35	340		PID 3 ppm bore hole
10	SS	W	Tan silty SAND (SM)	32/33/34	.1		
			Brown silty CLAY w/gypsum crystals (CL)				
15	SS	W.	Tan silty SAND (SM-SP)	37/17/24	.4		
			Light gray SAND (SP)				
20	SS	M	Tan clayey SAND (SC)	19/30/26	.1		
			Boring terminated @ 21.5'				
			* Hollow Core Auger				
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TRIO CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

LF-10

DRILLING LOGS

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW2 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 11/29/88 2:45 DATE/TIME END 11/29/88 4:30 DRILL CREW Flair/Luraschi/Monroe* *Geologist

DRILLING METHOD: AUGER 0 FT TO 21.5 FT, ROTARY - FT TO - FT DRILL RIG CME 55

AUGER/BIT SIZE(S) & INTERVAL(S) 3½" I.D./HCA* SURFACE COVER Gravel

TOC ELEV. 4089.00 BORING COORDINATES N 671943 E 554584 WATER DURING DRILLING Wet Seam 4.5

WATER AT COMPLETION 8' DELAYED WATER LEVEL Water @ 11.4' below T.O.C. on 2/11/89 @ 1 Monitor Well installed in bore hole

DATE GROUTED N/A MATERIAL(S) & QUANTITY See Monitor Well Material List

DEPTH FT	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	D	Tan sandy SILT w/surface gravel (Possible Fill) (ML)	7/12/13	.1		
	SS	M		9/4/4	.1		
5	SS	M	Brown clayey SILT w/gypsum crystals (ML)	8/12/14	.1		
	SS	M	Brown silty CLAY w/gypsum crystals (CL)	12/17/19	0		.2 PID Down Hole
10	SS	W		30/60/10=1½"	.1		
15	SS	W	Gypsum increasing	4/6/8	4.0		
20	SS	W		6/9/18	220		
25			Boring terminated at 21.5 feet * Hollow Core Auger				

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PETCHER BARREL
RC - ROCK CORE
TC - THO CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO MW3 PROJECT NO. 342-65219 PROJECT NAME Holloman Air Force Base

DATE/TIME START 11/30/88 11:30 DATE/TIME END 11/30/88 1:00 DRILL CREW Flair/Luraschi/Monro *Geologist

DRILLING METHOD: AUGER 0 FT TO 21.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA** SURFACE COVER Gravel

TOC ELEV. 4084.21 BORING COORDINATES N 671537 E 554540 WATER DURING DRILLING 6'

WATER AT COMPLETION 9' DELAYED WATER LEVEL Water @ 7.7' below TOC on 2/11/89 @ 10: Monitor well installed in boring

DATE GROUTED N/A MATERIAL(S) & QUANTITY See Monitor Well Material List

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	D	Brown clayey SAND w/organics & gypsum (SC)	5/3/2	.4	0.1	down hole
	SS	W		3/7/16	.4		
5			Light gray sandy SILT (ML)				
	SS	W	Brown silty SAND w/gypsum (SM)	7/7/13	.4	0.6	down hole
	SS	W		8/9/12	.4		
10			Brown sandy CLAY w/gypsum (CL)				
	SS	W		5/4/3	.4		
15							
	SS	W	Brown silty SAND w/gypsum (SM)	6/8/8	.4		
			gypsum crystals increasing				
20	SS	W		10/27/32	.4		
			Boring terminated at 21.5'				
			** Hollow Core Auger				
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THO CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW3A PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 11/30/88 10:45 DATE/TIME END 11/30/88 11:00 DRILL CREW Flair/Luraschi/Monroe* *Geologist

DRILLING METHOD: AUGER 0 FT TO 5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 4" O.D. SSA** SURFACE COVER Gravel

G.S. ELEV. Not Required BORING COORDINATES Not Required WATER DURING DRILLING None

WATER AT COMPLETION None DELAYED WATER LEVEL None

DATE GROUTED N/A MATERIAL(S) & QUANTITY Backfilled w/cuttings

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Fill Material				
			Trash encountered @ 4'				
5							
			No Samples Taken ** Solid Stem Auger				
10							
15							
20							
25							

SOIL SAMPLE KEY

SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TWO CONE

MOISTURE KEY

D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW4 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/1/88 2:00 DATE/TIME END 12/1/88 4:10 DRILL CREW Flair/Monroe*/Lurasch
* Geologist

DRILLING METHOD: AUGER 0 FT TO 21.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA** SURFACE COVER Gravel

TOC ELEV. 4081.31 BORING COORDINATES N 670903 E 554854 WATER DURING DRILLING 4'

WATER AT COMPLETION 7.5' DELAYED WATER LEVEL Water @ 7.2' below TOC on 2/11/89 @ 9:50 Monitor well installed in boring

DATE GROUTED N/A MATERIAL(S) & QUANTITY See Monitor Well Material List

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown silty SAND (SM)	3/3/3	.2		
	SS	M/W	Tan silty SAND (SM)	15/12/5	.2		
5	SS	W	Brown silty clayey SAND (SC)	5/7/13	.2		
	SS	M	Brown sandy CLAY w/gypsum crystals (CL)	7/10/17	.2		6 Down hole
10	SS	M	Tan clayey SAND w/silt seams & gypsum crystals (SC)	16/21/35	180		
15	SS	M	Light gray dense SAND w/iron stains (SP)	16/34/50	145		
20	SS		Fewer iron stains	28/53/19	65		
25			Boring terminated at 21.5 feet ** Hollow Core Auger				

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THIN CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW4A PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/1/88 10:00 DATE/TIME END 12/1/88 10:30 DRILL CREW Flair/Monroe*/Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 6 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 4" O.D. SSA ** SURFACE COVER Topsoil

G.S. ELEV. Not Required BORING COORDINATES Not Required WATER DURING DRILLING None

WATER AT COMPLETION None DELAYED WATER LEVEL None Backfilled with cuttings

DATE GROUTED N/A MATERIAL(S) & QUANTITY N/A

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Landfill Material				Background
							.4
							.5
5							
			Boring terminated at 5 feet Terminated because of landfill material encountered No samples taken				
10			** Solid Stem Auger				
15							
20							
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - TWO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW4B PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Ba

DATE/TIME START 11:00 12/1/88 DATE/TIME END 11:30 12/1/88 DRILL CREW Flair/Monroe*/Luraschi
* Geologist

DRILLING METHOD: AUGER 0 FT TO 5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 4" O.D. SSA** SURFACE COVER Topsoil

G.S. ELEV. Not Required BORING COORDINATES Not Required WATER DURING DRILLING None

WATER AT COMPLETION None DELAYED WATER LEVEL None Backfilled with cuttings

DATE GROUTED N/A MATERIAL(S) & QUANTITY N/A

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Landfill Material				
5			Boring terminated at 5 feet				
			Pilot hole for trash exploration				
			** Solid Stem Auger.				
10							
15							
20							
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TE - THIN FINE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW4C PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/1/88 11:30 DATE/TIME END 12/1/88 12:00 DRILL CREW Flair/Monroe*/Luraschi *Geologist

DRILLING METHOD: AUGER 0 FT TO 5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 4" O.D. SSA ** SURFACE COVER Topsoil

G.S. ELEV. Not Required BORING COORDINATES Not Required WATER DURING DRILLING None

WATER AT COMPLETION None DELAYED WATER LEVEL None, Backfilled with cuttings

DATE GROUTED N/A MATERIAL(S) & QUANTITY N/A

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Landfill Material				
5			Boring terminated at 5 feet				
			Pilot hole for trash exploration				
			** Solid Stem Auger				
10							
15							
20							
25							

SOIL SAMPLE KEY

SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THIN CORE

MOISTURE KEY

D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW4D PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12:30 12/1/88 DATE/TIME END 1:00 12/1/88 DRILL CREW Flair/Monroe*/Luraschi *Geologist

DRILLING METHOD: AUGER 0 FT TO 5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 4" O.D. SSA ** SURFACE COVER Topsoil

G.S. ELEV. Not Required BORING COORDINATES Not Required WATER DURING DRILLING 5'

WATER AT COMPLETION N/A DELAYED WATER LEVEL None, Backfilled with cuttings

DATE GROUTED - MATERIAL(S) & QUANTITY N/A

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
			Landfill Material				
5			Boring terminated at 5 feet Pilot hole for trash exploration ** Solid Stem Auger				
10							
15							
20							
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THIN CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW5 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 12/1/88 7:50 DATE/TIME END 12/1/88 10:00 DRILL CREW Flair/Monroe */Luraschi *Geologist

DRILLING METHOD: AUGER 0 FT TO 21.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D. / HCA ** SURFACE COVER Sand

TOC ELEV. 4081.54 BORING COORDINATES N 672981 E 556061 WATER DURING DRILLING 4'

WATER AT COMPLETION 4.5' DELAYED WATER LEVEL Water @ 5.4' below TOC on 2/11/89 @ 7:4 Monitor well installed in boring

DATE GROUTED N/A MATERIAL(S) & QUANTITY See Monitor Well Material List

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	Brown silty SAND (SM)	2/2/3	.2		
	SS	W	Light gray & tan clayey SAND w/ gypsum crystals (SC)	3/4/12	.2		
5	SS	W		12/18/26	.2		
	SS	W	Tan SAND w/gypsum crystals (SP)	16/23/32	.2		
10	SS	W		21/28/31	.2		
15	SS	M	Brown clayey SAND w/gypsum crystals (SC)	12/12/80	.2		
20	SS	W	Tan SAND (SP)	15/30/55	.2		
			Boring terminated at 21.5 feet ** Hollow Core Auger				
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE
TC - THO CONE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW-6 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 1/13/89 9:00 DATE/TIME END 1/13/89 10:30 DRILL CREW Flair, Monroe*, Arthur *Geologist

DRILLING METHOD: AUGER 0 FT TO 21.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA ** SURFACE COVER Topsoil

TOC ELEV. 4083.50 BORING COORDINATES N 671752 E 555313 WATER DURING DRILLING 8'

WATER AT COMPLETION 7.5' DELAYED WATER LEVEL Water @ 8.6' below TOC on 2/11/89 @ 8:45 Monitor Well Installed in Boring

DATE GROUTED N/A MATERIAL(S) & QUANTITY See Monitor Well Materials List

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	D	Tan silty SAND (SM)	4/5/7	0		
			Brown clayey SAND (SC)				
	SS	M	wood chips	4/5/4	0		
5	SS	M/W	Tan SAND w/landfill material & rust colored stains (SP)	4/2/2	0		
	SS	W/M	Tan silty SAND (SM)	5/7/12	16		
10	SS	M	Brown clayey SAND (SC)	10/10/11	1.6		
15	SS	M	Brown & gray sandy CLAY (CL)	7/11/14	.2		
20	SS	W/M	Gray clayey silty SAND (SM)	17/27/56	.2		
			Boring terminated at 21.5 feet ** Hollow Core Auger				
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

PROFESSIONAL SERVICE INDUSTRIES, INC.

BORING NO. MW7 PROJECT NO. 342-65219H PROJECT NAME Holloman Air Force Base

DATE/TIME START 1/13/89 3:00 DATE/TIME END 1/13/89 4:30 DRILL CREW Flair, Monroe*, Arthur *Geologist

DRILLING METHOD: AUGER 0 FT TO 21.5 FT, ROTARY - FT TO - FT DRILL RIG CME55

AUGER/BIT SIZE(S) & INTERVAL(S) 3¼" I.D./HCA** SURFACE COVER Gravel

TOC ELEV. 4088.24' BORING COORDINATES N 672448 E 554755 WATER DURING DRILLING 10.5'

WATER AT COMPLETION 10.5' DELAYED WATER LEVEL Water @ 10.6 feet below TOC on 2/11/89

DATE GROUTED N/A MATERIAL(S) & QUANTITY See Monitor Well Materials List

DEPTH FT.	SAMPLE TYPE & INTERVAL	MOISTURE	SOIL DESCRIPTION & VISUAL CLASSIFICATION	SPT	PID (ppm)	HAND PENETROMETER (tsf)	OTHER
	SS	M	3" gravel at surface Tan sandy SILT (ML)	4/8/8	0.2		
	SS	M	Brown silty sandy CLAY w/gypsum (CL)	5/6/9	0.2		
5	SS	M	Tan silty SAND (SM)	5/18/31	0.2		
	SS	M	Brown silty clayey SAND (SC)	12/18/29	0.2		
10	SS	M/W		8/13/25	0.2		
15	SS	M	Brown sandy CLAY w/gypsum (CL)	10/45/45=3¾"	0.2		
20	SS	M	Gray clayey silty SAND (SM-SC)	6/8/12	0.2		
			Boring terminated at 21.5 feet ** Hollow Core Auger				
25							

SOIL SAMPLE KEY
SS - SPLIT SPOON
ST - SHELBY TUBE
PB - PITCHER BARREL
RC - ROCK CORE

MOISTURE KEY
D - DRY (VERY LITTLE MOISTURE)
M - MOIST (SOME MOISTURE)
W - WET (SATURATED)

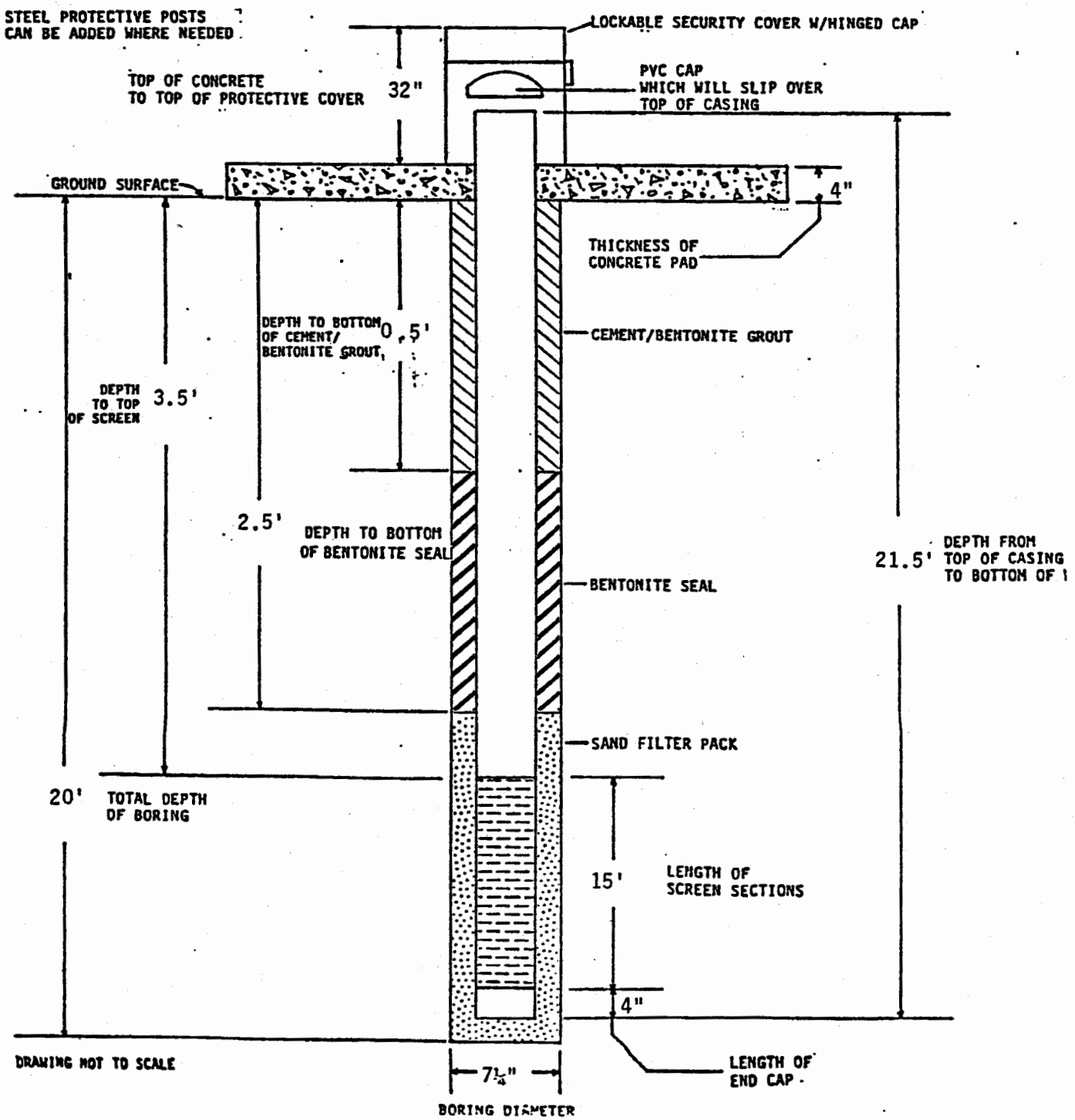
LF-10

WELL COMPLETION REPORTS

PROJECT Holloman Air Force Base MONITOR WELL I.D. NO. MW1

Monitor Well Data Sheet

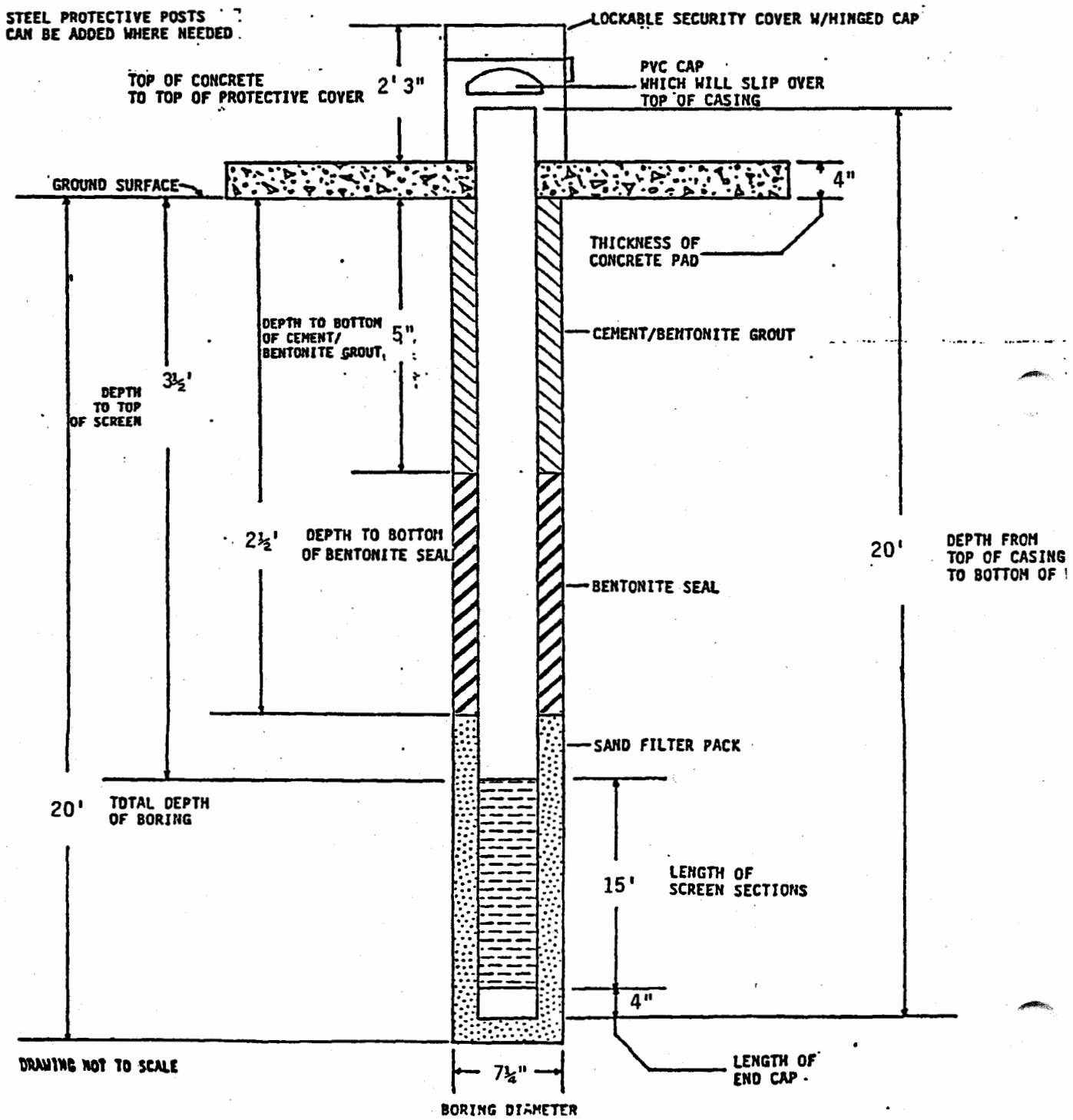
TOC ELEV = 4087.66



PROJECT Holloman Air Force Base MONITOR WELL I.D. NO. MW2

Monitor Well Data Sheet

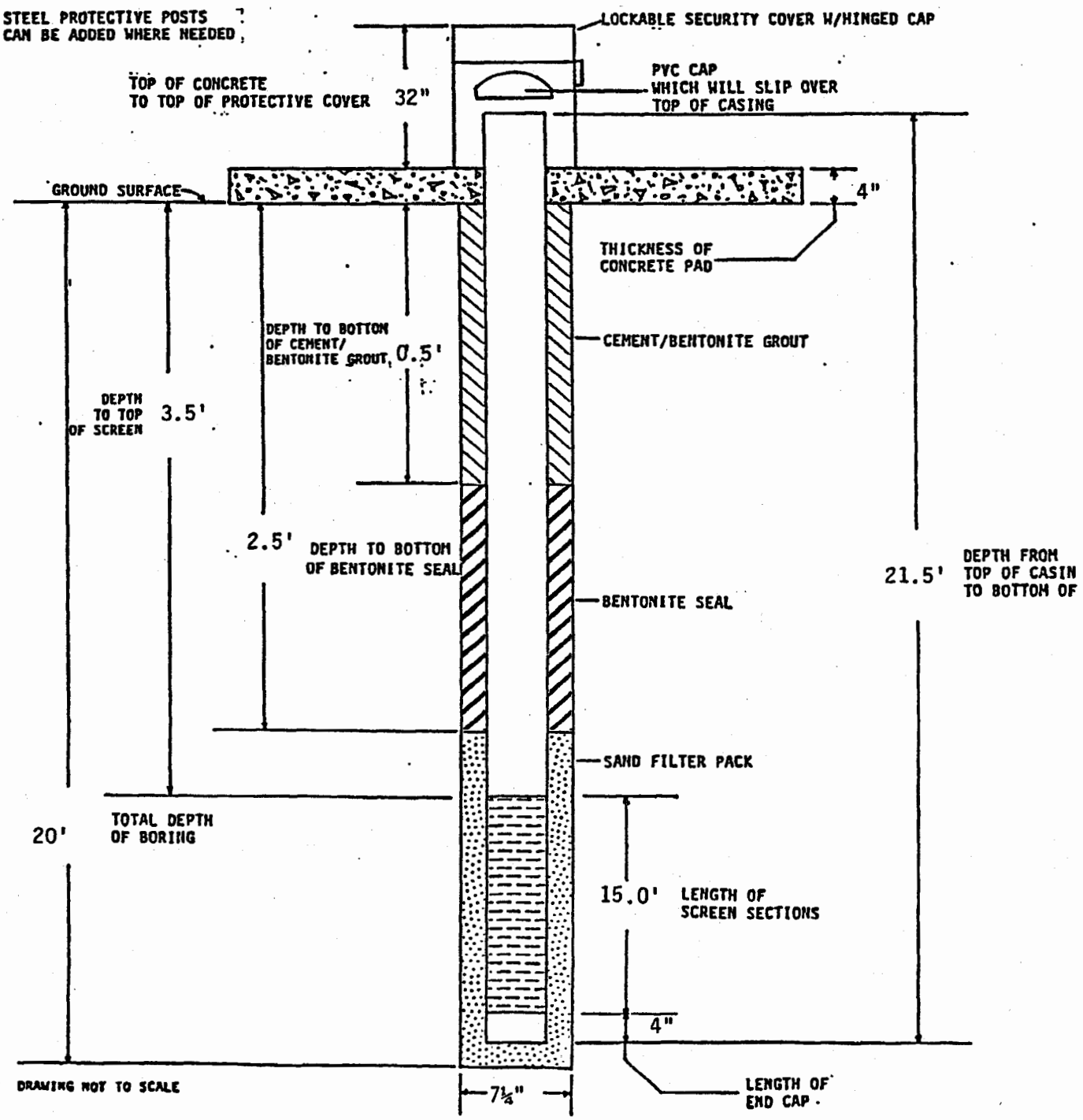
TOC ELEV = 4089.00



PROJECT Holloman Air Force Base MONITOR WELL I.D. NO. MW3

Monitor Well Data Sheet

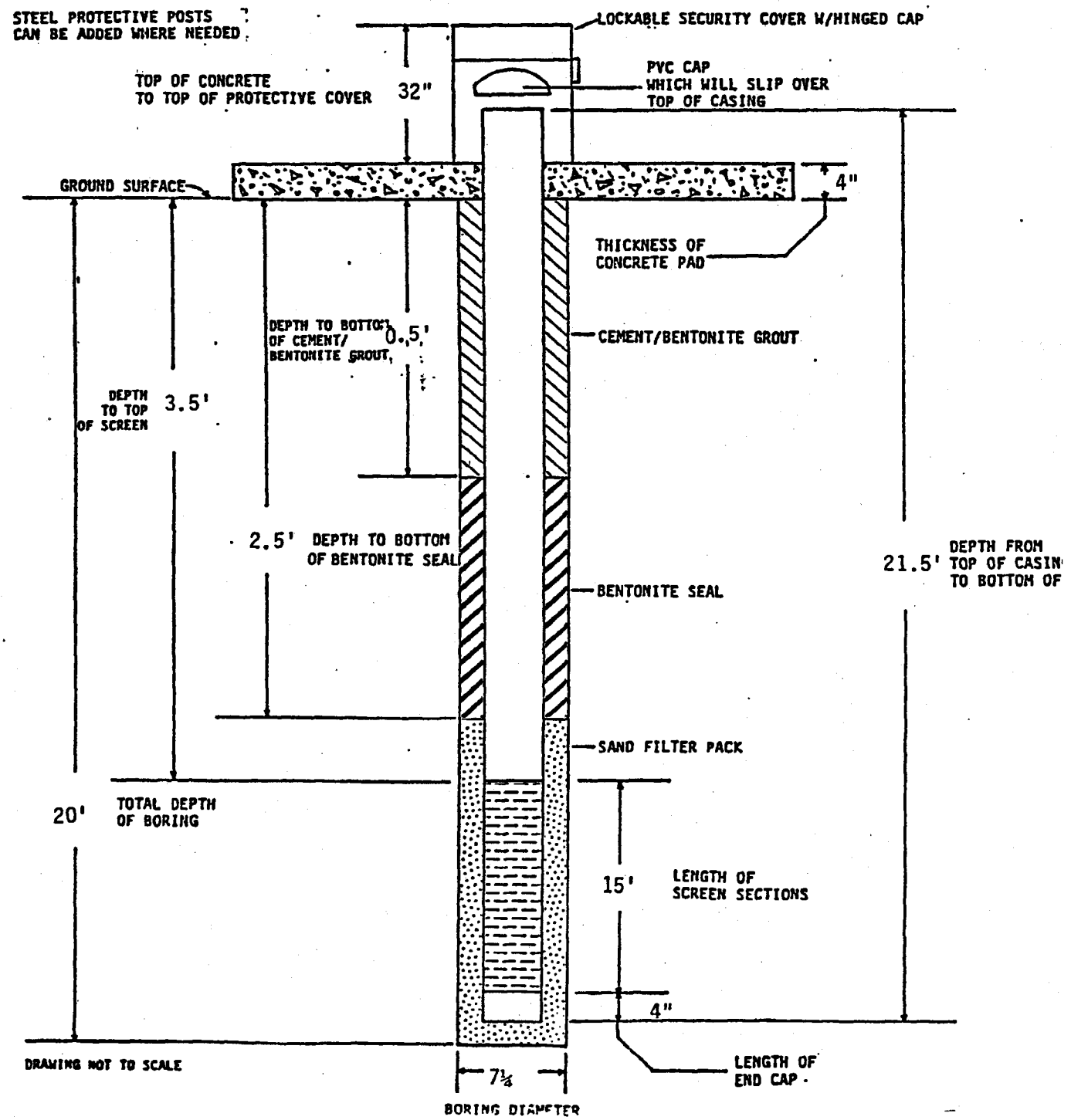
TOC ELEV = 4084.21



PROJECT Holloman Air Force Base MONITOR WELL I.D. NO. MW4

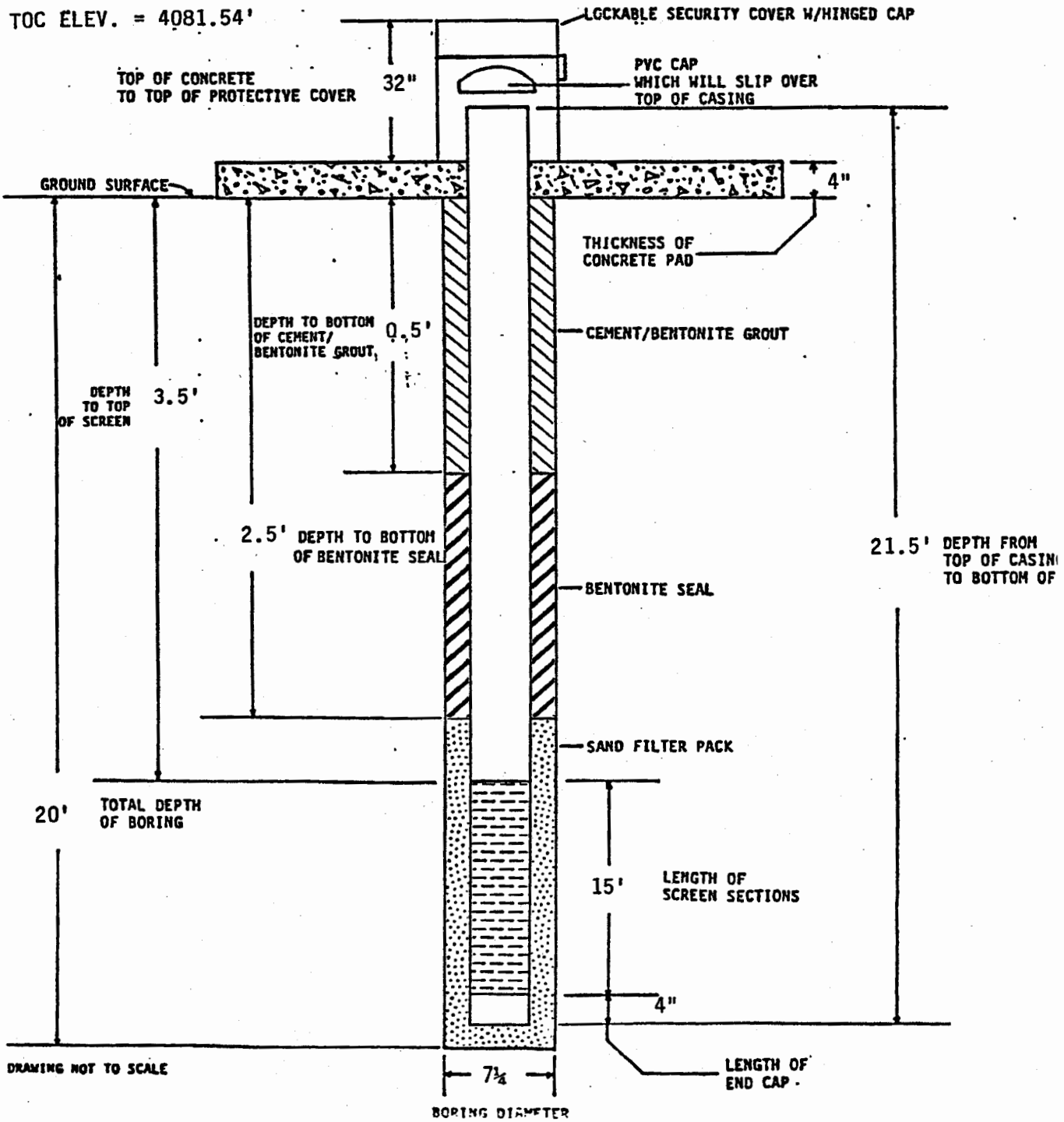
Monitor Well Data Sheet

TOC ELEV = 4081.31'



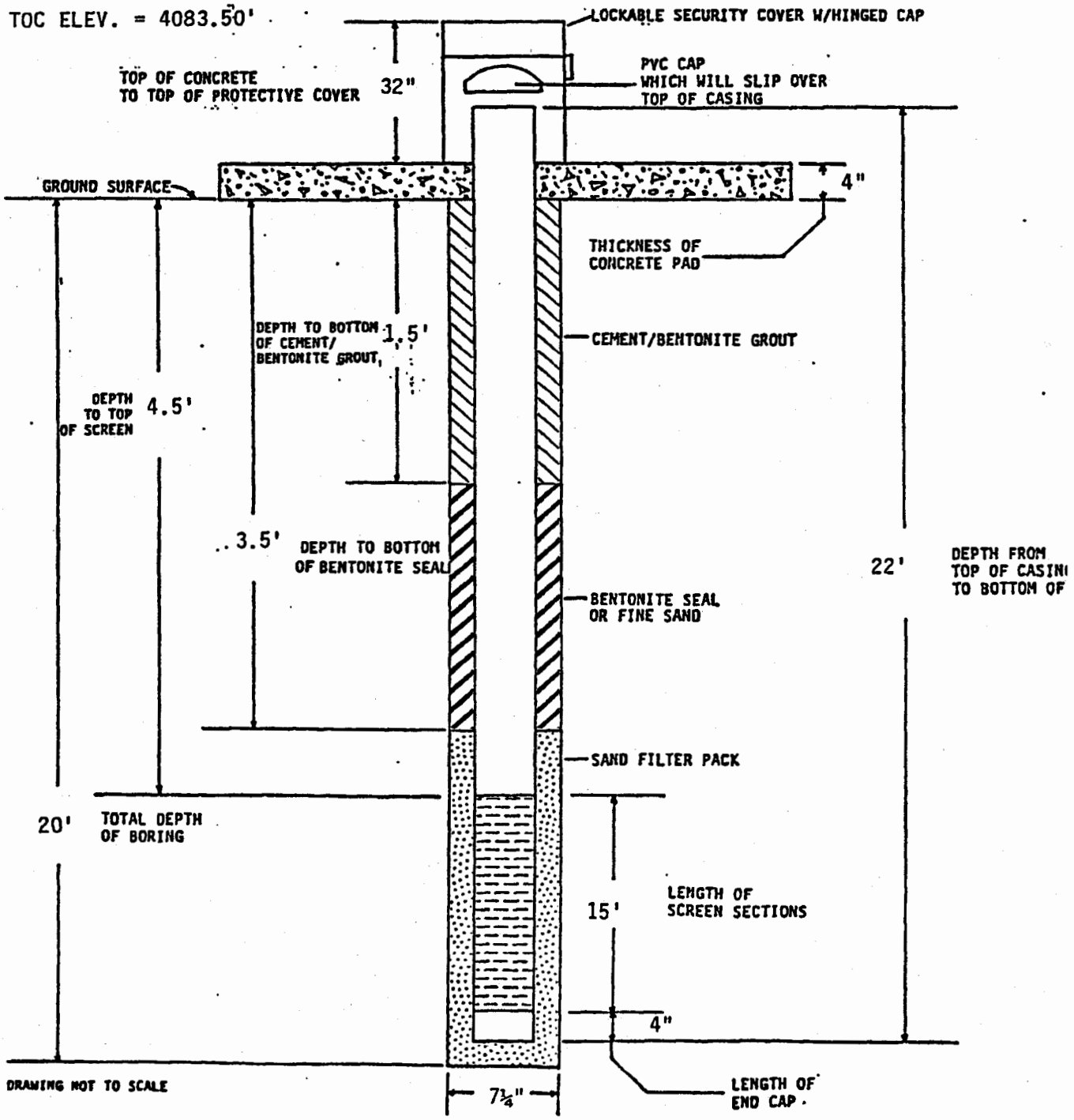
PROJECT Holloman Air Force Base MONITOR WELL I.D. NO. MW5

Monitor Well Data Sheet



PROJECT Holloman Air Force Base MONITOR WELL I.D. NO. MW6

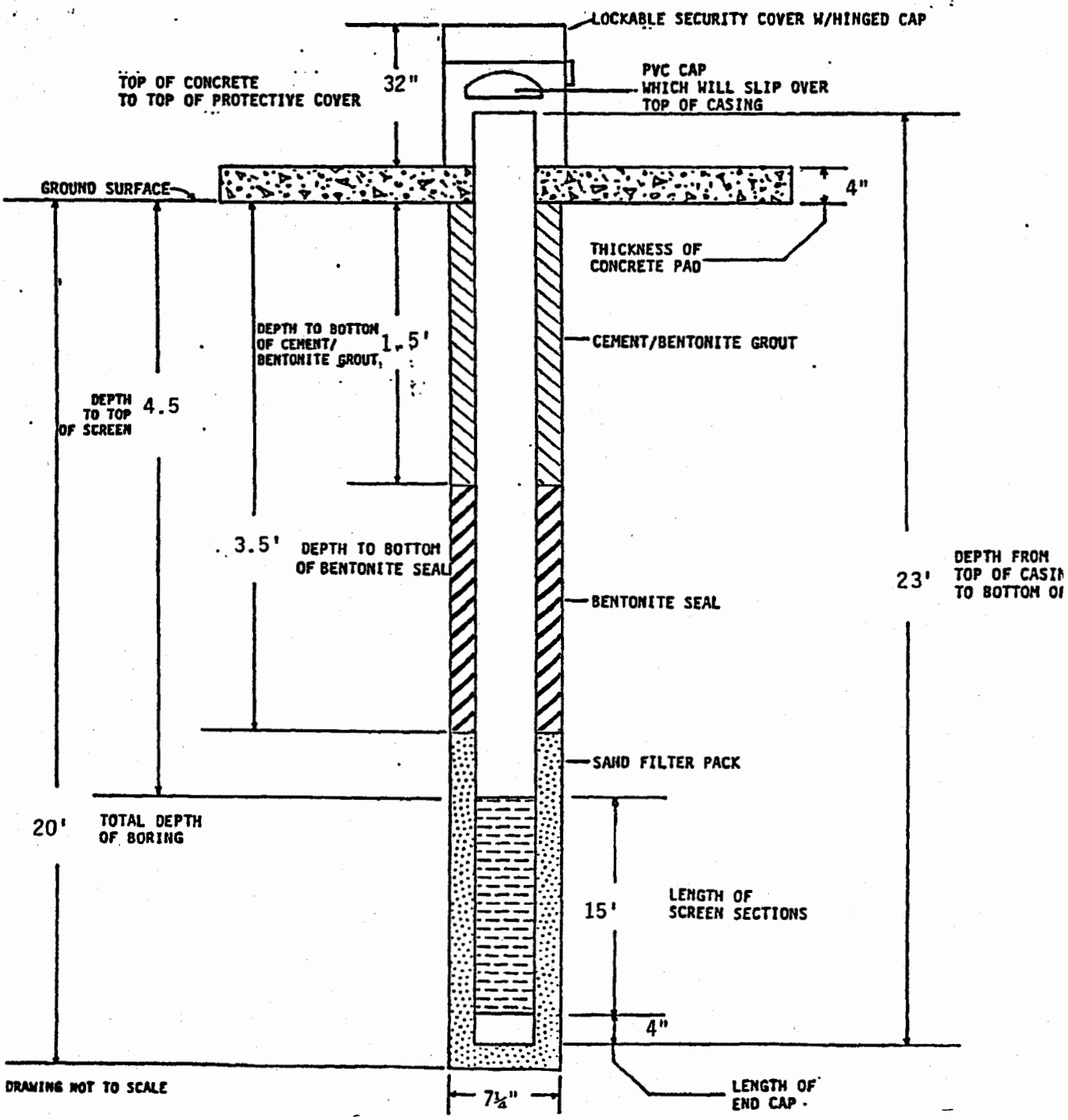
Monitor Well Data Sheet



PROJECT Holloman Air Force Base MONITOR WELL I.D. NO. MW-7

Monitor Well Data Sheet

TOC ELEV. = 4088.24'



APPENDIX H.2

LF-19

LF-19

DRILLING LOGS

DRILLING LOG

HOLE NO. MW-19-01

F2507

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	- 19
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	663965.58(Y), 548304.90(X)
9. SURFACE ELEVATION	4046.60
10. DATE STARTED	5 SEP 91
11. DATE COMPLETED	5 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	4.25 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 6.74 ft bmp
14. TOTAL DEPTH OF HOLE	15 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	SAND: moderate brown (5YR 4/4), moist, fine, poorly graded, soft. (SM)				3,3,6,6	1.2/2.0 ft
	2						
	3	SILTY, CLAYEY SAND: greyish-orange (10YR 7/4), soft, saturated. (SM)				4,8,7,8	0.3/2.0 ft
	4						▽ -water at 3.99 ft
	5	SAND: light brown (5YR 6/4), wet, very poorly graded, clean, fine grained. (SP)		MW-019-01		12,19,20,17	2.0/2.0 ft submitted for geotechnical sample
	6						
	7						
	8	CLAYEY SILT: moderate brown (5YR 4/4), moderately plastic, gypsum mottling and crystals, grading at 8.2 ft. (ML)					
	9	SILTY CLAY: moderate brown (5YR 4/4), moist to wet, moderate plasticity, gypsum crystals common. (CL)					

DRILLING LOG

HOLE NO. MW-19-01

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		same as above.					
	11						
	12						
	13						
	14						
	15						TD= 15 ft
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-19-02

F2367

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	19
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	663447.81(Y), 548245.37(X)
9. SURFACE ELEVATION	4043.13
10. DATE STARTED	25 AUG 91
11. DATE COMPLETED	25 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	4.07 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	14.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	04 NOV 91

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		ATC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SILTY SAND: pinkish-grey (5YR 8/1), very fine, moist. (SM)				2,3,3,2	1.5/2.0 ft
	1	SANDY CLAY: pinkish-grey (5YR 8/1), medium, wet, limestone fragments. (CL)					
	2						
	3						
	4	SILTY SAND: medium to fine, with CLAYEY, SILTY SAND light brown (5YR 6/4), layers at 5.5 to 6.5 ft, saturated. (SM)					water at 4.07 ft bgl
	5					5,5,10,11	1.5/2.0 ft
	6						
	7						
	8						
	9						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. MW-19-02

DRILLING LOG

HOLE NO. MW-19-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR ATC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11						
	12						
	13						
	14						boring terminated at 14.0' well was offset 5' from logged boring due to flowing sands in augers
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-19-03

F2447

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	19
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	663289.0 (Y),548401.6 (X)
9. SURFACE ELEVATION	4047.5
10. DATE STARTED	24 AUG 91
11. DATE COMPLETED	24 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	9.0 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 12.02 ft bmp
14. TOTAL DEPTH OF HOLE	18.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	SANDY SILT, some clay: greyish-orange (10YR 7/4), sand very fine to fine grained, poorly graded. (ML)				1,2,4,6	2.0/2.0 ft
	2						
	3	SANDY SILT, as above. (ML)				6,7,8,10	
	4	SAND: light brown (5YR 6/4), very fine to fine grained, poorly graded. (SP)					
	5	SAND, as above. (SP)				7,8,7,8	
	6						
	7						
	8	SAND, as above: saturated. (SP)				30,36,24,36	
	9						water level at 9.52 ft bgl ▽

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. MW-19-03

DRILLING LOG

HOLE NO. MW-19-03

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SAND, as above. (SP)					5.0/5.0 ft
	11						
	12						
		CLAYEY SILT, some sand: moderate brown (5YR 4/4), sand very fine to very coarse grained, well graded, medium plasticity. (MH)					
	13						
	14						
	15	CLAYEY SILT, as above. (MH)					3.0/3.0 ft
	16						
	17	CLAYEY SILT, as above: pale yellowish-brown 10YR6/2, yellowish stains, saturated					
	18						TD= 18.0 ft
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

LF-19

WELL COMPLETION REPORTS

ELEVATION GROUND WATER 4042.0			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 05 SEPT 91	STARTED 1400	COMPLETED 130	LOCATION (Coordinates or Station) 19
ELEVATION TOP OF CASING 4048.7			SIGNATURE OF INSPECTOR/INSTALLER TAC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-19-01

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

7.8 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.75 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

1.0 ft. bgl

3.0 ft. bgl

5.05 ft. bgl

15.0 ft. bgl

15.0 ft. bgl

7.5 in.

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 29 SEP 91/1430/6.81 ft bgl

04 NOV 91/1510/6.74 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

F2548

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 25 AUG 91	STARTED	COMPLETED	LOCATION (Coordinates or Station) 19
ELEVATION TOP OF HOLE			SIGNATURE OF INSPECTOR/INSTALLER ATC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW- 19- 02

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: _____

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL:

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK Slotted Interval 12.3–12.8' bgl

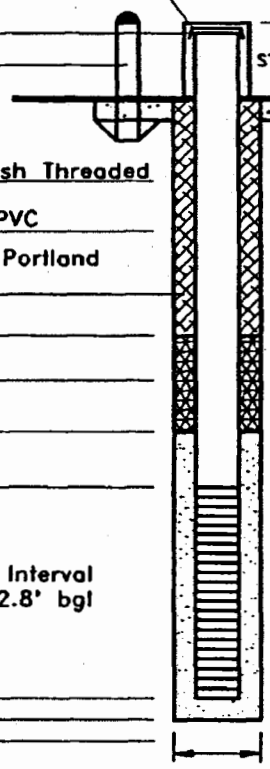
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

5.3 ft. LENGTH OF SOLID PIPE

10.6 ft. WELL SCREEN LENGTH



STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

0.8 ft.

1.8 ft.

2.8 ft.

13.0 ft.

14.0 ft.

7.5 in.

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: N/A

WELL DEVELOPMENT

METHOD: _____

TIME SPENT DEVELOPING: _____

VOLUME OF WATER REMOVED: _____

VOLUME OF WATER ADDED: _____

DESCRIPTION OF PREDEVELOPMENT WATER: _____

DESCRIPTION OF POST DEVELOPMENT WATER: _____

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 25 Aug 91/1500/4.0' bgl

DEPTH FROM TOP CASING AFTER DEVELOPMENT: _____

F2839

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 24 AUG 91	STARTED 1130	COMPLETED 1500	LOCATION (Coordinates or Station) 19
ELEVATION TOP OF CASING 4049.29			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-19-03

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

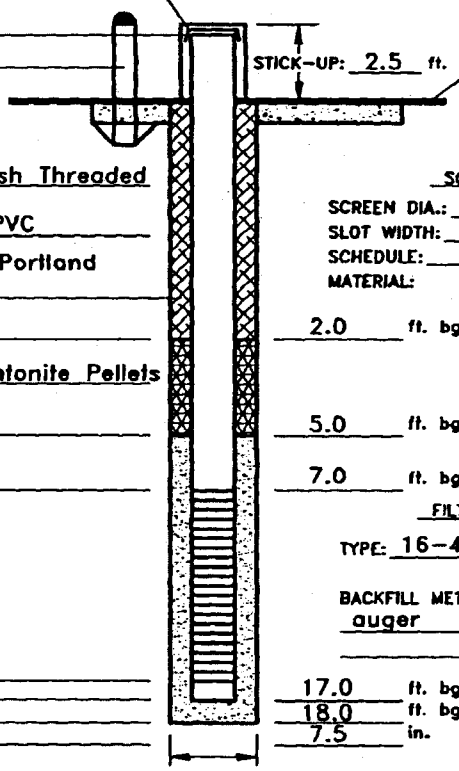
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

9.5 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH



STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

2.0 ft. bgl

5.0 ft. bgl

7.0 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

17.0 ft. bgl

18.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 24 AUG 91/1500/10.4 ft bgl

29 SEP 91/1030/11.88 bmp

04 NOV 91/1519/12.02 bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

F2338

APPENDIX H.3

LF-21

LF-21

DRILLING LOGS

DRILLING LOG

HOLE NO. MW-21-01

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	21
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	667762.0 (Y),542925.4 (X)
9. SURFACE ELEVATION	4044.18
10. DATE STARTED	23 AUG 91
11. DATE COMPLETED	23 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	7.2 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 6.89 ft bmp
14. TOTAL DEPTH OF HOLE	15.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2, 3	SILTY SAND: light brown (5YR 5/6), sand very fine to very coarse, well graded, saturated. (SM)				5,8,14,19	2.0/2.0 ft
	4	SAND: greyish-orange (10YR 7/4), very fine to fine grained, poorly graded, moist. (SP)					water level at 4.39 ft bgl
	5, 6, 7	SILTY SAND: light brown (5YR 6/4), sand very fine to fine grained, poorly graded, saturated. (SM)				8,9,11,14	2.0/2.0 ft
	8, 9	SILTY SAND; moderate brown (5YR 4/4), sand very fine to fine grained, poorly graded, gypsum crystals, caliche, saturated. (SM)				8,10,14,16	2.0/2.0 ft

DRILLING LOG

HOLE NO. MW-21-01

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		CLAYEY SILT: moderate brown (5YR 4/4), low plasticity, gypsum crystals. (ML)				32,31,16, 14	
	11	SILTY SAND: very pale orange (10YR 8/2), sand very fine to very coarse grained, well graded, caliche. (SM)					
	12	SILTY SAND: greyish-orange (10YR 7/4), sand very fine to fine grained, poorly graded. (SM)		MW-021-001			geotechnical analysis 12.0-14.0 ft
	13						
	14						
	15						TD= 15.0 ft
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-21-02

F2449

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	21
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	666828.2 (Y)542437.0 (X)
9. SURFACE ELEVATION	4041.29
10. DATE STARTED	23 AUG 91
11. DATE COMPLETED	23 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	8.0 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 9.95 ft bmp
14. TOTAL DEPTH OF HOLE	15.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2	CLAYEY SILT, some sand: dark yellowish-brown (10YR 4/2), low plasticity, sand fine to very fine grained, poorly graded. (ML)				1,2,2,3	1.0/2.0 ft
	3	SILTY SAND: light brown (5YR 5/6), sand very fine to fine grained, poorly graded, moist. (SM)				1,2,4,14	2.0/2.0 ft
	4	CLAYEY SILT: greyish-orange (10YR 7/4), low plasticity, gypsum crystals. (ML)					
	5, 6	SILTY SAND: greyish-orange (10YR 7/4), sand very fine to fine grained, poorly graded. (SM)				15,25,14, 13	1.5/2.0 ft
	7						water level at 7.45 ft bgl
	8	SILTY SAND, as above: light brown (5YR 5/6), saturated. (SM)				17,20,34, 39	2.0/2.0 ft
	9	CLAYEY SILT: moderate brown (5YR 4/4), low plasticity, gypsum crystals. (ML)					

DRILLING LOG

HOLE NO. MW-21-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	CLAYEY SILT, as above: lots of gypsum and caliche at base. (ML)				18,25,31, 39	2.0/2.0 ft
	12	CLAYEY SILT, as above. (ML)					5.0/5.0 ft
	13	CLAYEY SILT, as above: greyish-orange (10YR 7/4). (ML)					
	14	SILTY SAND: greyish-orange (10YR 7/4), sand very fine to fine grained, poorly graded. (SM)					
	15						TD= 15.0 ft
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-21-03

F2450

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	-21
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	666854.1 (Y),542275.6 (X)
9. SURFACE ELEVATION	4039.67
10. DATE STARTED	23 AUG 91
11. DATE COMPLETED	23 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	9.0 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 9.16 ft bmp
14. TOTAL DEPTH OF HOLE	15.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SILTY SAND: moderate brown (5YR 4/4), sand very fine to fine grained, poorly graded. (SM)				1,2,3,0	1.5/2.0 ft
	1	CLAYEY SILT: greyish-orange 10YR 7/4, moderate plasticity, saturated. (MH)					
	2	SILTY SAND: greyish-orange (10YR 7/4), sand very fine to sand very coarse grained, well graded, saturated. (SM)					
	3	SILTY SAND: light brown (5YR 5/6), sand very fine to fine grained, poorly graded, moist. (SM)				4,7,8,18	2.0/2.0 ft
	4	SILTY SAND, as above: greyish-orange 10YR 7/4, moist. (SM)					
	5	SILTY SAND, as above: moist. (SM)				4,9,13,14	1.5/2.0 ft
	6	SAND: greyish-orange (10YR 7/4), very fine to fine grained, poorly graded, moist. (SP)					
	7						water level at 6.66 ft bgl
	8	SAND, as above: saturated. (SP)				35,40,39, 40	2.0/2.0 ft
	9						

DRILLING LOG

HOLE NO. MW-21-03

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SAND, as above: light brown (5YR 6/4). (SP)				15,14,9,14	2.0/2.0 ft
	11	CLAYEY SAND: greyish orange (10YR 7/4), sand very fine to fine grained, poorly graded, low plasticity. (SC)					
	12	CLAYEY SAND, as above: lots of caliche. (SC)					5.0/5.0 ft
	13						
	14						
	15						TD= 15.0 ft
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-21-04

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	21
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	666887.8 (Y),542152.1 (X)
9. SURFACE ELEVATION	4037.78
10. DATE STARTED	24 AUG 91
11. DATE COMPLETED	24 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	7.8 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 7.64 ft bmp
14. TOTAL DEPTH OF HOLE	15.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SANDY SILT: moderate brown (5YR 4/4), sand very fine to medium grained, moderately graded, moist. (ML)				3,4,6,8	2.0/2.0 ft
	1						
		SANDY SILT, as above: greyish-orange (10YR 7/4), moist. (ML)					
	2						
	3						
	4						
							water level at 5.14 ft bgl
	5	SILTY SAND: light brown (5YR 6/4), sand very fine to fine grained, poorly graded, saturated. (SM)				8,9,12,13	1.5/2.0 ft
	6						
	7						
	8	SILTY SAND: pale yellowish-brown (10YR 6/2), very fine to fine grained, poorly graded, stained orangish-brown at top. (SM)				11,16,36, 30	
	9	SILTY SAND, as above: greyish-orange (10YR 7/4), no staining. (SM)					

DRILLING LOG

HOLE NO. MW-21-04

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11						
	12						
	13			MW-021-004			2.5/2.5 ft geotechnical sample 12.5-15.0 ft
	14						
	15						TD= 15.0 ft
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

LF-21

WELL COMPLETION REPORTS

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 23 AUG 91	STARTED 0830	COMPLETED 1130	LOCATION (Coordinates or Station) 21
ELEVATION TOP OF CASING 4046.59			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-21-01

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

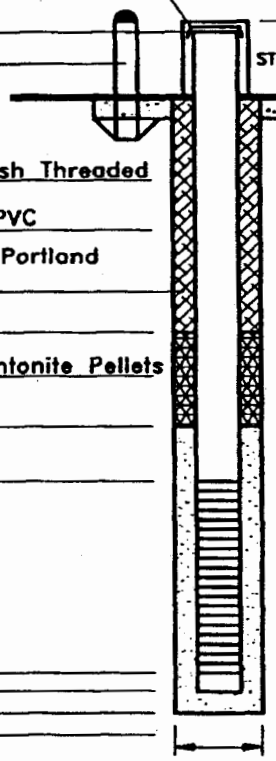
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

6.5 ft. LENGTH OF SOLID PIPE

ft. WELL SCREEN LENGTH



STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: [X] PVC [ ] STAINLESS STEEL

[ ] OTHER (DESCRIBE)

0.5 ft. bgl

2.0 ft. bgl

4.0 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

14.0 ft. bgl

15.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 23 AUG 91/1130/3.9 ft bgl

09 OCT 91/1145/6.43 ft bmp

04 NOV 91/1454/6.89 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

F2339

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 23 AUG 91	STARTED 1300	COMPLETED 1530	LOCATION (Coordinates or Station) 21
ELEVATION TOP OF CASING 4042.97			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-21-02

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

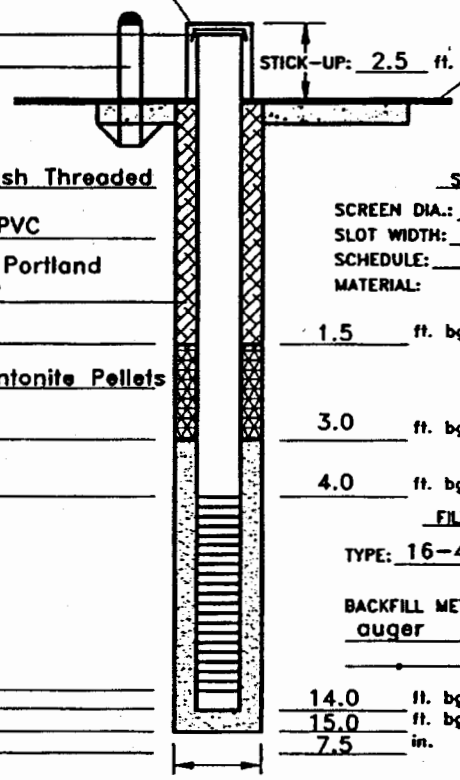
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

6.5 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH



STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

1.5 ft. bgl

3.0 ft. bgl

4.0 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

14.0 ft. bgl

15.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 09 OCT 91/1110/9.72 ft bmp

04 NOV 91/1457/9.95 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 23 AUG 91	STARTED 1600	COMPLETED 1730	LOCATION (Coordinates or Station) 21
ELEVATION TOP OF CASING 4041.77			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-21-03

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

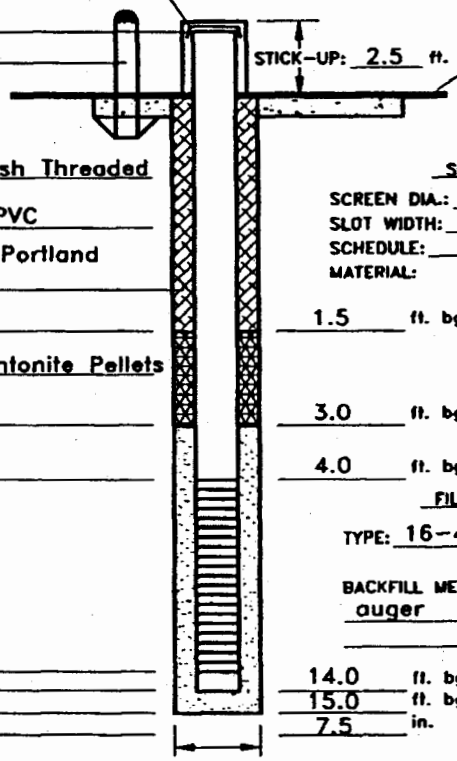
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

6.5 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH



STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL

☐ OTHER (DESCRIBE)

1.5 ft. bgl

3.0 ft. bgl

4.0 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

14.0 ft. bgl

15.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 09 OCT 91/1130/9.01 ft bmp

04 NOV 91/1457/9.95 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

F2341

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 24 AUG 91	STARTED 0800	COMPLETED 1015	LOCATION (Coordinates or Station) 21
ELEVATION TOP OF CASING 4039.99			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-21-04

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

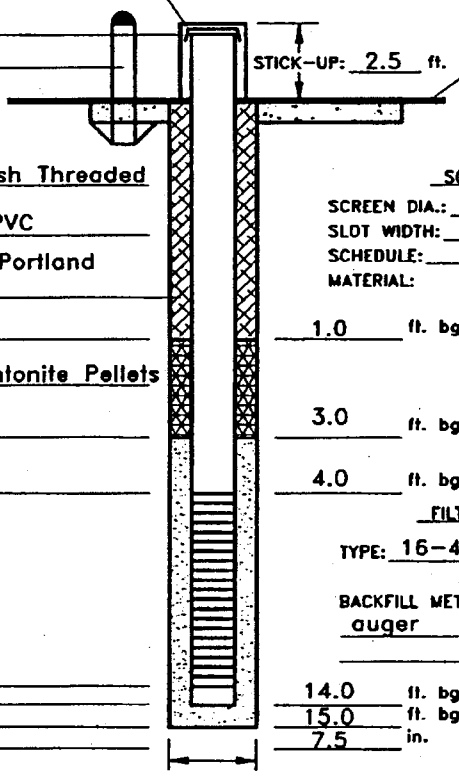
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

6.5 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH



STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

1.0 ft. bgl

3.0 ft. bgl

4.0 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

14.0 ft. bgl

15.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 24 AUG 91/1015/5.25 ft bgl

09 OCT 91/1130/7.58 ft bmp

04 NOV 91/1502/7.64 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

APPENDIX H.4

LF-22

LF-22

DRILLING LOGS

DRILLING LOG

HOLE NO. MW-22-01

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	22
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	666347.26(Y), 540855.91(X)
9. SURFACE ELEVATION	4037.70
10. DATE STARTED	23 AUG 91
11. DATE COMPLETED	23 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	3.6 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 12.08 ft bmp
14. TOTAL DEPTH OF HOLE	17.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	SILT minor clay and sand: greyish-orange (10YR 7/4), soft, moist, non-plastic. (ML)				?,?,?,?	1.5/2.0 ft hammer broke; not fixed until after first sample
	2	SILT: very pale orange (10YR 8/2), sharp contrast with above, non-plastic, hard, crumbly, gypsum. (ML)					
	3	SILT, as above: but soft.				7,7,13,42	2.0/2.0 ft
	4	grading to SAND: greyish-orange (10YR 7/4), soft, poorly graded, fine to very fine, grading to (10YR 8/2), pale orange, wet. (SP)					
	5	SAND, as above: moderate yellowish-brown (10YR 5/4), then at 5.6 ft sharp color change to (10YR 8/2), wet. (SP)				4,10,21,18	1.8/2.0 ft
	6						
	7						
	8	SAND, as above: wet.				26,30,35,35	1.2/2.0 ft
	9						

DRILLING LOG

HOLE NO. MW-22-01

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SAND, as above: wet.				19,28,50,4	1.8/2.0 ft
	11						—water at 10.08 ft
	12						
	13						
	14						
	15	SAND, as above: dusky yellow (5YR 6/4), iron staining in discrete bands.				11,8,17,43	2.0/2.0 ft
	16						
	17						TD= 17.0 ft
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-22-02

F2510

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	22
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	665986.20(Y), 540801.52(X)
9. SURFACE ELEVATION	4037.20
10. DATE STARTED	23 AUG 91
11. DATE COMPLETED	23 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	9.5 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 12.58 ft bmp
14. TOTAL DEPTH OF HOLE	17.5 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SAND: moderate brown (5YR 4/4), gravelly fill, well graded. (SW)				5,8,17,19	1.8/2.0 ft
	1	SILTY SAND: moderate brown (5YR 4/4), hard, dry to moist, very fine, gypsum mottling, grading at 1.2 ft to very pale orange (10YR 8/2). (SM)					
	2						
		SILTY SAND. as above: becoming less silty.				11,17,18, 13	2.0/2.0 ft
	3						
		grading to SAND: very pale orange (10YR 8/2), clean, soft, moist, very fine, very poorly sorted. (SM)					
	4						
	5	SAND, as above.				8,14,10,10	2.0/2.0 ft
	6						
		CLAYEY SILT: greyish orange (10YR 7/4), moist, moderate hard, abundant gypsum crystals, moderate plasticity. (ML)					
	7						
		SAND: pale orange (10YR 8/2), wet, very clean, very fine to fine grained, very poorly graded. (SP)				43,50	1.0/2.0 ft
	8						
	9						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. MW-22-02

DRILLING LOG

HOLE NO. MW-22-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SAND, as above: greyish-orange (10YR 7/4), saturated.				8,24,37,50	1.8/2.0 ft
	11						-water at 10.58 ft
	12						
	13						
	14						
	15	SAND, as above: pale yellowish-brown (10YR 6/20 to 16 ft then sharp contact with				19,10,12, 16	2.0/2.0 ft
	16	SILTY CLAY: dusty yellow (5Y 6/4). LOTS of gypsum crystals some 1" long, highly plastic, iron staining at contact. (CH)					
	17						TD= 17.5 ft
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-22-03

F2365

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	-22
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	665887.50(Y), 540712.36(X)
9. SURFACE ELEVATION	4037.18
10. DATE STARTED	24 AUG 91
11. DATE COMPLETED	24 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	10.69 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	18.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	04 NOV 91

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		ATC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1						
	2						
	3						
	4						
	5	CLAYEY SAND: pale red (5R 6/2), with white gypsum nodules. (SC)	HS=0.0ppm			7,10,31,15	2.0/2.0 ft
	6	SILTY SAND: white (N9) to pinkish-grey (5YR 8/1), gypsum, very dry, powdery. (SM)					
	7						
	8	SILTY SAND: white (N9), gypsum, very dry, powdery, hard, moist at 8 ft, voids present. (SM)	HS=0.0ppm			37,50	-no recovery
	9						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES

HOLE NO. MW-22-03

DRILLING LOG

HOLE NO. MW-22-03

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR ATC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SILTY SAND: light brown (5YR 6/4), gypsum, very fine, clean, wet. (SM)	HS=0.0ppm			25,42,50+	1.5/2.0 ft
	11						water at 10.69 ft bgl
	12						
	13						
	14						
	15					9,49,49, 50+	1.75/2.0 ft geotechnical sample 15-17'
	16						
	17						
	18						TD= 18 ft
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES

HOLE NO. MW-22-03

DRILLING LOG

HOLE NO. MW-22-04

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	22
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	665863.06(Y), 540592.81(X)
9. SURFACE ELEVATION	4038.25
10. DATE STARTED	24 AUG 91
11. DATE COMPLETED	24 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	12.22 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	20.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		ATC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2, 3, 4, 5	SILTY SAND: light brown (5YR 6/2), very fine, dry to moist. (SM)				2,7,4,3	2.0/2.0 ft
	6, 7, 8	CLAYEY SAND: pale red (5YR 6/2), with white gypsum nodules, moist. (SC)					
	9	SILTY SAND: light brown (5YR 5/6), fine, moist. (SM)				7,3,4,4	

DRILLING LOG

HOLE NO. MW-22-04

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR ATC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	SANDY CLAY: moderate brown (5YR 4/4), fine, very moist in sand layers. (CL)					
	12						water at 12.22 ft bgl
	13						
	14	grades to a greyish-yellow green, medium to fine, saturated.				5,6,5,6	
	15					17,16	GEOTECHNICAL SAMPLE: 15-17 ft in 3" spoon with 6" brass liners
	16						
	17						
	18						
	19						
	20						TD= 20.0 ft
	21						
	22						
	23						
	24						
	25						
	26						
	27						

LF-22

WELL COMPLETION REPORTS

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 23 AUG 91	STARTED 0800	COMPLETED 1530	LOCATION (Coordinates or Station) 22
ELEVATION TOP OF CASING 4039.0			SIGNATURE OF INSPECTOR/INSTALLER TAC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-22-01

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL 1.5 ft. bgl

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK 4.0 ft. bgl

TOP OF SCREEN 5.8 ft. bgl

FILTER PACK

BOTTOM OF WELL 15.9 ft. bgl

BOTTOM OF BORING 17.0 ft. bgl

BORING DIAMETER 7.5 in.

7.8 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.0 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 27 SEP 91/1500/11.9 ft bgl

04 NOV 91/1441/12.08 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

F2549

ELEVATION GROUND WATER 4026.1			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 23 AUG 91	STARTED 1530	COMPLETED 1930	LOCATION (Coordinates or Station) 22
ELEVATION TOP OF CASING 4038.7			SIGNATURE OF INSPECTOR/INSTALLER TAC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-22-02

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

8.5 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.0 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

1.5 ft. bgl

4.5 ft. bgl

6.5 ft. bgl

16.5 ft. bgl

17.5 ft. bgl

7.5 in.

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 25 SEP 91/1400/13.05 ft bgl

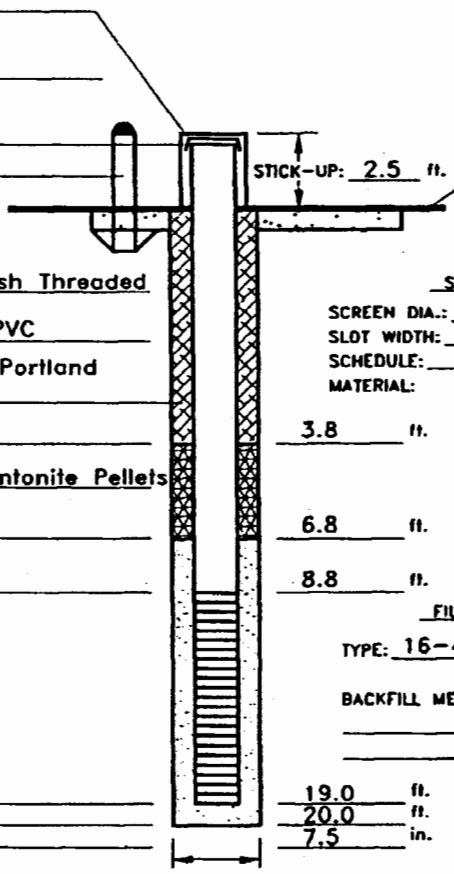
04 NOV 91/1444/12.58 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 24 AUG 91	STARTED	COMPLETED	LOCATION (Coordinates or Station) 22
ELEVATION TOP OF HOLE			SIGNATURE OF INSPECTOR/INSTALLER ATC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-22-03

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)



PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: _____

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

LENGTH OF SOLID PIPE: 11.3 ft.

WELL SCREEN LENGTH: 10.2 ft.

STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

TOP OF SEAL: 3.8 ft.

TOP OF FILTERPACK: 6.8 ft.

TOP OF SCREEN: 8.8 ft.

BOTTOM OF WELL: 19.0 ft.

BOTTOM OF BORING: 20.0 ft.

BORING DIAMETER: 7.5 in.

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE) _____

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: N/A

WELL DEVELOPMENT

METHOD: _____

TIME SPENT DEVELOPING: _____

VOLUME OF WATER REMOVED: _____

VOLUME OF WATER ADDED: _____

DESCRIPTION OF PREDEVELOPMENT WATER: _____

DESCRIPTION OF POST DEVELOPMENT WATER: _____

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 24 Aug 91/1100/11.5' bgl

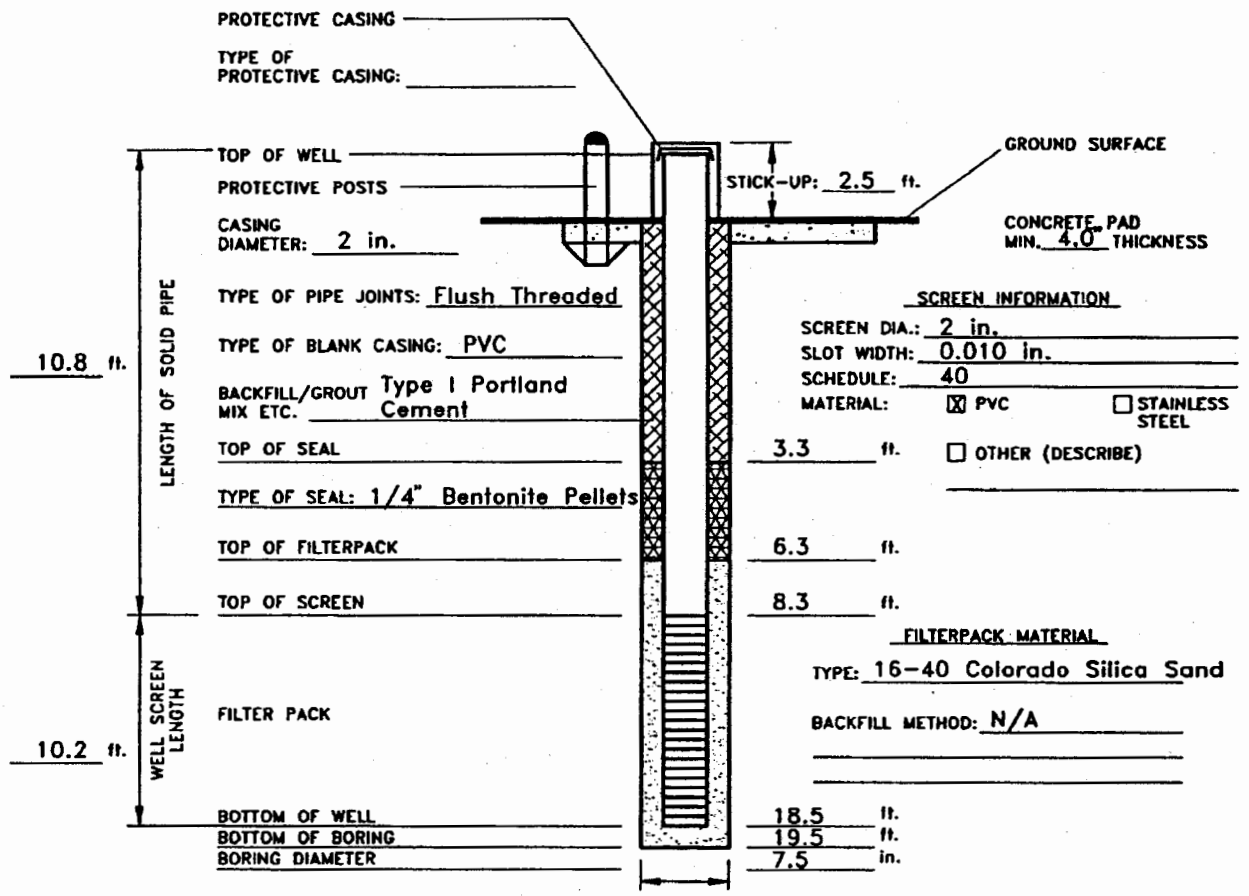
DEPTH FROM TOP CASING AFTER DEVELOPMENT: _____

F2836

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 24 AUG 91	STARTED	COMPLETED	LOCATION (Coordinates or Station) 22
ELEVATION TOP OF HOLE			SIGNATURE OF INSPECTOR/INSTALLER ATC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-22-04

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)



WELL DEVELOPMENT

METHOD:

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 24 Aug 91/1500/12.5' bgl

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

APPENDIX H.5

LF-23

LF-23

DRILLING LOGS

DRILLING LOG

HOLE NO. MW-23-01

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	23
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	9 SEP 91
11. DATE COMPLETED	9 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	6.0 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 11.74 ft bmp
14. TOTAL DEPTH OF HOLE	15.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		TAC

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1						
	2						
	3	SAND: light brown (5YR 6/4), soft, slightly moist, gypsum mottling, fine grained, minor silt. (SM) SILTY SAND: yellowish-grey (5Y 7/2), slightly moist, very poorly graded, fine grained, abundant gypsum mottling. (SM)			91JULH023-001	25,26,36,46	2.0/2.0 ft collected background sample
	4						
	5	SAND, as above.				18,44,50,45	1.9/2.0 ft
		SANDY SILT: very pale orange (10YR 8/2), non-plastic, slightly moist, soft, crumbly. (ML)					
	6	SAND: greyish-orange (10YR 7/4), wet to moist, fine grained, clean, very poorly graded. (SP)					
	7						
		SAND, as above.				17,18,23,32	2.0/2.0 ft
	8	grading to SAND: light brown (5YR 6/5), wet to saturated, very poorly graded, clean					
	9						-water at 9.74 ft

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. MW-23-01

DRILLING LOG

HOLE NO. MW-23-01

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11						
	12						
	13	SILTY, CLAYEY SAND: yellow grey (5Y 7/2), to 13 ft, becoming more silty and (5YR 6/4). (SM)				6,8,9,30	1.7/2.0 ft
	14	CLAY: moderate brown (5YR 4/4), very abundant gypsum crystals, some clusters 1" across, soft, highly plastic, wet. (CH)					
	15						TD= 15.0 ft
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-23-02

F2452

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	23
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	665645.3 (Y),540061.0 (X)
9. SURFACE ELEVATION	4028.87
10. DATE STARTED	9 SEP 91
11. DATE COMPLETED	9 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	4.1 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 6.65 ft bmp
14. TOTAL DEPTH OF HOLE	15.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2, 3, 4	SANDY CLAY: moderate brown (5YR 4/4), sand very fine to fine grained, poorly graded, high plasticity, moist. (CH)					5.0/5.0 ft; water level at 4.15 ft bgl
	5, 6, 7, 8	CLAYEY SILT, some sand: very pale orange (10YR 8/2), sand very fine to fine grained poorly graded, low plasticity, saturated. (ML)					3.5/5.0 ft
	9	SANDY SILT, some clay: moderate brown (5YR 4/4), sand very fine to fine grained, poorly graded, low plasticity. (ML)					

DRILLING LOG

HOLE NO. MW-23-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	SILTY SAND, some clay: very pale orange (10YR 8/2), sand very fine to fine grained, poorly graded, low plasticity. (SM)					
	12			MW-023-002			geotechnical sample 12.5-15.0 ft
	13						
	14	SILTY CLAY: moderate brown (5YR 4/4), gypsum crystals, low to moderate plasticity. (CL)					
	15						TD= 15.0 ft
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-23-03

F2453

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	23
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	665516.3 (Y),540082.9 (X)
9. SURFACE ELEVATION	
10. DATE STARTED	9 SEP 91
11. DATE COMPLETED	9 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	6.0 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 6.93 ft bmp
14. TOTAL DEPTH OF HOLE	15.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2, 3, 4	SANDY CLAY: moderate brown (5YR 4)/4), sand very fine to fine grained, poorly graded, high plasticity, saturated. (CH)					2.5/5.0 ft
	5, 6	SILTY CLAY: very pale orange (10YR 8/2), moderate plasticity, saturated, grading into. (CH)					water level at 4.43 ft bgl
	7	SILTY SAND: very pale orange (10YR 8/2), moderate yellow (5Y 4/6) staining, saturated. (SM)					
	8, 9	SILTY CLAY: moderate brown (5YR 4/4), moderate plasticity, full of gypsum crystals. (CH)					

DRILLING LOG

HOLE NO. MW-23-03

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
				MW-023-003			geotechnical sample 10.0-12.5 ft
	11						
	12						
	13	SILTY SAND: yellowish-grey (5Y 7/2), with moderate yellow (5Y 7/6) staining, some gravel. (SM)					
	14						
	15						TD= 15.0 ft
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-23-04

F2512

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	23
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	665395.76(Y), 540147.39(X)
9. SURFACE ELEVATION	4028.78
10. DATE STARTED	9 SEP 91
11. DATE COMPLETED	9 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	2.0 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 7.50 ft bmp
14. TOTAL DEPTH OF HOLE	15 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2, 3	SILTY SAND: dark yellowish-brown (10YR 4/2), then at 0.2 ft becoming SAND: dark yellowish-orange (10YR 6/6), soft, wet, very poorly graded, clean, fine to very fine. (SP)				2,2,2,2	1.7/2.0 ft
	4						color change in cuttings to (5YR 5/6)
	5	SAND: light brown (5YR 5/6), soft, minor silt. (SM)				5,6,6,10	▽ -water at 5.0 ft 1.7/2.0 ft
	6, 7, 8, 9	CLAYEY SAND: moderate brown (5YR 4/4), wet, soft, moderately plastic, abundant gypsum crystals, zone of crystals have only minor silt. (ML)					

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. MW-23-04

DRILLING LOG

HOLE NO. MW-23-04

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		CLAYEY SILT: as above.				4,2,2,2	1.5/2.0 ft
	11	CLAY: yellowish-grey (5Y 7/2), highly plastic, wet, soft, gypsum layer 0.2 ft thick at 10.8 ft, only minor clay-mostly gypsum, some crystals 1" across. (CH)					
	12	SAND: moderate yellowish-brown (10YR 5/4), wet, soft, silty, gypsum crystal, poorly graded. (SM)					
	13						
	14						
	15						TD= 15.0 ft
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

LF-23

WELL COMPLETION REPORTS

ELEVATION GROUND WATER 4025.4			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 09 SEPT 91	STARTED 0945	COMPLETED 1100	LOCATION (Coordinates or Station) 23
ELEVATION TOP OF CASING 4037.1			SIGNATURE OF INSPECTOR/INSTALLER TAC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-23-01

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

6.7 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.0 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

0.8 ft. bgl

2.8 ft. bgl

4.7 ft. bgl

14.58 ft. bgl

15.0 ft. bgl

7.5 in.

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 09 SEP 91/1130/9.8 ft bgl

27 SEP 91/1427/11.74 ft bmp

04 NOV 91/1830/13.22 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

F2551

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 09 SEP 91	STARTED 1400	COMPLETED 1530	LOCATION (Coordinates or Station) 23
ELEVATION TOP OF CASING 4030.50			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-23-02

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

LENGTH OF SOLID PIPE: 6.6 ft.

WELL SCREEN LENGTH: 9.5 ft.

STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

0.5 ft. bgl

2.5 ft. bgl

4.1 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

14.0 ft. bgl

15.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 09 SEP 91/1530/4.1 ft bgl

28 SEP 91/0930/6.35 ft bmp

04 NOV 91/1432/6.65 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 09 SEP 91	STARTED 0930	COMPLETED 1130	LOCATION (Coordinates or Station) 23
ELEVATION TOP OF CASING 4030.44			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-23-03

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

6.6 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

0.5 ft. bgl

2.2 ft. bgl

4.1 ft. bgl

14.0 ft. bgl

15.0 ft. bgl

7.5 in.

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 09 SEP 91/1130/4.5 ft bgl

28 SEP 91/0930/6.65 ft bmp

04 NOV 91/1434/6.93 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

F2344

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 09 SEPT 91	STARTED 1245	COMPLETED 1600	LOCATION (Coordinates or Station) 23
ELEVATION TOP OF CASING 4030.95			SIGNATURE OF INSPECTOR/INSTALLER TAC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-23-04

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL 0.6 ft. bgl

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK 2.0 ft. bgl

TOP OF SCREEN 4.2 ft. bgl

FILTER PACK

BOTTOM OF WELL 14.09 ft. bgl

BOTTOM OF BORING 15.0 ft. bgl

BORING DIAMETER 7.5 in.

6.7 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 09 SEP 91/1630/6.35 ft bgl

28 SEP 91/1800/9.24 ft bmp

04 NOV 91/1437/7.5 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

APPENDIX H.6

LF-29

LF-29

DRILLING LOGS

DRILLING LOG

HOLE NO. MW-29-01

72466

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 3 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	29
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	677999.7 (Y),549358.1 (X)
9. SURFACE ELEVATION	4102.16
10. DATE STARTED	10 SEP 91
11. DATE COMPLETED	10 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	26.0 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 24.65 ft bmp
14. TOTAL DEPTH OF HOLE	35.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2	SILTY SAND: very pale orange (10YR 8/2), sand very fine to medium grained, moderately graded, caliche. (SM)					5.0/5.0 ft
	3, 4	SILTY SAND: moderate orange pink (5YR 8/4), sand very fine grained, poorly graded, gypsum crystals. (SM)					
	5	SILTY SAND: light brown (5YR 6/4), sand very fine grained, poorly graded, gypsum crystals. (SM)					3.5/5.0 ft
	6, 7, 8, 9	SAND: light brown (5YR 5/6), sand very fine grained, poorly graded. (SP)					

DRILLING LOG

HOLE NO. MW-29-01

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SAND, as above. (SP)					
	11	SILTY SAND: light brown (5YR 6/4), sand very fine to medium grained, moderately graded, caliche. (SM)					3.5/5.0 ft
	12						
	13	SILTY SAND: light brown (5YR 4/4), sand very fine to fine grained, poorly graded. (SM)					
	14	SILTY CLAY: moderate brown 5YR 4/4, gypsum crystals, medium plasticity. (CH)					
	15	SILTY CLAY, as above. (CH)					5.0/5.0 ft
	16						
	17						
	18						
	19	SILTY SAND: greyish-orange (10YR 7/4), sand very fine to fine grained, poorly graded. (SM)					
	20	SILTY SAND, some clay: low plasticity, caliche, moist. (SM)					4.5/5.0 ft
	21						
	22						▽ water level at 22.45 ft bgl
	23	SILTY CLAY: moderate brown (5YR 4/4), medium plasticity, gypsum crystals, moist. (CH)					
	24						
	25	SILTY CLAY, as above. (CH)					
	26						
	27	saturated					

DRILLING LOG

HOLE NO. MW-29-01

F2466

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 3 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	29	SILTY SAND: very pale orange (10YR 8/2), sand very fine to fine grained, poorly graded, caliche, saturated. (SM)					
	30	SILTY SAND: light brown (5YR 6/4), sand very fine to fine grained, poorly graded. (SM)					
	31						
	32						
	33			MW-029-001			geotechnical sample 32.5-35.0 ft
	34						
	35						TD= 35.0 ft
	36						
	37						
	38						
	39						
	40						
	41						
	42						
	43						
	44						
	45						

DRILLING LOG

HOLE NO. MW-29-02

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 3 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	29
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	677665.9 (Y),548729.3 (X)
9. SURFACE ELEVATION	4096.25
10. DATE STARTED	10 SEP 91
11. DATE COMPLETED	10 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	20.0 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 20.37 ft bmp
14. TOTAL DEPTH OF HOLE	20.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						%

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2	SILTY SAND: very pale orange (10YR 8/2), sand very fine to medium grained, moderately graded. (SM)					5.0/5.0 ft
	3, 4	SILTY SAND: light brown (5YR 6/4), sand very fine to fine grained, poorly graded. (SM)					
	5, 6	SILTY SAND: light brown (5YR 5/6), sand very fine to fine grained, poorly graded. (SM) SILTY SAND, as above. (SM)					3.5/5.0 ft
	7, 8	SILTY SAND, some clay: low plasticity, gypsum crystals. (SM)					
	9	SAND: very pale orange (10YR 8/2), sand very fine grained, poorly graded, stained moderate yellow (5Y 7/4), dark yellowish-orange (10YR 6/6) and a rust color. (SP)					

DRILLING LOG

HOLE NO. MW-29-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	SILTY CLAY: light brown (5YR 5/6), low plasticity. (CL)					3.0/5.0 ft
	12	SILTY SAND, some clay: moderate brown (5YR 4/4), sand very fine to fine grained, poorly graded, very low plasticity. (SM)					
	13						
	14	SAND: very pale orange (10YR 6/2), very fine grained, poorly graded. (SP)					
	15	SILTY CLAY: very pale orange (10YR 8/2), moderate plasticity. (CH)					3.0/5.0 ft
	16	CLAYEY SILT: moderate yellowish brown (10YR 5/4), low plasticity, (ML)					
	17						
	18	SILTY CLAY: dusky yellow (5YR 6/4), medium plasticity. (CH)					water level at 18.17 ft bgl
	19	SANDY CLAY: moderate brown (5YR 4/4), sand very fine grained, low plasticity, gypsum crystals. (CL)					
	20						
	21	SANDY CLAY, as above: saturated at 21.0 ft. (CL)					3.0/5.0 ft
	22	SAND: greyish-orange pink (5YR 7/2), stained dusky yellow (5YR 6/4) in places with thin black and rust colored layers, saturated. (SP)					
	23						
	24						
	25						
	26						
	27			MW-029-002			3.0/5.0 ft geotechnical sample 26.5-29.0 ft

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES

HOLE NO. MW-29-02

F2467

DRILLING LOG

HOLE NO. MW-29-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 3 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	29						TD= 29 ft
	30						
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						
	41						
	42						
	43						
	44						
	45						

DRILLING LOG

HOLE NO. MW-29-03

F2517

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	29
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	677162.19(Y), 548755.18(X)
9. SURFACE ELEVATION	4094.92
10. DATE STARTED	10 SEP 91
11. DATE COMPLETED	11 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	14.5 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 18.53 ft bmp
14. TOTAL DEPTH OF HOLE	25 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2, 3, 4	SANDY SILT: moderate brown (5YR 4/4), dry, soft, crumbly, sand very fine grained, (non-plastic). SILT: very pale orange (10YR 8/2), dry, crumbly, non-plastic, gypsum, moderately soft. (ML)				3,6,13,14	1.8/2.0 ft
	5, 6, 7, 8, 9	SILTY SAND: light brown (5YR 6/4), dry, soft, very fine to fine grained, very poorly graded. (SM)				16,26,26, 22	2.0/2.0 ft

DRILLING LOG

HOLE NO. MW-29-03

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11, 12	SILTY SAND: light brown (5YR 5/6), soft to 11.3', dry, then light brown (5YR 6/4), hart, fine to very fine grained becoming more silty, gypsum mottling. (SM)				20,36,30, 42	2.0/2.0 ft
	13, 14	SILT: very pale orange (10YR 8/2) at ~12.5' crumbly, moist, gypsum. (ML)					
	15, 16, 17, 18, 19	SILTY CLAY: moderate brown (5YR 4/4), moderately plastic, moderately hard, moist, abundant small gypsum crystals, mottling/veins. (CL)				9,12,18,24	cuttings wet at 14.5 ft —water at 16.03 ft
	20, 21, 22	SILTY SAND: light brown (5YR 6/4), wet, soft, fine grained, gypsum crystals at 21.3 ft. (SM)				12,10,14, 32	2.0/2.0 ft
	23, 24	SILT: saturated, light brown, cuttings consistency of melted ice cream. (ML)					
	25						TD= 25.0 ft
	26, 27						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES

HOLE NO. MW-29-03

DRILLING LOG

HOLE NO. MW-29-04

F2518

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 3 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	29
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	677011.5(Y), 548931.1(X)
9. SURFACE ELEVATION	4096.93
10. DATE STARTED	10 SEP 91
11. DATE COMPLETED	10 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	17.4 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 19.41 ft bmp
14. TOTAL DEPTH OF HOLE	30.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		TAC

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SILTY SAND: grayish-orange (10YR 7/4), dry, soft, very poorly sorted, very fine grained. (SM)				3,5,5,3	1.5/2.0 ft
	1						
	2						
	3						
	4						cuttings change to lighter color
	5	SILTY SAND, as above: very pale orange (10YR 8/2).				4,6,5,2	1.7/2.0 ft
	6	changes to light brown (5YR 5/6).					
	7						
	8	SILT: very pale orange (10YR 8/2), gypsum (from cuttings). (ML)					
	9						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. MW-29-04

DRILLING LOG

HOLE NO. MW-29-04

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	SAND: light brown (5YR 5/6), slightly moist, soft, sand fine to medium grained, poorly graded, clean. (SP)				9,8,23,43	2.0/2.0 ft
	12	SILT: very pale orange (10YR 8/2), hard, moist, non-plastic, crumbly. (ML)					
	13						
	14						
	15	SILT: very pale orange (10YR 8/7), hard, slightly moist, non-plastic, cemented in zones, gypsum. (ML)				50+	0.5/0.5 ft
	16						
	17						cuttings wet ▽ Water level at 17.4 ft. bgl.
	18	SANDY SILT: light brown (5YR 5/6), moderate plasticity, moist, clayey (from cuttings.					
	19						
	20	SILTY SAND: moderate brown (5YR 4/4), soft, wet, fine grained, minor gypsum mottling, clayey. (SM)				10,19,24, 35	2.0/2.0 ft -split spoon wet
	21						
	22						
	23						
	24	SILTY SAND: very pale orange (10YR 8/2), wet (cuttings).					
	25	SILTY SAND: very pale orange (10YR 8/2), fine grained, moderately hard, poorly graded. (SM)				45,28,14, 12	2.0/2.0 ft
	26	grades at 25.4 ft to light brown (5YR 6/4).					
	27	CLAY: moderate brown (5YR 4/4), gypsum crystals, highly plastic, soft, wet. (CH)					

DRILLING LOG

HOLE NO. MW-29-04

F2518

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 3 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	29						
	30						TD= 30.0 ft
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						
	41						
	42						
	43						
	44						
	45						

LF-29

WELL COMPLETION REPORTS

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 10 SEP 91	STARTED 0900	COMPLETED 1300	LOCATION (Coordinates or Station) 29
ELEVATION TOP OF CASING 4103.37			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-29-01

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

26.6 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.2 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL

18.5 ft. bgl ☐ OTHER (DESCRIBE)

21.5 ft. bgl

24.4 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

34.4 ft. bgl

35.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 10 SEP 91/1300/26.0 ft bgl

23 OCT 91/1000/24.6 ft bmp

04 NOV 91/1349/24.65 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

F2356

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 10 SEPT 91	STARTED 1520	COMPLETED 1745	LOCATION (Coordinates or Station) 29
ELEVATION TOP OF CASING 4097.81			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-29-02

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

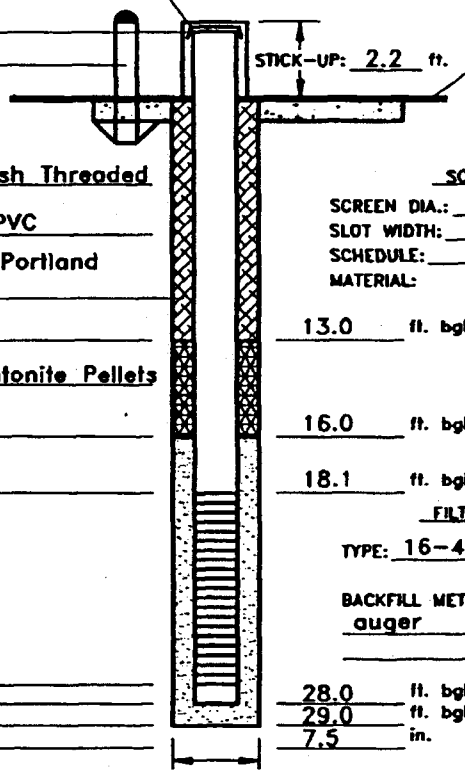
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

LENGTH OF SOLID PIPE: 20.3 ft.

WELL SCREEN LENGTH: 9.5 ft.



STICK-UP: 2.2 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0" THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

13.0 ft. bgl

16.0 ft. bgl

18.1 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

28.0 ft. bgl

29.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See Well Development Record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 10 SEP 91/1745/20.0 ft. bgl

23 OCT 91/0930/20.3 ft. bmp

4 NOV 91/1345/20.37 ft. bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

D17385

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 11 SEPT 91	STARTED 0745	COMPLETED 0900	LOCATION (Coordinates or Station) 29
ELEVATION TOP OF CASING 4097.14			SIGNATURE OF INSPECTOR/INSTALLER LEM
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-29-03

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

16.6 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

9.0 ft. bgl

12.0 ft. bgl

14.1 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

24.0 ft. bgl

25.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See Well Development Record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 23 OCT 91/0900/18.56 ft. bmp

4 NOV 91/1343/18.53 ft. bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

D1738T

ELEVATION GROUND WATER 4079.1	PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 10 SEPT 91 / STARTED 0900 / COMPLETED 1300	LOCATION (Coordinates or Station) 29
ELEVATION TOP OF CASING 4098.5	SIGNATURE OF INSPECTOR/INSTALLER TAC
DRILLING METHOD HOLLOW STEM AUGER	WELL NO. (as shown on drawing: title and file number) MW-29-04

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

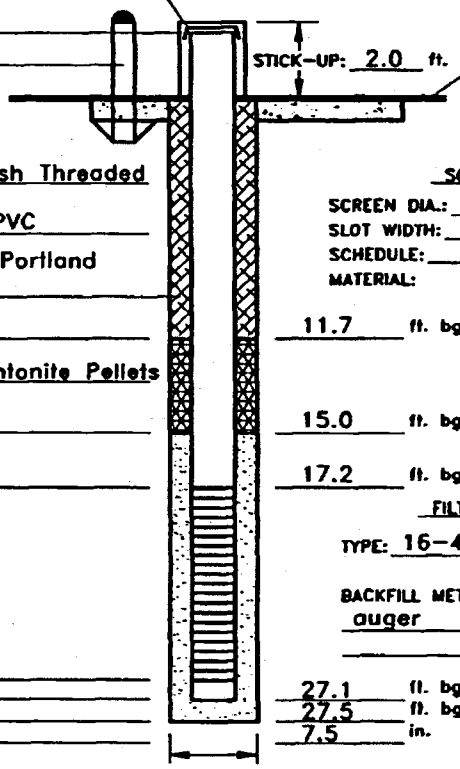
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

19.2 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH



STICK-UP: 2.0 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL

☐ OTHER (DESCRIBE)

11.7 ft. bgl

15.0 ft. bgl

17.2 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

27.1 ft. bgl

27.5 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 10 SEP 91/1300/17.4 ft bgl

23 OCT 91/0900/19.34 ft bmp

04 NOV 91/1341/19.41 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

2558

APPENDIX H.7

DP-30/SD-33

DP-30/SD-33

BORING LOGS

DRILLING LOG

HOLE NO. SB-30&33-01

F2541

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 1 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	675908.37(Y), 553031.37(X)
9. SURFACE ELEVATION	4100.80
10. DATE STARTED	26 AUG 91
11. DATE COMPLETED	26 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	10.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	SILTY SAND: dark yellowish-orange (10YR 6/6), dry, gravelly, well graded, sand fine grained, waste just present in tip at 1.3 ft.	HS=0.0ppm			2,4,2,4	1.5/2.0 ft
					91JULH030 &033-001		composite sample 1.5 ft to 4.6 ft
	2	WASTE, SAND & SILT: black (N1) some woody material.	HS=0.0ppm			0,2,1,1	1.6/2.0 ft VOA collected 2 ft to 4 ft
	3						
	4	WASTE, as above:	HS=0.0ppm			0,0,0,2	1.0/2.0 ft
	5	SAND: very pale orange (10YR 8/2), soft, moist, fine to very fine grained, poorly graded. (SP)					
	6	SAND, as above: in tip.				0,10,0,16	no recovery
	7						
	8	SAND, as above: light brown (5YR 6/4)			91JULH030 &033-002	3,12,10,14	2.0/2.0 ft
	9						TD= 10.0 ft

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. SB-30&33-01

DRILLING LOG

HOLE NO. SB-30&33-02

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	676057.2 (Y),552837.3 (X)
9. SURFACE ELEVATION	4100.95
10. DATE STARTED	27 AUG 91
11. DATE COMPLETED	27 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	12.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SILTY SAND: light brown (5YR 6/4), sand very fine to fine grained, poorly graded. (SM)				4,4,2,2	2.0/2.0 ft
	1	CLAYEY SILT, some sand: moderate brown (5YR 4/4), medium plasticity, sand fine grained, poorly graded. (MH)					
	2	CLAYEY SILT, some sand: moderate brown (5YR 4/4). (MH)	HS=0.2ppm			4,2,6,2	2.0/2.0 ft
	3	WASTE: dark yellowish-orange (10YR 6/6).					
	4	WASTE: pale yellowish-brown (10YR 6/2).	HS=238ppm		91JULH030 &33-003		1.0/1.0 ft samples composited from 2-8 ft except VOA's
	5	WASTE: black (N1).					
	6	WASTE, as above.	HS=98ppm			2,1,1,2	VOA samples taken
	7	WASTE: moderate yellowish-brown (10YR 5/4).					
	8	SILTY SAND: very pale orange (1)YR 8/2), sand very fine to fine grained, poorly graded. (SM)			91JULH030 &33-004	8,20,50,4	samples composited from 8-12 ft except VOA's
	9						

DRILLING LOG

HOLE NO. SB-30&33-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	SILTY SAND, as above: stained yellow. (SM)					VOA samples taken
	12						TD= 12.0 ft
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. SB-30&33-03

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 1 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	675898.57(Y), 552774.62(X)
9. SURFACE ELEVATION	4101.98
10. DATE STARTED	26 AUG 91
11. DATE COMPLETED	26 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	8 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	FILL: disturbed soils-sand, clay, silt, colors vary from very pale orange (10YR 8/2) to moderate brown (5YR 4/4)				1,1,2,1	2.0/2.0 ft
	2	FILL: to 2.7 ft then	HS=16.8ppm			1,0,1,1	1.1/2.0 ft
	3	WASTE: black (N1) composed of SILTY CLAY(?), wet, unidentifiable tape or plastic.			91JULH030 &33-005		composite sample from 2.7 ft to 5.5 ft
	4	WASTE, as above: to 5.5 ft then	HS=21.2ppm			0,0,0,10	2.0/2.0 ft VOA sampled from 4.0 to 5.0 ft
	5						
	6	SAND: greyish-orange (10YR 7/4), soft, moist, very poorly graded, fine sand. (SP) SAND, as above.			91JULH030 &33-006	5,10,13,19	2.0/2.0 ft some waste on top of the core
	7						
	8						TD= 8.0 ft
	9						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. SB-30&33-03

DRILLING LOG

HOLE NO. SB-30&33-04

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	675928.58(Y), 552741.03(X)
9. SURFACE ELEVATION	4102.06
10. DATE STARTED	26 AUG 91
11. DATE COMPLETED	26 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	12 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	FILL-SAND: moderate yellow brown (10YR 5/4), soft, dry to 0.9 ft then moist, moderately well graded, minor silt, fine grained. (SM)				0,1,0,1	1.2/2.0 ft
	2	SAND, as above: to 2.6 ft then				0,0,0,0	0.7/2.0 ft
	3	WASTE: dark yellow brown (10YR 4/2) to dusky yellow brown (10YR 2j/2), rusty sand, small tinsel type plastic.			91JULH030 &33-007		composite sample from 2.6 ft to 7.4 ft
	4	WASTE: soft black (N1), saturated waste colloidal to sludgy, grey, hairy layers, medium grey to greyish-black (N4)-(N2).	HS=19.4ppm			0,0,9,4	2.0/2.0 ft
	5						
	6	WASTE, as above: to 7.4 ft then				0,0,4,5	2.0/2.0 ft VOA collected at 6.0 ft to 7.4 ft
	7						
		SAND: very light grey (N8), hard, fine grained, black zones/mottling.	HS=12.6ppm				
	8	SAND, as above: moist, hard.			91JULH030 &33-008	13,22,15, 25	2.0/2.0 ft VOA collected at 8.0 ft to 10.0 ft
	9						

DRILLING LOG

HOLE NO. SB-30&33-04

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SAND: light brown (5YR 6/4), medium hard, moist, poorly graded, fine. (SP)				9,14,20,25	2.0/2.0 ft
	11	SILTY SAND: very pale orange (10YR 8/2), gypsum. (SM)					
	12						TD= 12.0 ft
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. SB-30&33-05

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	676056.3 (Y),552823.8 (X)
9. SURFACE ELEVATION	4100.76
10. DATE STARTED	26 AUG 91
11. DATE COMPLETED	26 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	12.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	SILTY SAND: pale yellowish-brown (10YR 6/2), stained moderate yellowish-brown (10YR 5/4), with depth. (SM)			91JULH030 &33-009	1,3,3,2	1.0/2.0 ft composite sample from 1.5-8.0 ft
	2	SILTY SAND, as above. (SM)	HS=3.6ppm			1,0,0,1	1.5/2.0 ft
	4	SILTY SAND, as above. (SM)	HS=10.6ppm			1,0,0,1	1.0/2.0 ft VOA's collected from 4.0-6.0 ft
	6	SILTY SAND: greyish-orange (10YR 7/4), slightly stained. (SM)				10,12,15, 17	2.0/2.0 ft
	8	SILTY SAND, as above: very pale orange (10YR 8/2), not stained. (SM)			91JULH030 &33-010	24,33,35, 40	2.0/2.0 ft composite sample from 8.0-12.0 ft VOA's collected from 8.0-10.0 ft
	9	CLAYEY SILT: greyish-orange (10YR 7/4), low plasticity. (ML)					

DRILLING LOG

HOLE NO. SB-30&33-05

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR LEM

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	SANDY CLAY: very pale orange (10YR 8/2), medium plasticity, sand very fine to coarse grained, well graded. (CH) SANDY CLAY, as above: pale yellowish-brown (10YR 6/2). (CH)				15,25,39, 43	2.0/2.0 ft
	12						TD= 12.0 ft
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. SB-30&33-06

F2430

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 1 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	676078.6 (Y),552836.8 (X)
9. SURFACE ELEVATION	4101.34
10. DATE STARTED	27 AUG 91
11. DATE COMPLETED	27 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	10.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						%

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	SILTY SAND: moderate yellowish-brown (10YR 5/4), sand very fine to fine grained poorly graded. (SM)				3,3,2,8	1.5/2.0 ft
	2	SILTY SAND, as above. (SM)			91JULH030 &33-011 91JULH030 &33-022	1,2,0,1	1.3/2.0 ft composite sample from 2.0-6.0 ft. RAS dup taken
	3	WASTE: pale yellowish-brown (10YR 6/2), bluish-white (5B 9/1), dusky yellow (5Y 6/4).					
	4	SILTY SAND: light brown (5YR 5/6), (SM) grading into WASTE: black (1N), moderate yellowish-brown (10YR 5/4). (SM)				1,0,0,1	1.5/2.0 ft VOAs collected from 4.0-6.0 ft.
	5	WASTE.					
	6	SILTY SAND: pale yellowish-orange (10YR 8/6), sand very fine to fine grained, poorly graded. (SM)			91JULH030 &33-012	7,18,21,27	2.0/2.0 ft composite sample from 6-10 ft. VOAs collected from 6.0-8.0 ft.
	7						
	8	SILTY SAND, as above. (SM)				24,39,49, 50+	2.0/2.0 ft
	9	CLAYEY SILT: moderate yellowish-brown (10YR 5/4), low plasticity. (ML)					TD= 10.0 ft

DRILLING LOG

HOLE NO. SB-30&33-07

F2A31

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 1 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	676060.7 (Y),552868.7 (X)
9. SURFACE ELEVATION	4101.02
10. DATE STARTED	27 AUG 91
11. DATE COMPLETED	27 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	8.0 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						%

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	LEM

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	SILTY SAND: moderate brown (5YR 4/4), sand very fine to fine grained, poorly graded. (SM)				3,9,6,4	2.0/2.0 ft
	2	CLAYEY SILT: moderate brown (5YR 4/4), low plasticity, gypsum crystals, small waste body at top, olive grey (5Y 4/1). (ML)			91JULH030 &33-013	4,7,12,15 2,5,10,10 2,4,7,10 3,2,6,10	2.0/2.0 ft composite sample from 2.0-4.0 ft VOAs collected from 2.0-4.0 ft
	3						
	4	CLAYEY SILT, as above: no waste. (ML)			91JULH030 &33-014	7,10,10,11	2.0/2.0 ft composite sample from 4.0-8.0 ft VOAs collected from 4.0-6.0 ft
	5						
	6	CLAYEY SILT, as above. (ML)				5,11,12,22	2.0/2.0 ft
	7						
	8						TD= 8.0 ft
	9						

DRILLING LOG

HOLE NO. SB-30&33-08

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 1 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	676069.88(Y), 552875.26(X)
9. SURFACE ELEVATION	4101.04
10. DATE STARTED	27 AUG 91
11. DATE COMPLETED	27 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	6 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	FILL, SAND, SILT & CLAY: very pale orange (10YR 8/2), to moderate brown (5YR 3/4), dry crumbly, disturbed sediment, to 1.4 ft.				0,1,2,0	2.0/2.0 ft
	2	WASTE: moderate brown (10YR 4/4), with minor black (N2) zones composed of stained sand.			91JULH030 &33-015		
		WASTE, as above.				0,0,2,4	2.0/2.0 ft VOA from 2.0 to 2.5 ft
	3	SILT: very pale orange (10YR 8/2), hard, dry, non-plastic, crumbly. (ML)					
	4	SILT, as above.			91JULH030 &33-016	0,0,0,0	1.7/2.0 ft
	5						
	6						TD= 6.0 ft
	7						
	8						
	9						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. SB-30&33-08

DRILLING LOG

HOLE NO. SB-30&33-09

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 1 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	676083.95(Y), 552889.61(X)
9. SURFACE ELEVATION	4101.15
10. DATE STARTED	27 AUG 91
11. DATE COMPLETED	27 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	6 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SILTY SAND: moderate brown (5YR 4/4), hard, dry fine to very fine grained, then at 0.9 ft. (SM)				2,4,2,5	1.0/2.0 ft
	1	WASTE: dusky yellow brown (10YR 2/2) to dark yellow brown (10YR 4/2), moist, sandy, plastic material common.			91JULH030 &33-017		composite sample from 0.9 ft to 2.7 ft
	2	WASTE, as above: plastic material common.				5,13,12,11	1.4/2.0 ft VOA from 2.0 ft to 2.7 ft
	3	SILT: very pale orange (10YR 8/2), hard, dry, crumbly, non-plastic. (ML)			91JULH030 &33-018		
	4	SILT, as above.				6,5,9,15	2.0/2.0 ft
	5						
	6						TD= 6.0 ft
	7						
	8						
	9						

DRILLING LOG

HOLE NO. SB-30&33-10

F2547

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	676059.06(Y), 552953.17(X)
9. SURFACE ELEVATION	4100.65
10. DATE STARTED	27 AUG 91
11. DATE COMPLETED	27 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	14 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
			GROUT	TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	SANDY SILT: light brown (5YR 6/4), dry, soft, non-plastic. (ML)				2,4,6,4	2.0/2.0 ft
	2	SANDY SILT, as above: to 2.6 ft.	HS=0.0ppm			0,0,0,0	0.9/2.0 ft
	3	WASTE: dark yellowish-brown (10YR 4/2), dry, silty and sandy, paper fragments.			91JULH030 &33-019		composite sample from 2.6 ft to 8.9 ft
	4	WASTE, as above, sandy: dry.	HS=0.0ppm			0,0,1,5	0.8/2.0 ft
	5						
	6					0,0,0,0	0.0/2.0 ft
	7						installed sand catcher in SS
	8	WASTE, as above: with black soft sludge and plant material, to 8.9 ft, grading to	HS=67.0ppm			0,2,16,30	2.0/2.0 ft VOA collected from 8.0 ft to 8.9 ft
	9	SILT: medium light grey (N6), hard, dry, crumbly. (ML)					

DRILLING LOG

HOLE NO. SB-30&33-10

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SANDY SILT: grey (N6), hard, dry, cumbly, gypsum, non-plastic. (ML)			91JULH030 &33-020	7,18,50+	1.5/2.0 ft composite sample 10.0 to 14.0 ft VOA collected at 10.0 to 12.0 ft
	11						
	12	SANDY SILT, as above				9,13,14,18	2.0/2.0 ft
	13						
	14						TD= 14.0'
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. SB-30&33-11

F2542

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 1 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	675881.04(Y), 552831.57(X)
9. SURFACE ELEVATION	4101.37
10. DATE STARTED	26 AUG 91
11. DATE COMPLETED	26 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	8 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	
18. GEOTECHNICAL SAMPLES	DISTURBED / UNDISTURBED
19. TOTAL NUMBER OF CORE BOXES	
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC / METALS / OTHER (SPECIFY) / OTHER (SPECIFY) / OTHER (SPECIFY)
21. TOTAL CORE RECOVERY	%
22. DEPOSITION OF HOLE	BACKFILLED / MONITORING WELL / OTHER (SPECIFY): GROUT
23. SIGNATURE OF INSPECTOR	TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		FILL: everything to 1.0 ft, clay, sand, gravel then at 1.0 ft				5,6,8,9	2.0/2.0 ft
	1	SAND: greyish-orange (10YR 7/4), soft, moist, poorly graded, fine grained. (SP)					
	2	SILT: very pale orange (10YR 8/2), gypsum, non-plastic, moderately hard, dry. (ML)				6,11,10,10	1.6/2.0 ft
	3						
	4	SILT, as above: to 4.4 ft then CLAYEY SILT: moderate brown (5YR 4/4), moderately plastic, gypsum mottling, slightly moist. (ML)				6,9,10,17	1.7/2.0 ft
	5						
	6	SANDY SILT: moderate red brown (5YR 4/4), non-plastic, slightly moist, soft. (ML)				6,12,10,12	2.0/2.0 ft
	7						
	8	grades to SAND: light brown (5YR 6/4), soft, very poorly graded, fine to very fine grained. (SP)					TD= 8.0 ft no waste body encountered
	9						

DP-30/SD-33

DRILLING LOGS

DRILLING LOG

HOLE NO. MW-30&33-01

F2519

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 3 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	676333.33(Y), 552710.92(X)
9. SURFACE ELEVATION	4103.31
10. DATE STARTED	28 AUG 91
11. DATE COMPLETED	28 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	21.2 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	22.4 FT/ 30 minutes
14. TOTAL DEPTH OF HOLE	31 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	04 NOV 91 23.87 ft bmp

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1, 2, 3, 4	SILTY SAND: moderate brown (5YR 4/4), dry, fine to very fine grained. (SM)					
	5, 6	SILTY SAND, as above: SOFT, very poorly graded, very fine to fine grained, some gypsum mottling. (SM)	DH=0.0ppm			2,4,8,9	2.0/2.0 ft
	7, 8, 9	CLAYEY SILT: moderate brown (5YR 4/4), hard, dry, moderate plasticity, abundant gypsum mottling. (ML)					

DRILLING LOG

HOLE NO. MW-30&33-01

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 3 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SILTY SAND: moderate brown (5YR 4/4), soft, moist.	DH=0.0ppm			3,8,8,25	2.0/2.0 ft
	11	grading to CLAYEY, SANDY SILT: moderate brown (5YR 4/4), hard, moderate plasticity, gypsum mottling, slightly moist. (ML)					
	12						
	13						
	14						
	15	SANDY SILT: moderate brown (5YR 4/4), hard, moderate plasticity, slightly moist. (ML)	DH=0.0ppm			4,20,11,11	2.0/2.0 ft
	16	grading to CLAYEY SILT: moderate brown (5YR 4/4), moist, highly plastic, abundant gypsum mottling. (MH)					
	17						
	18						
	19						
	20	SILTY, CLAYEY SAND: moderate brown (5YR 4/4), soft, moist. (SM)	DH=1.6ppm			4,7,10,20	2.0/2.0 ft
	21	grading to SAND: light brown (5YR 5/6), soft, wet, fine to very fine grained, very poorly graded. (SP)					
	22						-water at 21.87 ft
	23						
	24	SAND: moderate brown (5YR 4/4), soft, saturated, fine to medium grained, abundant gypsum crystals and clusters 1" across. (SP)	DH=1.0ppm			0,4,4,10	1.6/2.0 ft
	25	CLAYEY SILT: very pale orange (10YR 8/2), moderately hard, non-plastic, black material at bottom of core looks organic, composed of gypsum. (ML)					
	26			MW-30/33-01			26.1 to 28.6 ft sent for geotechnical analysis
	27						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES

HOLE NO. MW-30&33-01

DRILLING LOG

HOLE NO. MW-30&33-01

F2519

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 3 OF 3 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
							5.0/5.0 ft
	29						
	30		HS= 0.0ppm on dark material				
	31						TD= 31.0 ft
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						
	41						
	42						
	43						
	44						
	45						

DRILLING LOG

HOLE NO. MW-30&33-02

F2408

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 3 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	675765.27(Y), 552844.20(X)
9. SURFACE ELEVATION	4102.38
10. DATE STARTED	28 AUG 91
11. DATE COMPLETED	28 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	21.02 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 23.52 ft bmp
14. TOTAL DEPTH OF HOLE	32 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		HTH

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
							cuttings
	1						
	2						
	3						
	4						
	5	CLAYEY SILT: moderate brown (5YR 3/4), dry, medium plasticity, mottled with white. (ML)				13,14,20, 29	1.3/2.0 ft
	6	SILTY SAND: light brown (5YR 6/4), very fine grained, poorly graded. (SM)					
	7						
	8	SILTY SAND: as above.				10,3,2,7	1.6/2.0 ft
	9						

DRILLING LOG

HOLE NO. MW-30&33-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR HTH

SHEET 2 OF 3 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SILTY CLAY: light brown (5YR 4/4), dry, medium plasticity, mottled, small gypsum crystals, interbedded silts. (CL)				11,16,37, 34	1.9/2.0 ft
	11	SILT: light brown (5YR 6/4), dry, (11.1-11.9 ft). (ML)					
	12						
	13	CLAYEY SILT: greyish-orange (10YR 7/4), dry, low plasticity, trace fine to very fine grained sand. (ML)				14,33,48, 36	0.1/2.0 ft
	14						
	15	SILTY CLAY: light brown (5YR 5/6), dry, medium plasticity, small gypsum crystals. (CL)				12,17,19, 21	2.0/2.0 ft
	16						
	17						
	18	SILTY SAND: light brown (5YR 5/6), dry, fine to very fine grained, poorly graded, trace clay, gypsum cement. (SM)				13,14,16, 18	2.0/2.0 ft
	19						
	20	CLAYEY SILT: light brown (5YR 5/6), dry, low plasticity, trace fine sand. (ML)				12,14,14, 12	2.0/2.0 ft
	21						water at 21.02 ft bgl
	22						
	23						
	24						
	25	SILTY CLAY: moderate brown (5YR 4/4), wet, trace sand, medium plasticity, small gypsum crystals. (CL)				6,6,6,8	2.0/2.0 ft
	26						
	27						

DRILLING LOG

HOLE NO. MW-30&33-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR HTH

SHEET 3 OF 3 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	29						
	30	SANDY CLAY: moderate brown (5YR 4/4), wet, moderate plasticity, medium to fine sand, clay and sand content varies. (SC)					2.0/2.0 ft
	31						
	32						TD= 32.0 ft
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						
	41						
	42						
	43						
	44						
	45						

DRILLING LOG

HOLE NO. MW-30&33-03

F2308

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ALEX SANCHEZ
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	675815.63(Y), 552958.61(X)
9. SURFACE ELEVATION	4101.35
10. DATE STARTED	28 AUG 91
11. DATE COMPLETED	28 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	20.03 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
14. TOTAL DEPTH OF HOLE	27 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	04 NOV 91

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		ATC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SANDY SILT: pale brown (5YR 5/2), very fine, powdery, roots (topsoil). (ML)				2,8,15,37	2.0/2.0 ft
	1	grades to greyish-orange pink (10R 8/2).					
	2						
	3						
	4						
	5	SILTY SAND: moderate reddish-orange (10R 6/6), very fine, slightly moist. (SM)				10,15,11, 13	2.0/2.0 ft
	6						
	7						
	8						
	9						

DRILLING LOG

HOLE NO. MW-30&33-03

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR ATC

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		CLAYEY, SILTY SAND: moderate reddish brown (10R 4/6). (SM)				7,13,20,23	2.0/2.0 ft
	11	grades to pale reddish brown (10R 5/4). (SM)					
	12						
	13						
	14						
	15	SILTY SAND: fine, moist, pale reddish brown (10R 5/4).				10,10,16, 17	2.0/2.0 ft
	16						
	17						
	18						
	19						
	20	SANDY CLAY: moderate reddish brown (10R 4/6), medium to fine, saturated. (CL)					water at 20.03 ft bgl
						4,5,6,10	2.0/2.0 ft
	21						
	22						
	23						
	24						
	25						TD=27.0'
	26						
	27						

DRILLING LOG

HOLE NO. MW-30&33-04

F2520

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 3 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	30, 33
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	675912.54(Y), 553036.27(X)
9. SURFACE ELEVATION	4100.91
10. DATE STARTED	28 AUG 91
11. DATE COMPLETED	28 AUG 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	22.0 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 21.76 ft bmp
14. TOTAL DEPTH OF HOLE	25 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		TAC

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
							Drilled to 5' bgl
	1						
	2						
	3						
	4						
	5	SANDY SILT: greyish-orange pink (10R 8/2), dry, non-plastic, crumbly, hard, gypsum, becoming more sandy near 7 ft. (ML)	DH=0.2ppm			5,8,25,28	2.0/2.0 ft
	6						
	7						
	8						
	9						

DRILLING LOG

HOLE NO. MW-30&33-04

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 2 OF 3 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	SANDY, CLAYEY SILT: moderate brown (5YR 4/4), hard, moist, moderately plastic, gypsum mottlin. (ML)	DH=0.2ppm			9,9,15,30	2.0/2.0 ft
	12 13 14	SANDY SILT: very pale orange (10YR 8/2), soft, moist, non-plastic. (ML)					
	15 16 17 18 19	SILTY SAND: light brown (5YR 5/6), minor clay, moist, fine to very fine, poorly graded, soft, abundant gypsum zones and mottling. (SM)	DH=1.0ppm			4,10,18,22	2.0/2.0 ft ▽ —water at 19.16 ft
	20 21	SILTY SAND, as above.				3,6,10,11	2.0/2.0 ft
	22 23	SILTY SAND: yellowish-grey (5Y 7/2), soft to moderately hard, moist to saturated, poorly graded. (SM)					
	24 25	CLAYEY, SANDY SILT: moderate brown (5YR 4/4), moderately hard, moist to wet, highly plastic, abundant gypsum crystals. (ML)				10,12,11, 24	2.0/2.0 ft graditional contact
	26 27	SILTY CLAY: moderate brown (5YR 4/4) as above. (CL)				6,11,12,8	2.0/2.0 ft

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES

HOLE NO. MW-30&33-04

DRILLING LOG

HOLE NO. MW-30&33-04

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR TAC

SHEET 3 OF 3 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	29			MW-030/033 -04			2.5/2.5 ft geotechnical sample taken 28.0 ft to 30.5 ft
	30						TD= 30.5 ft
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						
	41						
	42						
	43						
	44						
	45						

F2520

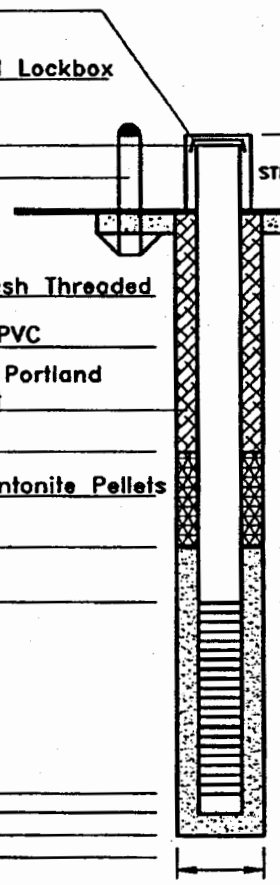
DP-30/SD-33

WELL COMPLETION REPORTS

ELEVATION GROUND WATER 4080.8			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 28 AUG 91	STARTED 0800	COMPLETED 1200	LOCATION (Coordinates or Station) 30, 33
ELEVATION TOP OF CASING 4104.7			SIGNATURE OF INSPECTOR/INSTALLER TAC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-30&33-01

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)



PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

LENGTH OF SOLID PIPE: 21.2 ft.

WELL SCREEN LENGTH: 9.5 ft.

STICK-UP: 2.0 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

14.0 ft. bgl

17.0 ft. bgl

19.2 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

29.1 ft. bgl

31.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 17 OCT 91/1115/23.81 ft bgl

04 NOV 91/1356/23.87 ft bmp

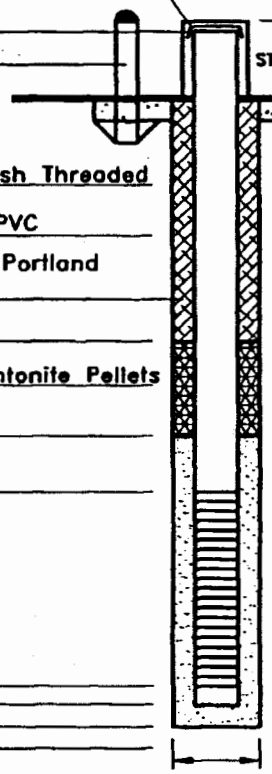
DEPTH FROM TOP CASING AFTER DEVELOPMENT:

F2559

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 27 AUG 91	STARTED	COMPLETED	LOCATION (Coordinates or Station) 30, 33
ELEVATION TOP OF CASING 4104.00			SIGNATURE OF INSPECTOR/INSTALLER HTH & ATC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-30+33-02

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)



PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

LENGTH OF SOLID PIPE: 21.3 ft.

WELL SCREEN LENGTH: 9.5 ft.

STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

TOP OF SEAL	16.8	ft. bgl
TOP OF FILTERPACK	19.8	ft. bgl
TOP OF SCREEN	21.8	ft. bgl
BOTTOM OF WELL	32.0	ft. bgl
BOTTOM OF BORING	32.5	ft. bgl
BORING DIAMETER	7.5	in.

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 15 OCT 91/1100/23.60 ft bmp

04 NOV 91/1404/23.52 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 28 AUG 91	STARTED	COMPLETED	LOCATION (Coordinates or Station) 30,33
ELEVATION TOP OF CASING			SIGNATURE OF INSPECTOR/INSTALLER ATC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-30 & 33-03

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

16.3 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0" THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

9.0 ft. bgl

12.0 ft. bgl

13.8 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

24.0 ft. bgl

25.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 04 NOV 91/1402/22.53 ft bgl

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

FF878

ELEVATION GROUND WATER 4080.5			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 28 AUG 91	STARTED 1330	COMPLETED 1700	LOCATION (Coordinates or Station) 30, 33
ELEVATION TOP OF CASING 4102.3			SIGNATURE OF INSPECTOR/INSTALLER TAC
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-30&33-04

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

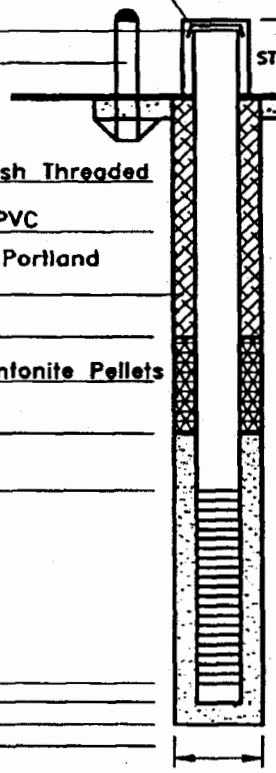
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

21.7 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH



STICK-UP: 2.6 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL

13.6 ft. bgl ☐ OTHER (DESCRIBE)

16.6 ft. bgl

19.1 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

29.0 ft. bgl

30.5 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See well development record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 15 OCT 91/1630/23.53 ft bgl

04 NOV 91/1400/21.76 ft bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

560

APPENDIX H.8

SS-39

SS-39

BORING LOGS

DRILLING LOG

HOLE NO.	179-B01
SHEET 1 OF 1 SHEETS	
1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger; 3.75" ID; 8.0" OD; Split spoon (ASTM D1586-84); 3" ID/2" ID; 140 lb. drop-hammer
8. HOLE LOCATION	Easting=685215.84; Northing=530607.53
9. SURFACE ELEVATION	
10. DATE STARTED	11/17/93
11. DATE COMPLETED	11/17/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	7.8 ft.
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	8.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes
SW8270	
SW6010	
SW7421	
SW9045	
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM): yellowish brown (10YR 5/6), fine grained, with root inclusions, moist, nonplastic, loose.	0.0	0.0	1/3/7/5	179-B01-01-01
	2		SILTY SAND (SM): pale brown (10YR 7/4), fine grained, moist, nonplastic, loose.	0.0	0.0	8/12/21/27	179-B01-02-01
	4			0.0	0.0	14/38/50+	179-B01-03-01
	6		SANDY SILT (ML): yellowish red (5YR 4/6), with fine grained sand, moist, nonplastic, hard. SILTY SAND (SM): yellowish brown (10YR 5/6), fine grained, moist to wet, nonplastic, loose.	0.0	0.0	9/20/23/24	179-B01-04-01
▼	8		Water table at 7.8 ft. Total Depth = 8.00 ft.				

DRILLING LOG

HOLE NO.	179-B02
1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
SHEET 1 OF 1 SHEETS	
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger 3.75" ID; 8.0" OD Split spoon (ASTM D1586-84) 3" ID/2" ID 140 lb. drop-hammer
8. HOLE LOCATION	Easting=685162.60; Northing=530600.29
9. SURFACE ELEVATION	
10. DATE STARTED	11/17/93
11. DATE COMPLETED	11/17/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	6 ft.
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	8.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes
SW8270	
SW6010	
SW7421	
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM): yellowish brown (10YR 5/6), fine grained, with root inclusions, moist, nonplastic, medium dense to dense.	0.0	0.5	2/5/7/10	179-B02-01-01
	2			0.0	1.2	17/34/38/50+	179-B02-02-01
	4			0.0	1.2	13/24/24/24	179-B02-03-01
▼	6		SILTY SAND (SM): yellowish brown (2.5Y 6/3), fine grained, wet to saturated, nonplastic, medium dense. Water table at 6 ft.	0.0	1.2	9/37/26/14	179-B02-04-01
	8		POORLY GRADED SAND (SP): yellowish brown (10YR 5/6), fine grained, with clay, saturated, low plasticity, medium dense. Total Depth = 8.00 ft.				

DRILLING LOG

HOLE NO.	179-B03
SHEET 1 OF 1 SHEETS	
1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger; 3.75" ID; 8.0" OD; Split spoon (ASTM D1586-84) 3" ID/2" ID; 140 lb. drop-hammer
8. HOLE LOCATION	Easting=685107.74; Northing=530611.77
9. SURFACE ELEVATION	
10. DATE STARTED	11/17/93
11. DATE COMPLETED	11/17/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	6 ft.
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	8.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes
	SW8270; SW6010; SW7421
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
	0		SILTY SAND (SM): yellowish brown (10YR 5/6), fine grained, with root inclusions, moist, nonplastic, loose.	0.0	2.5	WH/1/2/3	179-B03-01-01
	2			0.0	1.8	3/3/10/26	179-B03-02-01
	4		SILTY SAND (SM): pale brown (10YR 7/4), fine grained, with caliche inclusions, moist to wet, nonplastic, dense.	0.0	1.5	50+	179-B03-03-01
▼	6		Water table at 6.0 ft. SILTY SAND (SM): yellowish brown (10YR 5/6), fine grained, saturated, nonplastic, loose.	0.0	2.2	6/7/7/4	179-B03-04-01
	8		Total Depth = 8.0 ft.				
	10						

DRILLING LOG

HOLE NO.	179-B04
1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
SHEET 1 OF 1 SHEETS	
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger; 3.75" ID; 8.0" OD; Split spoon (ASTM D1586-84); 3" ID/2" ID; 140 lb. drop-hammer
8. HOLE LOCATION	Easting=684934.63; Northing=530613.03
9. SURFACE ELEVATION	
10. DATE STARTED	11/17/93
11. DATE COMPLETED	11/17/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	3.6 ft.
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	4.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes
SW8270	
SW6010	
SW7421	
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM): yellowish brown (10YR 5/6), fine grained, with root inclusions, moist, nonplastic, loose.	0.0	0.0	1/2/6/5	179-B04-01-01
	2		SILTY SAND (SM): pale brown (10YR 8/4), fine grained, moist to wet, nonplastic, loose.	0.0	0.0	6/12/12/16	179-B04-02-01
			Water table at 3.6 ft.				
	4		Total Depth = 4.0 ft.				
	6						
	8						

DRILLING LOG

HOLE NO.	179-B05
SHEET 1 OF 2 SHEETS	

1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger; 3.75" ID; 8.0" OD; Split spoon (ASTM D1586-84); 3" ID/2" ID; 140 lb. drop-hammer
8. HOLE LOCATION	Easting=685276.17; Northing=530609.26
9. SURFACE ELEVATION	
10. DATE STARTED	11/17/93
11. DATE COMPLETED	11/17/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	12.2 ft.
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	14.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes
	SW8270, SW6010, SW7421, SW9045
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM): yellowish brown (10YR 5/6), fine grained, with root inclusions, moist, nonplastic, loose.	0.0	0.0	2/4/5/3	179-B05-01-01
	2			0.0	0.0	3/3/5/12	179-B05-02-01
	4		SILTY SAND (SM): pale brown (10YR 7/4), fine grained, moist, nonplastic, dense.	0.0	0.0	21/27/33/50+	179-B05-03-01
	6		POORLY GRADED SAND (SP): yellowish brown (2.5Y 6/3), fine to medium grained, with fine gypsum crystals, moist, nonplastic, dense.	0.0	0.0	27/31/33/41	
	8		SILTY SAND (SM): yellowish brown (10YR 5/6), fine grained, moist, nonplastic, dense.	0.0	0.0	9/12/24/30	
							10

DRILLING LOG

HOLE NO. 179-B05

1. COMPANY NAME: Radian Corporation

2. INSPECTOR: David R. Robbins

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM) as above.	0.0	0.0	30/27/30/26	
	12		CLAYEY SAND (SC): yellowish red (5YR 4/6), fine grained, wet, low plasticity, medium dense. Water table at 12.2 ft.	0.0	0.0	12/11/29/28	179-B05-04-01
	14		Total Depth = 14.0 ft.				
	16						
	18						
	20						
	22						
	24						
	26						

PROJECT: Table 2 - RFI

HOLE NO.: 179-B05

DRILLING LOG

HOLE NO.	179-B06
SHEET 1 OF 2 SHEETS	

1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger; 3.75" ID; 8.0" OD; Split spoon (ASTM D1586-84); 3" ID/2" ID; 140 lb. drop-hammer
8. HOLE LOCATION	Easting=685239.15; Northing=530883.32
9. SURFACE ELEVATION	
10. DATE STARTED	11/17/93
11. DATE COMPLETED	11/17/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	13.2 ft.
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	14.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes
SW8270	
SW6010	
SW7421	
SW9045	
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM): yellowish brown (10YR 6/4), fine grained, with fine gravel and root inclusions, dry, nonplastic, loose.	0.0	0.0	WH/1/2/2	179-B06-01-01
	2		SILTY SAND (SM): pale brown (10YR 7/4), fine grained, with root and caliche inclusions, dry, nonplastic, medium dense.	0.0	0.0	2/4/12/30	179-B06-02-01
	4			0.0	0.0	19/34/30/30	179-B06-03-01
	6		SILTY SNAD (SM): strong brown (7.5YR 4/6), fine grained, with fine gypsum crystals, dry, nonplastic, dense.				
			POORLY GRADED SAND (SP): pale yellow (2.5Y 8/2), fine grained, mottled with fine grained white sand, moist to wet, nonplastic, dense.	0.0	0.0	10/22/40/50+	
	8			0.0	0.0	17/18/26/50+	

0 2 4 6 8 10

DRILLING LOG

HOLE NO. 179-B06

1. COMPANY NAME: Radian Corporation

2. INSPECTOR: David R. Robbins

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			POORLY GRADED SAND (SP) as above.	0.0	0.0	18/22/30/50+	
	12						
▼			Water table at 13.2 ft.	0.0	0.0	20/25/31/50+	179-B06-04-01
	14		Total Depth = 14.0 ft.				
	16						
	18						
	20						
	22						
	24						
	26						

PROJECT: Table 2 - RFI

HOLE NO.: 179-B06

DRILLING LOG

HOLE NO.	179-B07
1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
SHEET 1	OF 2 SHEETS
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger; 3.75" ID; 8.0" OD; Split spoon (ASTM D1586-84); 3" ID/2" ID; 140 lb. drop-hammer
8. HOLE LOCATION	Easting=685168.93; Northing=530819.26
9. SURFACE ELEVATION	
10. DATE STARTED	11/18/93
11. DATE COMPLETED	11/18/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	15 ft.
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	16.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes
	SW8270, SW6010, SW7421, SW9045
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM): yellowish brown (10YR 6/4), fine grained, with root inclusions, dry, nonplastic, loose.	0.0	0.0	WH/2/8/7	
	2		SILTY SAND (SM): pale brown (10YR 7/4), fine grained, dry, nonplastic, loose.	0.0	1.3	2/5/6/5	
	4			0.0	0.0	2/3/8/4	179-B07-01-01
	6		SILTY SAND (SM): strong brown (7.5YR 5/6), fine grained, dry, nonplastic, loose.	0.0	0.0	3/8/12/19	179-B07-02-01
	8		POORLY GRADED SAND (SP): pale yellow (2.5Y 7/2), fine grained, moist, nonplastic, medium dense.	0.0	0.0	22/35/50+	179-B07-03-01

0 2 4 6 8 10

DRILLING LOG

HOLE NO. 179-B07

1. COMPANY NAME: Radian Corporation

2. INSPECTOR: David R. Robbins

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			POORLY GRADED SAND (SP) as above.	0.0	0.0	18/23/27/50+	
	12			0.0	0.0	18/50+	
	14		CLAYEY SAND (SC): light gray (2.5Y 7/2), fine grained, moist, nonplastic, dense.				
▼			POORLY GRADED SAND (SP): fine grained, with slight iron staining, wet, nonplastic, dense. Water table at 15.0 ft.	0.0	0.0	19/22/50+	179-B07-04-01
	16		Total Depth = 16.0 ft.				
	18						
	20						
	22						
	24						
	26						

PROJECT: Table 2 – RFI

HOLE NO.: 179-B07

DRILLING LOG

HOLE NO.	179-B08
1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
SHEET 1 OF 2 SHEETS	
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger; 3.75" ID; 8.0" OD; Split spoon (ASTM D1586-84); 3" ID/2" ID; 140 lb. drop-hammer
8. HOLE LOCATION	Easting=685085.38; Northing=530726.74
9. SURFACE ELEVATION	
10. DATE STARTED	11/18/93
11. DATE COMPLETED	11/18/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	10.2 ft.
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	12.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	Yes
DISTURBED	X
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes
SW8270	
SW6010	
SW7421	
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM): yellowish brown (10YR 6/4), fine grained, with root inclusions, dry, medium dense.	0.0	0.0	2/6/13/11	179-B08-01-01
	2			0.0	0.0	5/11/5/5	179-B08-02-01
	4			0.0	2.3	3/5/8/9	179-B08-03-01
	6		SILTY SAND (SM): reddish brown (5YR 5/4), fine grained, moist, nonplastic, dense.	0.0	2.3	17/19/21/27	
	8			0.0	2.3	26/30/36/50+	

0 2 4 6 8 10

DRILLING LOG

HOLE NO. 179-B08

1. COMPANY NAME: Radian Corporation

2. INSPECTOR: David R. Robbins

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			Water table at 10.2 ft.				
			SILTY SAND (SM) as above.	0.0	1.3	26/30/30/36	179-B08-04-01
	12		Total Depth = 12.0 ft.				
	14						
	16						
	18						
	20						
	22						
	24						
	26						

PROJECT: Table 2 – RFI

HOLE NO.: 179-B08

DRILLING LOG

HOLE NO.	181-B01
1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
SHEET	1 OF 2 SHEETS
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger; 3.75" ID; 8.0" OD; Split spoon (ASTM D1586-84); 3" ID/2" ID; 140 lb. drop-hammer
8. HOLE LOCATION	Easting=685062.69; Northing=530246.78
9. SURFACE ELEVATION	
10. DATE STARTED	11/16/93
11. DATE COMPLETED	11/16/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	NONE
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	16.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No; DISTURBED: ; UNDISTURBED:
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes; SW8270
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical; GROUTED: Grout; MONITORING WELL: ; OTHERS (SPECIFY):
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
	0	Fill	FILL: silty sand, yellowish brown (10YR 5/6), medium grained, with root inclusions, moist, nonplastic, loose.	0.0	0.0	3/1/1/1	
	2	Fill		0.0	5.2	2/1/2/2	
	4	Fill		2.2	14.1	5/6/9/50+	
	6		Auger refusal at base of concrete sump. Offset boring 1.5 ft. east and continued drilling. SILTY SAND (SM): pale yellow (2.5Y 8/4), fine grained, with fine gypsum crystals, moist, nonplastic, loose.	0.0	0.0	3/3/6/7	181-B01-01-01
	8			0.0	0.0	18/25/38/50+	
	10						

DRILLING LOG

HOLE NO. 181-B01

1. COMPANY NAME: Radian Corporation

2. INSPECTOR: David R. Robbins

SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM) as above.	0.0	0.0	23/18/26/30	
	12		CLAYEY SAND (SC): brownish gray (2.5Y 6/2), fine grained, with caliche inclusions, wet, low plasticity, dense.	0.0	0.0	12/22/26/34	
	14			0.0	0.0	15/27/21/34	
	16		Total Depth = 16.00 ft.				
	18						
	20						
	22						
	24						
	26						

10 12 14 16 18 20 22 24 26 28

DRILLING LOG

HOLE NO.	181-B02
SHEET 1 OF 1 SHEETS	
1. COMPANY NAME	Radian Corporation
2. DRILLING SUBCONTRACTOR	Southwest Engineering, Inc.
3. PROJECT	Table 2 - RFI
4. LOCATION	Holloman AFB
5. NAME OF DRILLER	Alex Sanchez
6. MANUFACTURERS DESIGNATION OF DRILL	CME 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hollow Stem Auger; 3.75" ID; 8.0" OD; Split spoon (ASTM D1586-84); 3" ID/2" ID; 140 lb. drop-hammer
8. HOLE LOCATION	Easting=685046.65; Northing=530389.74
9. SURFACE ELEVATION	
10. DATE STARTED	11/17/93
11. DATE COMPLETED	11/17/93
12. OVERBURDEN THICKNESS	NA
15. DEPTH GROUNDWATER ENCOUNTERED	3 ft.
13. DEPTH DRILLED INTO ROCK	NA
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	10.00 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Yes
SW8270	
21. TOTAL CORE REC.	NA
22. DISPOSITION OF HOLE	Vertical
GROUTED	Grout
MONITORING WELL	
OTHERS (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David R. Robbins

ELEV. a	DEPTH b	GRAPHIC LOG c	DESCRIPTION OF MATERIALS d	SPLIT SPOON (ppm) e	HEAD-SPACE (ppm) f	BLOW COUNTS g	ANALYTICAL SAMPLE NO. h
			SILTY SAND (SM): dark brown (7.5YR3/2), fine grained, contains organic matter, moist to wet, nonplastic, very loose.		0.0	WH	
	2				1.8	WH	
			Water table at 3.0 ft.				
	4					WH	
	6		LEAN CLAY (CL): brown yellow (10YR6/6), saturated with petroleum, with strong black staining, wet, high plasticity, very soft.			2/3/3/2	
	8				792.4	3/2/2/2	181-B02-01-01
			Total Depth = 10.00 ft.				

0 2 4 6 8 10

PROJECT: Table 2 - RFI HOLE NO.: 181-B02

SS-39

DRILLING LOGS

DRILLING LOG

HOLE NO. MW-39-01

F2397

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	39
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	685782.38(Y), 531057.13(X)
9. SURFACE ELEVATION	4058.04
10. DATE STARTED	25 SEP 91
11. DATE COMPLETED	25 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	~19 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 25.88 ft bmp
14. TOTAL DEPTH OF HOLE	28 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		X	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						%

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		ACD

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SILTY SAND, to sandy silt: tan (10YR 8/2), dry, loose, crumbly, very fine, poorly graded, homogeneous. (SM)					4.0/5.0 ft
	1						
	2	changes to a (10YR 7/4) color.					
	3						
	4	changes to brown (5YR 6/4), tough caliche at 4 ft.					
	5	minor caliche, tan (10YR 8/2).					4.0/5.0 ft
	6						
	7	brown color, firm					
	8	SAND: orange-pink (5YR 8/4), clean, very fine, loose, dry, crumbly, homogeneous, poorly graded, fine to very fine. (SP)					
	9						

DRILLING LOG

HOLE NO. MW-39-01

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR ACD

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
							3.5/5.0 ft
	11						
	12						
	13	minor caliche at 13 ft. thin (1") silt zone (brown).					
	14						
	15	some tan zones, some light brown zones, some silty sand zones, caliche to ~17 ft.					4.5/5.0 ft
	16						
	17						
	18						
	19	wet at 19 ft.					
	20	some silty/clayey zones, some caliche, olive grey to tan to brown					▽ —water at 20.16 ft
	21						
	22						
	23			MW039-01-22.5-25.0			
		black staining at ~23.5 ft. (thin).					
	24						
	25						
	26						
	27						
							TD=28 ft

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES

HOLE NO. MW-39-01

DRILLING LOG

HOLE NO. MW-39-02

F2417

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	39
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	685059.60(Y), 530243.32(X)
9. SURFACE ELEVATION	4049.35
10. DATE STARTED	25 SEP 91
11. DATE COMPLETED	25 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	15.14 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 17.84 ft bmp
14. TOTAL DEPTH OF HOLE	25.5 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		HTH

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1	SILT: very pale orange (10YR 8/20), non-plastic, dry, some caliche. (ML)	HS=0.0ppm			3,8,9,9	1.8/2.0 ft
	2						
	3	SILT: as above. (ML)	HS=0.0ppm			3,3,2,2	1.7/2.0 ft
	4						
	5	SILT: as above. (ML)	HS=0.0ppm			3,8,10,23	1.5/2.0 ft
	6						
	7						
	8	SAND: very pale orange (10YR 8/2), very fine grained, poorly graded, dry, rust staining. (SP)	HS=1.5ppm			16,24,28, 30	1.8/2.0 ft
	9						

DRILLING LOG

HOLE NO. MW-39-02

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR HTH

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SANDY SILT, as above: with more silt. (ML)				15,21,29, 28	
	11						
	12						
	13						
	14						
	15	SILT: very pale orange (5YR 8/2), medium plastic, moist, firm. (ML)				20,19,23, 26	water at 15.14 ft bgl
	16						
	17						
	18						
	19						
	20	SAND: very pale orange (5YR 8/2), fine to very fine grained, poorly graded, mottled brown, wet. (SP)				11,10,26, 30	
	21						
	22						
	23						
	24						
	25						TD= 25.5 ft
	26						
	27						

DRILLING LOG

HOLE NO. MW-39-03

F2398

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	39
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	685072.76(Y), 530596.80(X)
9. SURFACE ELEVATION	4038.33
10. DATE STARTED	25 SEP 91
11. DATE COMPLETED	25 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	2 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 7.50 ft bmp
14. TOTAL DEPTH OF HOLE	14 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		ACD

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
		SAND: tan, some silty zones, clean, very fine, crumbly, moist, homogeneous, poorly graded. (SP)					4.0/5.0 ft
	1						water at ~1-2 ft
	2	changes to a duky yellow orange (10YR 6/6), wet.					
	3	changes to light brown (5YR 6/4), caliche present.					
	4						
	5						-water at 5.0 ft
	6	fine to very fine sand, hard (caliche?) zones.					
	7	changes to a brown (5YR 5/6) color.					
	8						
	9						

DRILLING LOG

HOLE NO. MW-39-03

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR ACD

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	changes to a fine to medium sand.					
	12	SAND: yellow-grey (5Y 7/2) to pale orange (10YR 8/2), caliche, very fine, hard, poorly graded, wet, clean.					
	13						
	14						TD= 14 ft
	15						
	16						
	17						
	18						
	19						
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						

DRILLING LOG

HOLE NO. MW-39-04

F2418

1. COMPANY NAME	RADIAN CORPORATION
2. DRILLING SUBCONTRACTOR	SOUTHWEST ENG INC
SHEET 1 OF 2 SHEETS	
3. PROJECT	HOLLOMAN AFB RI/FS FOR 29 SITES
4. LOCATION	39
5. NAME OF DRILLER	ART VALTIERRA
6. MANUFACTURER'S DESIGNATION OF DRILL	HOLLOW-STEM AUGER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	BOREHOLE DIA.: 7.5"
8. HOLE LOCATION	685269.87(Y), 530918.81(X)
9. SURFACE ELEVATION	4051.73
10. DATE STARTED	25 SEP 91
11. DATE COMPLETED	25 SEP 91
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	17.05 ft bgl
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	04 NOV 91 19.25 ft bmp
14. TOTAL DEPTH OF HOLE	24 ft.
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DEPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		HTH

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	1						
	2						
	3						
	4						
	5	SILTY SAND: light brown (5YR 5/6), grading to a very pale orange (10YR 8/2), very fine grained, poorly graded, moist with caliche, some silty layers. (SP)				8,9,15,40	1.8/2.0 ft
	6						
	7						
	8						
	9						

PROJECT HOLLOMAN AFB RI/FS FOR 29 SITES HOLE NO. MW-39-04

DRILLING LOG

HOLE NO. MW-39-04

PROJECT HOLLOMAN AFB RI/FS

INSPECTOR HTH

SHEET 2 OF 2 SHEETS

a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS/RECOVERY h
	11	SAND: very pale orange (5YR 8/2), medium grained, poorly graded, dry to moist, bedding planes, iron staining on bedding planes. (SP)				11,32,48, 50	1.7/2.0 ft
	12						
	13						
	14						
	15	SAND: greyish-orange (10YR 7/4), mdeium medium grained, poorly graded, wet, clay and silt layers. (SP)	DH=0.0ppm			15,14,10, 29	1.5/2.0 ft
	16						
	17						water at 17.05 ft bgl
	18						
	19						
	20	SAND: very pale orange (5YR 8/2), fine to very fine grained, poorly graded, wet, clean. (SP)	DH=0.0ppm			11,18,9,8	possibly slough from 20-23.1 ft during well installation
	21						
	22						
	23						
	24						TD= 24.0 ft
	25						
	26						
	27						

HTRW DRILLING LOG

DISTRICT	
HOLE NUMBER	SS39-01
1. COMPANY NAME	FLUOR DANIEL GTI
2. DRILL SUBCONTRACTOR	TEG
SHEET / SHEET	1 OF 2
3. PROJECT	SS-39
4. LOCATION	HOLLOMAN AFB, NM
5. NAME OF DRILLER	Karis Vandehey
6. MANUFACTURER'S DESIGNATION OF DRILL	STRATA PROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2"x3' SS Split Spoons; 3'x1"x0.006 SS Screen; Peristaltic Pump
8. HOLE LOCATION	SEE MAP
9. SURFACE ELEVATION	
10. DATE STARTED	18 MAY 1998
11. DATE COMPLETED	18 MAY 1998
12. OVERBURDEN THICKNESS	NA
13. DEPTH DRILLED INTO ROCK	NA
14. TOTAL DEPTH OF HOLE	8'
15. DEPTH GROUNDWATER ENCOUNTERED	5'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—
18. GEOTECHNICAL SAMPLES	None
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	—	—	—	—	100%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	Bentonite	—	—	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT	HOLE NO.
SS39	SS39-01

ENG FORM 5056-R, AUG 94

(Proponent: CECW-

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 553

PROJECT 5539-

INSPECTOR L. S. STEVENSON

SHEET 2 OF

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
		Gypsum Crust					begin SS sampling @ 2'
	1	SAND, tan SW					
	2	SAND, brown (10 YR 8/3) moist, soft, sl. plastic. SM					
	3	silty fine SAND, brown (10 YR 8/2), moist, soft, sl. plasticity. SM					
	4						
	5	SAND w/ silt and clay, brown (10 YR 8/2), moist, plastic SM			5539-01-5		▽ water @ 5' sample screen @ 5' to 8'
	6	SAND, brown (10 YR 4/4) moist, firm SW					
	7						
	8	SAND, gray (10 YR 7/1), moist, firm SW					

PROJECT 5539-01

HOLE NO. 5539-01

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER SS39-02
1. COMPANY NAME FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR –	SHEET 1 OF SHEETS 2
3. PROJECT SS 39	4. LOCATION HOLLOMAN AFB, NM	
5. NAME OF DRILLER –	6. MANUFACTURER'S DESIGNATION OF DRILL –	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: post hole; SS screen / peristaltic pump	8. HOLE LOCATION See Map	
	9. SURFACE ELEVATION –	
	10. DATE STARTED 18 MAY 1998	11. DATE COMPLETED 18 MAY 1998
12. OVERBURDEN THICKNESS –	13. DEPTH GROUNDWATER ENCOUNTERED 0.8'	
13. DEPTH DRILLED INTO ROCK –	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED –	
14. TOTAL DEPTH OF HOLE 3'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) –	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None			

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	–	–	–	–	100

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Abandoned	Cuttings	–	–	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT	HOLE NO.
SS39	SS39-02

ENG FORM 5056-R, AUG 94

(Proponent: CECW-

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 5539-02

PROJECT 5539

INSPECTOR L. S. STEVENSON

SHEET 2 of 2

ELEV (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
	1	Sandy CLAY, red (2.5 YR 4/4), moist, hard CL			5539-02-1		Post Hole tow: Clay adhere: strongly to equipment, itself. Approx. 1/8" surface crus evaporite gy
	2	silty SAND, brown (2.5 YR 6/3), wet, hard grading to soft @ 2.5 ft.	--				
	3	SM					

PROJECT 5539

HOLE NO 5539-02

ENG FORM 5056A-R, AUG 94

(Proponent: CECW

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER: SS39-03
1. COMPANY NAME: FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR: –	SHEET 1 OF 2 SHEETS
3. PROJECT: SS39	4. LOCATION: HOLLOMAN AFB, NM	
5. NAME OF DRILLER: –	6. MANUFACTURER'S DESIGNATION OF DRILL: –	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: POST HOLE, SS screen w/ peristaltic pump	8. HOLE LOCATION: SEE MAP	
	9. SURFACE ELEVATION: –	
	10. DATE STARTED: 18 MAY 1998	11. DATE COMPLETED: 18 MAY 1998
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: 1.5'	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: –	
14. TOTAL DEPTH OF HOLE: 3'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): –	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	–	–	–

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
water	by 8260	–	–	–	–	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	cuttings	–	–	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT	HOLE NO
SS39	SS39-03

ENG FORM 5056-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 5539-0

PROJECT 5539

INSPECTOR L. S. STEVENSON

SHEET 2 of 2

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
		Silty CLAY, brown (5YR3/3) moist, firm, cohesive. CL					Post Hole to 3'
	1	SAND, white (5YR7/1), moist, firm. SP					
	2						▽ water @ 2' rose to 1.5'
		- as above, wet, soft. SP					
	3						

PROJECT 5539

HOLE NO. 5539-03

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER: 5539-04
1. COMPANY NAME: FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR: —	SHEET 1 OF 2 SHEETS
3. PROJECT: 5539	4. LOCATION: HOLLOMAN AFB NM	
5. NAME OF DRILLER: —	6. MANUFACTURER'S DESIGNATION OF DRILL: —	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: POST HOLE; SS Screen / Peristaltic Pump	8. HOLE LOCATION: SEE MAP	
	9. SURFACE ELEVATION: —	
	10. DATE STARTED: 18 MAY 1998	11. DATE COMPLETED: 18 MAY 1998
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: ~3'	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —	
14. TOTAL DEPTH OF HOLE: 3.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	—	—	—	—	100

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	cuttings	—	—	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE

PROJECT	HOLE NO.
5539	5539-04

ENG FORM 5056-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER SS39-C

PROJECT SS39

INSPECTOR L. S. STEVENSON

SHEET 2 OF 2

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		silty SAND, brown (5YR6/3) moist, soft SM					Post Hole to
	1	CLAY, brown (5YR3/3), moist, firm, "sticky", plastic CL					
	2	SAND, white (5YR 8/1), moist, firm SP	--				
	3						▽ water @ ~3'
	4						

PROJECT SS39

HOLE NO SS39-04

ENG FORM 5056A-R, AUG 94

(Proponent: CECW

HTRW DRILLING LOG

DISTRICT	
HOLE NUMBER	SS39-0
1. COMPANY NAME	FLUOR DANIEL GTI
2. DRILL SUBCONTRACTOR	—
SHEET / SHEETS	1 OF 2
3. PROJECT	SS 39
4. LOCATION	
5. NAME OF DRILLER	—
6. MANUFACTURER'S DESIGNATION OF DRILL	—
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	POST HOLE SS screen/peristaltic pump
8. HOLE LOCATION	SEE MAP
9. SURFACE ELEVATION	—
10. DATE STARTED	18 MAY 1998
11. DATE COMPLETED	19 MAY 1998
12. OVERBURDEN THICKNESS	NA
13. DEPTH DRILLED INTO ROCK	NA
14. TOTAL DEPTH OF HOLE	4'
15. DEPTH GROUNDWATER ENCOUNTERED	~4'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	1.8' after overnight
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
— NONE	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	—	—	—	—	100

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	Cuttings	—	—	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT	HOLE NO
SS 39	SS39 - 05

ENG FORM 5056-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 55[illegible]

PROJECT 5539

INSPECTOR L. S. STEVENSON

SHEET 2 OF 2

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
		silty SAND, brown (5YR3/3) moist, firm. SM					POST HOLE.
	1	CLAY, brown (5YR3/3), moist, firm, "sticky",					
	2	SAND, white (5YR7/1), moist, hard CL					
	3						
	4	TD					▽ flowing water @ 4', rose to 1.8' depth overnight.
							~3 gal purged from hole prior to sampling

PROJECT 5539

HOLE NO. 5539-05

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER SS39-06
1. COMPANY NAME FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR TEG	SHEET 1 OF SHEETS 2
3. PROJECT SS 39	4. LOCATION HOLLOMAN AFB, NM	
5. NAME OF DRILLER Karis Vandehey	6. MANUFACTURER'S DESIGNATION OF DRILL STRATA PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 2" x 3' SS split spoons, 3' x 1" x 0.006 SS sample screen Peristaltic pump	8. HOLE LOCATION SEE MAP	
	9. SURFACE ELEVATION —	
	10. DATE STARTED 18 MAY 1998	11. DATE COMPLETED 18 MAY 1998
12. OVERBURDEN THICKNESS NA	15. DEPTH GROUNDWATER ENCOUNTERED 3.4'	
13. DEPTH DRILLED INTO ROCK NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED —	
14. TOTAL DEPTH OF HOLE 8'	17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY) —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	—	—	—	—	100%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	BENTONITE	—	—	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS SCALE:

PROJECT	HOLE NO.
SS39-	SS39-06

ENG FORM 5056-R, AUG 94 (Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER SS3[illegible]

PROJECT SS39

INSPECTOR L. S. STEVENSON

SHEET 2 OF [illegible]

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
	1						
	2	silty SAND, brown (7.5YR 7/3), moist, soft SM					
	3	silty SAND, tan (7.5YR 7/4) moist, firm, sl. plastic, sl. cohesive. SM					▽ water @ 3.4'
	4						
	5	fine SAND, brown (7.5YR 5/3), moist, firm SP					sample scree 5' to 8'
	6	silty fine SAND, tan (7.5YR 8/2), soft, moist, sl. cohesive SM					
	7						
	8	fine SAND, white/gray mottled (7.5YR 7/1), hard, w/ gyp crystals SP					

PROJECT SS39

HOLE NO SS39-06

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER SS39-07
1. COMPANY NAME FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR TEG	SHEET 1 OF SHEETS 2
3. PROJECT SS 39	4. LOCATION HOLLOMAN AFB, NM	
5. NAME OF DRILLER Karis Vandeheyg	6. MANUFACTURER'S DESIGNATION OF DRILL STRATA PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 3'x2" SS Split Spoon; 3'x1"x 0.006 SS sample screen; Peristaltic pump	8. HOLE LOCATION SEE MAP	
	9. SURFACE ELEVATION —	
	10. DATE STARTED 18 MAY 1998	11. DATE COMPLETED 18 MAY 1998
12. OVERBURDEN THICKNESS NA	15. DEPTH GROUNDWATER ENCOUNTERED ~3.5'	
13. DEPTH DRILLED INTO ROCK NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED —	
14. TOTAL DEPTH OF HOLE 5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19 TOTAL NUMBER OF CORE BOXES
NONE	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
Water	by 8260	—	—	—	—	100%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	BENTONITE	—	—	Lee S. Stevenson

LOCATION SKETCH/COMMENTS SCALE:

PROJECT	HOLE NO.
SS 39	SS39-07

ENG FORM 5056-R, AUG 94 (Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER SS3[illegible]

PROJECT SS39

INSPECTOR LS STEVENSON

SHEET 2 OF [illegible]

ELEV (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
							Push to 2'
	1						
	2	SAND, tan (10YR 8/3), wet, soft, well graded SW					
	3	sandy SILT, gray (10YR 7/1), wet, firm ML					▽ water ~ 3.5 ft.
	4						
	5	CLAY w/ sand, yellow 10YR 8/8, wet, hard CL					

PROJECT SS39

HOLE NO. SS39-07

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER 5539-08
1. COMPANY NAME: FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR: TEG	SHEET 1 OF 2 SHEETS
3. PROJECT: 5539	4. LOCATION: HOLLOMAN AFB, NM.	
5. NAME OF DRILLER: Karis Vandehey	6. MANUFACTURER'S DESIGNATION OF DRILL: STRATA PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2"x3' SS split Spoon; 3'x1"x0.006 Sample Screen; Peristaltic Pump	8. HOLE LOCATION: SEE MAP	
	9. SURFACE ELEVATION: –	
	10. DATE STARTED: 18 MAY 1998	11. DATE COMPLETED: 18 MAY 1998
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: 7.4'	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: –	
14. TOTAL DEPTH OF HOLE: 11'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): –	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	–	–	–

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
water	by 8260	–	–	–	–	100

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	BENTONITE	–	–	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT	HOLE NO.
5539	5539-08

ENG FORM 5056-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: SS3

PROJECT: SS39

INSPECTOR: L. S. STEVENSON

SHEET 2 OF

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
							Pushto 2'
	1						
	2	Silty fine SAND, brown (10YR 6/4), dry, soft, "loose". SM	--				
	3						
	4						
	5	SILT w/ sand, white (10YR 8/2), dry, firm SM					
	6	SILT, white (10YR 8/2), wet, soft, sl. kohesive ML					
	7						
	8	SAND, brown (10YR 5/6), wet, soft SM					▽ water @ 7.4'
	9						sample screen 8' to
	10	SAND, gray (5Y 7/1), moist, hard SP					
	11						

PROJECT: SS39

HOLE NO: SS39-08

ENG FORM 5056A-R, AUG 94

(Proponent: CECV

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER SS32-09
1. COMPANY NAME: FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR: TEG	SHEET 1 OF 2 SHEETS
3. PROJECT: SS39	4. LOCATION: Holloman AFB, NM	
5. NAME OF DRILLER: Karis Vandehey.	6. MANUFACTURER'S DESIGNATION OF DRILL: STRATA PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2"x3'/SS split Spoon; 3'x1"x0.006 SS sample Screen; Peristaltic Pump	8. HOLE LOCATION: SEE MAP	
	9. SURFACE ELEVATION: —	
	10. DATE STARTED: 19 MAY 1998	11. DATE COMPLETED: 19 MAY 1998
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: 18'	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —	
14. TOTAL DEPTH OF HOLE: 20'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	—	—	—	—	80%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	bentonite	—	—	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT	HOLE NO.
SS39	SS39-09

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: SS39-09

PROJECT: SS39

INSPECTOR: L.S. STEVENSON

SHEET: 2 OF 2

ELEV. (h)	DEPTH (h)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
		gravel, "lime rock", concrete rubble "~~parking~~" fill					PUSH to 2'.
	1						
	2	fine SAND w/silt, tan (7.5 YR 7/4), dry, mod. firm. SM					
	3						
	4	silty SAND, white (7.5YR 8/1), dry, mod. firm SM					
	5	SAND w/ tr. silt, tan (7.5 YR 8/2), tr. moisture, mod. firm. SM					
	6	SAND, brown (10 YR 5/6), dry SP					
	7	SAND w/ tr. clay, tan (7.5 YR 8/3), moist, sl. plastic. SC					
	8	SAND, orange (7.5 YR 8/6), dry, bands of firm/soft, w/ occas. 3/4" cemented nodules SW					
	9						
	10	as above, firm					
	11	as above, loose					
	12	fine SAND, white (10 YR 8/1), dry, soft SW					
	13						
	14	SAND, orange (7.5 YR 7/6), moist, firm SP					
	15	silty SAND, brown (7.5 YR 6/3), (w/ gyp. nodules & crystals). tr. moisture, hard SM					very difficu to penetrate w/ DPT
	16	SAND, tan (7.5 YR 7/4), tr. moisture, firm SP					
	17	SAND, brown (7.5 YR 6/3) tr. moisture, firm, SP					sample screen 17' to 20'
	18	silty SAND, pink (7.5 YR 8/3), tr. moisture, hard SM					▽ water @ 18"
	19	SAND, Brown (7.5YR 7/4), wet, firm, SP					1" sand lens @ 18.8'
	20						

PROJECT: SS39

HOLE NO. SS39-09

ENG FORM 5056A-R, AUG 94

(Proponent: CECW

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER SS39-10
1. COMPANY NAME FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR TEG	SHEET 1 OF SHEETS 2
3. PROJECT SS39	4. LOCATION HOLLOMAN AFB, NM	
5. NAME OF DRILLER Karis Vandehey	6. MANUFACTURER'S DESIGNATION OF DRILL STRATAPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 2"x3' SS split spoon; 3'x1"x0.006 sample screen; Peristaltic Pump	8. HOLE LOCATION SEE MAP	
	9. SURFACE ELEVATION	
	10. DATE STARTED 18 MAY 1998	11. DATE COMPLETED 18 MAY 1998
12. OVERBURDEN THICKNESS NA	15. DEPTH GROUNDWATER ENCOUNTERED 17'	
13. DEPTH DRILLED INTO ROCK NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED —	
14. TOTAL DEPTH OF HOLE 20'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	—	—	—	—	100

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	bentonite	—	—	Lee Scott Stineman

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT SS39	HOLE NO. SS39-10

ENG FORM 5056-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER SS39-10

PROJECT SS39

INSPECTOR L. S. STEVENSON

SHEET 2 OF 2

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
		surface sand & gravel fill					PUSH to 2'
	1						
	2	fine SAND, white (10 YR 8/3), sl. moist, firm ~~SW~~ SP					
	3						
	4						
	5	SAND, red (~~7.5~~ 2.5 YR 6/6) tr. moisture, sl. cohesive SM					
	6						
	7	fine SAND, white (~~2.5~~ 5 YR 8/1), dry, loose, powdery. SP					
	8						
	9	fine SAND, gray (10 YR 7/1), tr. moisture, sl. cohesive SM					
	10	fine SAND, white (2.5 YR 8/1), dry, powdery SP					
	11						
	12	CLAY, gray, v. thin lens ~1' CL					
	13	CLAY, red (5 YR 4/6), sl. moist, firm, mod. plastic, ~~cohesive~~ CL					1" gray sand lens @ 13.5'
	14	clayey SAND, gray (10 YR 6/1), moist hard, w/ gyp. crystals, + red & yellow cemented nodules SC					
	15						
	16	fine SAND, white (10 YR 8/1) moist to wet, firm SP					
	17	clayey SAND, red (5 YR 5/4), moist, sl. plastic. SC					▽ water @ 17'
	18	CLAY, brown (10 R 4/4), tr moisture, stiff w/ brown nodules CL					sand lens @ 18', 1.5" th
	19						Sample s e 17' to 20'
	20	SAND, gray (10 YR 7/1), w/ sm. red nodule SM					

PROJECT SS 39

HOLE NO. SS39-10

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER SS39-11
1. COMPANY NAME FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR TEG	SHEET 1 OF 2 SHEETS
3. PROJECT SS 39	4. LOCATION HOLLOMAN AFB, NM	
5. NAME OF DRILLER Karis Vandehey.	6. MANUFACTURER'S DESIGNATION OF DRILL STRATAPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 2"x3' SS Split Spoon; 3'x1"x0.006 sample screen; Peristaltic Pump	8. HOLE LOCATION SEE MAP	
	9. SURFACE ELEVATION	
	10. DATE STARTED 19 MAY 1998	11. DATE COMPLETED 19 MAY 1998
12. OVERBURDEN THICKNESS NA	15. DEPTH GROUNDWATER ENCOUNTERED 8'	
13. DEPTH DRILLED INTO ROCK NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED —	
14. TOTAL DEPTH OF HOLE 11'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
Water	by 8260	—	—	—	—	100

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	bentonite	—	—	Lee S. [illegible]

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT SS39	HOLE NO. SS39-11

ENG FORM 5056-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER SS3[illegible]

PROJECT SS39

INSPECTOR L. S. Stevenson

SHEET 2 OF [illegible]

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
	1						Road Rubble large debris built up causeway over playa
	2						
	3						low recovery in 2'-5' SS
	4	SAND, gray (7.5YR 5/1), moist, firm SP					
	5	SAND, gray (7.5YR 5/1), moist, firm SP					
	6	SAND w CLAY, gray (7.5 YR 5/1), moist, soft, plastic SC					
	7	SAND w/ silt, lt gray (10 YR 7/1), ~~mod firm~~, moist, sl. plastic SM					
	8	SAND w/ tr. silt, gray (10 YR 7/1), wet, loose SM					▽ water @ 8'
	9	SAND, gray & white banded (10 YR 7/1 – 10 YR 8/1), moist, firm SM					Sample [illegible] 8'-11
	10						
	11						
	12						

PROJECT SS39

HOLE NO SS39-11

ENG FORM 5056A-R, AUG 94

(Proponent: CECW

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER: SS39-12
1. COMPANY NAME: FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR: TEG	SHEET 1 OF 2 SHEETS
3. PROJECT: SS39	4. LOCATION: HOLLOMAN AFB, NM	
5. NAME OF DRILLER: Karis Vandehey	6. MANUFACTURER'S DESIGNATION OF DRILL: STRATA PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2"x3' SS Split Spoons; 3'x1"x0.006 sample screen; peristaltic pump	8. HOLE LOCATION: SEE MAP	
	9. SURFACE ELEVATION: —	
	10. DATE STARTED: 22 MAY 1998	11. DATE COMPLETED: 22 MAY 1998
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: 2.7'	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —	
14. TOTAL DEPTH OF HOLE: 6'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	—	—	—	—	100%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	bentonite	—	—	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT	HOLE NO.
SS39	SS39-12

ENG FORM 5056-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 5539-1

PROJECT 5539

INSPECTOR L. S. STEVENSON

SHEET 2 of 2

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
	1	silty SAND, ~~wet~~ brown (5 YR 6/4), wet, soft SM					
	2						▽ water @ 2.7'
	3						Sample series 3'-6'
	4	SILT, lt brown (7.5 YR 7/4), moist, firm ML					
	5						
	6						

PROJECT 5539

HOLE NO. 5539-12

ENG FORM 5056A-R, AUG 94

(Proponent: CECW

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER: SS39-13
1. COMPANY NAME: FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR: TEG	SHEET ___ OF ___ SHEETS
3. PROJECT: SS 39	4. LOCATION: HOLLOMAN AFB	
5. NAME OF DRILLER: Karis Vandehey	6. MANUFACTURER'S DESIGNATION OF DRILL: STRATA PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2"x3' SS Split Spoons; 3' x 1" x 0.006 sample screen; Peristaltic Pump	8. HOLE LOCATION: See MAP	
	9. SURFACE ELEVATION: –	
	10. DATE STARTED: 22MAY 1998	11. DATE COMPLETED: 22MAY 1998
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: 10.1'	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: –	
14. TOTAL DEPTH OF HOLE: 14'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): –	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	–	–	–

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	–	–	–	–	too 90

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	bentonite	–	–	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT	HOLE NO.
SS39 ~~-13~~	SS39-13

ENG FORM 5056-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER SS39-1

PROJECT SS 39

INSPECTOR L. S. STEVENSON

SHEET 2 OF 2

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
							push to 2'
	1						
	2	SILT, tan (7.5 YR 8/3), moist, firm ML					
	3						
	4	SILT, brown (7.5 YR 5/8), moist, soft ML					
	5	SILT, white (7.5 YR 8/2), wet, soft ML					
	6	SILT, brown (7.5 YR 6/4), moist to wet, soft, w/ gypsum nodules. ML					
	7	SILT, brown (7.5 YR 6/4), moist, hard ML					
	8	no recovery					
	9						
	10	SAND, brown (5 YR 5/6), tr. moist, w large (1") gyp nodules. SP					▽ water @ 10.1'
	11	SILT, white (5 YR 8/2), dry, hard ML					sample screen 11'-14'
	12	SAND w/ silt, brown (5 YR 5/6), wet, soft SM					
	13	silty fine SAND, white (5 YR 8/4), moist, hard SM					
	14						

PROJECT SS39

HOLE NO SS39-13

ENG FORM 5056A-R, AUG 94

(Proponent: CECW

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER SS39-14
1. COMPANY NAME: FLUOR DANIEL GTI	2. DRILL SUBCONTRACTOR: TEG	SHEET #1 OF SHEETS 2
3. PROJECT: SS 39	4. LOCATION: HOLLOMAN AFB, NM	
5. NAME OF DRILLER: Karie Vandehey	6. MANUFACTURER'S DESIGNATION OF DRILL: STRATAPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2"x3' SS Split Spoons; 3'x1"x0.006 sample screen; Peristaltic Pump	8. HOLE LOCATION: SEE MAP	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 22 MAY 1998	11. DATE COMPLETED: 22 MAY 1998
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: 4.9'	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —	
14. TOTAL DEPTH OF HOLE: 9'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
water	by 8260	—		—	—	100.

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ABANDONED	bentonite	—	—	Lee Scott Stevenson

LOCATION SKETCH/COMMENTS

SCALE:

PROJECT	HOLE NO.
SS39	SS39-14

ENG FORM 5056-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 5539-1

PROJECT 5539

INSPECTOR L. S. STEVENSON

SHEET 2 OF 2

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
	1	fine SAND, tan (7.5YR 7/1), moist, loose SP					
	2						
	3	Sandy SILT, tan (7.5YR 7/4), wet, soft ML					
	4	SILT, tan (10YR 7/3), moist, firm ML					
	5						▽ water @ 4.9'
	6	Silty SAND, tan (7.5YR 7/4), wet, soft SM					Sample Screen 6' to 9'
	7						
	8						
	9	fine SAND, tan (7.5YR 8/4), moist, firm SP					

PROJECT 5539

HOLE NO. 5539-~~B~~14

ENG FORM 5056A-R, AUG 94

(Proponent: CECW

HTRW DRILLING LOG

DISTRICT	
HOLE NUMBER	SS39-1
1. COMPANY NAME	HAFB/USACE
2 DRILL SUBCONTRACTOR	—
SHEET	1 OF
3 PROJECT	SS-39
4 LOCATION	Holloman AFB, NM
5 NAME OF DRILLER	—
6. MANUFACTURER'S DESIGNATION OF DRILL	—
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	Hand auger SS screen/peristaltic pump
8 HOLE LOCATION	See map
9 SURFACE ELEVATION	—
10 DATE STARTED	6/24/98
11 DATE COMPLETED	6/24/98
12. OVERBURDEN THICKNESS	—
13 DEPTH GROUNDWATER ENCOUNTERED	2.5'
13 DEPTH DRILLED INTO ROCK	—
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
14 TOTAL DEPTH OF HOLE	3'
17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19 TOTAL NUMBER OF CORE BOXES
None			

20 SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21 TOTAL RECOVERY
water	by 8260					

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 SIGNATURE OF INSPECTOR
Abandoned	cuttings			Drew Lossard/Steve Pearson

LOCATION SKETCH/COMMENTS SCALE:

PROJECT	HOLE NO.
SS-39	SS39-15

ENG FORM 5056-R, AUG 94 (Proponent: CEC

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER SS39

PROJECT SS-39

INSPECTOR D. Lessard/S. Pearson

SHEET 2 OF 2

ELEV (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
	1	Brownish red clayey SILT ML					
	2	Light brown silty SAND, wet @ 2.5' SM					▽ @ 2.5'
	3	TD					

PROJECT

HOLE NO

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-E

HTRW DRILLING LOG

DISTRICT		HOLE NUMBER SS39-1
1. COMPANY NAME HAFB/USACE	2 DRILL SUBCONTRACTOR —	SHEET SHEETS OF
3 PROJECT SS-39	4 LOCATION Holloman AFB, NM	
5 NAME OF DRILLER —	6 MANUFACTURER'S DESIGNATION OF DRILL —	
7 SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Hand auger; SS screen/peristaltic pump	8 HOLE LOCATION See map	
	9 SURFACE ELEVATION —	
	10. DATE STARTED 6/24/98	11 DATE COMPLETED 6/24/98
12. OVERBURDEN THICKNESS —	15. DEPTH GROUNDWATER ENCOUNTERED 2.5'	
13. DEPTH DRILLED INTO ROCK —	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED —	
14. TOTAL DEPTH OF HOLE 3'	17 OTHER WATER LEVEL MEASUREMENTS (SPECIFY) —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19 TOTAL NUMBER OF CORE BOXES
None			

20 SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21 TOTAL CORE RECOVERY
Water	by 8260					

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 SIGNATURE OF INSPECTOR
Abandoned	cuttings			Drew Lessard / Steve Pearson

LOCATION SKETCH/COMMENTS SCALE:

PROJECT	HOLE NO.
SS-39	SS39-16

ENG FORM 5056-R, AUG 94 (Proponent: CEC)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER SS39

SHEET 2 OF 2

PROJECT SS-39

INSPECTOR D. Lessard / S. Pearson

ELEV (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h)
	1	Brownish red clayey SILT ML					
	2	Light brown silty SAND, wet @ 2.5' SM					▽ @ 2.5'
	3	TD					

PROJECT

HOLE NO

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-I

SS-39

WELL COMPLETION REPORTS

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 25 SEPT 91	STARTED	COMPLETED	LOCATION (Coordinates or Station) 39
ELEVATION TOP OF CASING 4059.86			SIGNATURE OF INSPECTOR/INSTALLER ACD
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-39-01

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

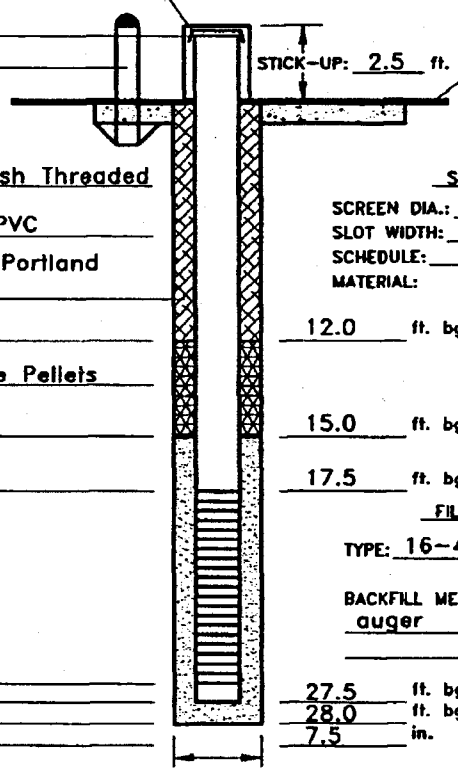
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

20.0 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH



STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

12.0 ft. bgl

15.0 ft. bgl

17.5 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

27.5 ft. bgl

28.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See Well Development Record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 4 NOV 91/1534/22.66 ft. bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

D17381

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 25 SEPT 91	STARTED 1600	COMPLETED 1800	LOCATION (Coordinates or Station) 39
ELEVATION TOP OF CASING 4051.15			SIGNATURE OF INSPECTOR/INSTALLER HTH
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-39-02

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

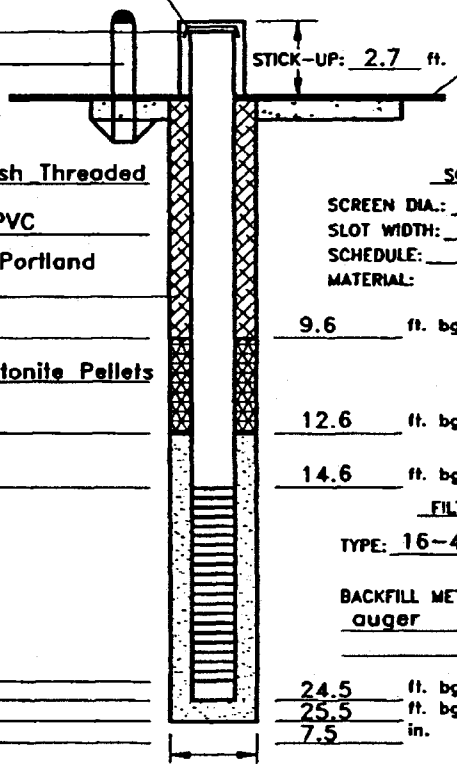
BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

LENGTH OF SOLID PIPE: 17.3 ft.

WELL SCREEN LENGTH: 9.5 ft.



STICK-UP: 2.7 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0" THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

9.6 ft. bgl

12.6 ft. bgl

14.6 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Pour through auger

24.5 ft. bgl

25.5 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See Well Development Record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 21 OCT 91/1030/18.00 ft. bmp

4 NOV 91/1548/17.84 ft. bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

17380

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 25 SEPT 91	STARTED	COMPLETED	LOCATION (Coordinates or Station) 39
ELEVATION TOP OF CASING 4040.63			SIGNATURE OF INSPECTOR/INSTALLER ACD
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-39-03

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

6.6 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.5 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0 THICKNESS

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

1.0 ft. bgl

3.0 ft. bgl

4.0 ft. bgl

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Tremie through auger

14.0 ft. bgl

14.0 ft. bgl

7.5 in.

WELL DEVELOPMENT

METHOD: See Well Development Record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 4 NOV 91/1544/7.50 ft. bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

D1738J

ELEVATION GROUND WATER			PROJECT HOLLOMAN AFB RI/FS
DATE INSTALLED 25 SEPT 91	STARTED 1400	COMPLETED 1600	LOCATION (Coordinates or Station) 39
ELEVATION TOP OF CASING 4053.34			SIGNATURE OF INSPECTOR/INSTALLER HTH
DRILLING METHOD HOLLOW STEM AUGER			WELL NO. (as shown on drawing: title and file number) MW-39-04

MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)

PROTECTIVE CASING

TYPE OF PROTECTIVE CASING: Steel Lockbox

TOP OF WELL

PROTECTIVE POSTS

CASING DIAMETER: 2 in.

TYPE OF PIPE JOINTS: Flush Threaded

TYPE OF BLANK CASING: PVC

BACKFILL/GROUT MIX ETC. Type I Portland Cement

TOP OF SEAL

TYPE OF SEAL: 1/4" Bentonite Pellets

TOP OF FILTERPACK

TOP OF SCREEN

FILTER PACK

BOTTOM OF WELL

BOTTOM OF BORING

BORING DIAMETER

15.4 ft. LENGTH OF SOLID PIPE

9.5 ft. WELL SCREEN LENGTH

STICK-UP: 2.2 ft.

GROUND SURFACE

CONCRETE PAD MIN. 4.0" THICKNESS

8.2 ft. bgl

11.2 ft. bgl

13.2 ft. bgl

23.1 ft. bgl

24.0 ft. bgl

7.5 in.

SCREEN INFORMATION

SCREEN DIA.: 2 in.

SLOT WIDTH: 0.010 in.

SCHEDULE: 40

MATERIAL: ☒ PVC ☐ STAINLESS STEEL ☐ OTHER (DESCRIBE)

FILTERPACK MATERIAL

TYPE: 16-40 Colorado Silica Sand

BACKFILL METHOD: Pour through auger

WELL DEVELOPMENT

METHOD: See Well Development Record

TIME SPENT DEVELOPING:

VOLUME OF WATER REMOVED:

VOLUME OF WATER ADDED:

DESCRIPTION OF PREDEVELOPMENT WATER:

DESCRIPTION OF POST DEVELOPMENT WATER:

WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS

DATE/TIME/LEVEL 21 OCT 91/1015/19.20 ft. bmp

4 NOV 91/1540/19.25 ft. bmp

DEPTH FROM TOP CASING AFTER DEVELOPMENT:

01738P

APPENDIX I

STANDARD OPERATING PROCEDURES

APPENDIX A
HOLLOMAN AIR FORCE BASE
STANDARD OPERATING PROCEDURES (SOPs)

HAFB SOP-1	Documentation, Sample Handling, Chain-of-Custody, and Shipping
HAFB SOP-2	Sampling Equipment Decontamination
HAFB SOP-3	Staking, Utility Clearance, and Permitting
HAFB SOP-4	Direct Push Sampling for Soil and Groundwater
HAFB SOP-5	Soil Sampling for Chemical Analysis
HAFB SOP-6	Procedure for Field Screening of Volatile Organics
HABP SOP-7	Lithologic Description and Geotechnical Sampling
HAFB SOP-8	Groundwater Sampling for Chemical Analysis
HAFB SOP-9	Field Management of Investigation-Derived Waste (IDW)
HAFB SOP-10	Borehole Abandonment and Site Restoration

SOP HAFB-1
DOCUMENTATION, SAMPLE HANDLING, CHAIN-OF-CUSTODY, AND SHIPPING

1.0 OBJECTIVE

This SOP contains specific details concerning sample control, documentation, and transportation procedures.

2.0 EQUIPMENT AND MATERIAL

The following equipment will be necessary to complete sample documentation, handling, and shipment:

Forms and Records

- Log books;
- Chain-of-custody forms;
- Custody seals;
- Sample identification labels; and,

Shipping Supplies

- Clear tape;
- Rigid plastic coolers;
- Strapping tape;

- "This Side Up" arrow labels;
- Address labels;
- Heavy-duty plastic trash bags and ties;
- Small and large re-sealable plastic bags;
- Protective mesh for various sample bottle sizes;
- Absorbent material for packing samples; and
- Ice.

3.0 METHODOLOGY

Sample control and documentation are necessary to ensure the defensibility of data and to verify the quality and quantity of work performed in the field. Accountable documents include field logbooks, instrument calibration logbooks, sample logs, correspondence, sample labels, chain-of-custody forms, photographs, and analytical records. All information pertinent to a field activity must be entered into a logbook, including uncompleted work.

3.1 SAMPLE CONTROL AND DOCUMENTATION

All logbooks should be numbered and are to be bound with consecutively numbered pages; log book pages and data should never be removed. Loose-leaf forms, sample logs, and figures used for sample location will be kept in a 3-ring binder. Indelible black ink will be used for recording all data. At minimum, the following data should be recorded during the course of the investigation:

- Date, field observations, and weather conditions, including any unusual circumstances;

- Calibration of field equipment before sample analysis;
- Names of field crew members;
- Name of the sample collector;
- Identification of sampling location and depth of sample;
- Rough sketch of sampling location related to significant physical objects;
- Depth to water at groundwater sampling locations;
- Purge method and purge volume;
- Sample collection method;
- Types and numbers of sample containers used;
- Preservatives used;
- Results of field analysis; and
- Sample observations (color, turbidity, odor, soil type, etc.).

To change an incorrect entry, draw a line through the entry, write the change above or adjacent to the entry, and date and initial the change. If anyone other than the person to whom a logbook is assigned makes an entry, that person should date and sign the entry. All project logbooks are to be turned over to the document control officer at the end of each work period and to a central file at the end of the field activity.

3.2 SAMPLE LABELING

In addition to the field logbook, a complete sample label should be filled out for each sample.

All sample containers should be sealed immediately after sample collection. Samplers should place the completed sample label onto the sample container and secure it with clear tape. Sample labels must identify the sample ID, site, sample type, sampler's initials, sampling location, depth, time, date, analyses requested, laboratory, containers, and any special instructions. Labels should be completed with black waterproof ink.

3.3 SAMPLE CONTROL/CHAIN-OF-CUSTODY/SHIPMENT

Once the samples have been collected and labeled, they should be kept cool with ice or in a refrigerator. The following procedures are for sample handling and shipment to a laboratory for analysis:

A. Fill out a chain-of-custody form for every sample shipping container (cooler). Information recorded on this form includes the following:

- Samples collected and corresponding laboratory analyses;
- Time and date of sample;
- Sample number;
- Type of sample;
- Sampler's initials;
- Preservatives used;
- MS/MSD analysis;
- Relinquisher's signature, date, and time; and
- Special instructions.

B. Double check the information on the chain-of-custody form against the sample labels and sample logs. Make sure each sample is accounted for and that samples are being sent to the correct laboratory.

C. Wipe the sample container exteriors clean with a paper towel dampened with clean water.

D. Ensure that each container has a properly completed label.

E. Place the sample containers in resealable plastic bags. Containers from the same sample location and depth can be placed in the same bag, but separate samples from different sites will not be placed in the same bag to prevent cross-contamination.

F. Place the sample container(s) in a cooler lined with a large plastic garbage bag.

G. Pack the container(s) with ample amounts of packing material to prevent possible breakage and absorb liquid material released should breakage occur. This material should be place under the container(s) and between all containers for multiple container shipments to prevent the containers from touching each other or the bottom of the shipping container.

H. Place ice among the sample containers to maintain the samples at or below 4□C during transport.

I. Add any needed absorbent to fill all void spaces.

J. Seal the completed chain-of-custody form for the appropriate cooler in a resealable plastic bag and tape it to the inside of the top lid of the cooler. The sample custodian should retain the pink copy of the form and maintain it in a file of field documentation.

K. Securely close the outer shipping container with strapping tape around both ends. If there is a drain on the cooler, tape it shut.

L. Affix signed and dated custody seals to all closures on the shipping container to prevent tampering.

M Affix "This Side Up" arrows on two opposing sides of the cooler. No DOT placards are required.

Compliance with all applicable DOT and International Air Transport Association (IATA) shipping regulations is required.

4.0 COMMENTS

- To expedite the sampling and shipping process, it is recommended that preprinted sample labels, chain-of-custody forms, address labels, and overnight delivery forms be used.
- If using a refrigerator to store sample, monitor the temperature using a thermometer and be careful not to freeze water samples.

SOP HAFB-2
SAMPLING EQUIPMENT DECONTAMINATION

1.0 OBJECTIVE

Decontamination of boring equipment and sampling tools is performed as a QA measure and safety precaution. It helps prevent cross-contamination among samples and helps maintain a clean working environment for the safety of field personnel. The methodology for decontamination was prepared in accordance with the following documents:

EPA. 1991. *Environmental Compliance Branch, Standard Operating Procedures and Quality Assurance Manual* (SOPQAM), U.S. Environmental Protection Agency, Region IV, Environmental Services Division, Athens, Georgia.

NIOSH, OSHA, USCG, and EPA. 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.* Prepared by the National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), U.S. Coast Guard (USCG), and EPA. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, NIOSH report, October 1985. Washington, D.C.: U.S. Government Printing Office.

2.0 EQUIPMENT AND MATERIAL NEEDS

- Soap: Laboratory grade, non-phosphated - or equivalent;
- Tap water;
- Reagent-grade water;
- Pesticide-grade isopropanol;
- Cleaning brushes;

- Cleaning containers: plastic bucket and galvanized steel pans;
- Waste containers as outlined in SOP A-14; and
- Health and safety equipment as outlined in the SSHP.

3.0 METHODOLOGY

Small, reusable equipment, including sampling equipment, is mainly decontaminated by rinsing with liquids that include soap or detergent solutions, tap water, deionized water, or solvents. Following decontamination, if the equipment is not to be reused immediately, it will be stored, protected from recontamination by wrapping in aluminum foil, and appropriately rinsed before the next use.

3.1 PRE-SAMPLING DECONTAMINATION ACTIVITIES

A. Don the appropriate PPE, as specified in the SSHP and as required for the specific work area.

B. Assemble containers and equipment for decontamination, designing the decontamination station in such a manner as to prevent liquid from spilling onto the ground.

C. Decontaminate all new equipment or equipment not previously decontaminated before use.

D. If the protective wrapping on a piece of precleaned equipment has been torn, or if there is any question about its cleanliness, the equipment should be considered contaminated and undergo the full decontamination procedures before it is used.

3.2 DECONTAMINATING SAMPLING EQUIPMENT

A. Remove any solid particles from the equipment or material by brushing and rinsing with available potable water. This will remove gross contamination.

B. Wash equipment with a brush and a phosphate-free detergent solution.

C. Rinse equipment thoroughly with potable water.

D. Double rinse the equipment with reagent-grade water.

E. Allow equipment to air dry thoroughly. If there is not enough time to air dry completely, the equipment should be rinsed with copious amounts of reagent water. Equipment may then be reused immediately.

F. Unless the equipment is going to be used immediately, it must be wrapped in new aluminum foil, shiny side out, to keep it clean until needed. For large bulky equipment, new plastic sheeting can be substituted for the aluminum foil.

3.3 DECONTAMINATION OF LARGE EQUIPMENT

Drilling equipment (rigs, drill rods, augers, bits, etc.), DPT equipment, and other large pieces of field equipment, unable to be decontaminated using the method described above, must be high-pressure steam cleaned before and after each use.

Steam cleaning will be performed at an appropriate central decontamination area specified by the Base. The decontamination area must be capable of containing decontamination fluids and allow for managing of investigation-derived wastes (IDW) as specified in the appropriate SOP.

3.4 COMMENTS

- Any field equipment not used during a field activity must be decontaminated before its return to the equipment stock for reuse at another site. This requirement applies even if the aluminum foil on precleaned equipment is not torn. This requirement can be waived only if after initial decontamination, the equipment was sealed in plastic.

- At each phase of the decontamination process, decontamination fluids and rinsates should be collected and managed as outlined in the appropriate SOP.

- Isopropanol rinse should be omitted for any equipment such as plastic well-sounding tapes.

- Solvents should not be used on any type of non-Teflon plastic equipment that will contact an environmental sample or be introduced into a monitoring well.

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SOP B-3
STAKING, UTILITY CLEARANCE, AND PERMITTING

1.0 OBJECTIVE

To ensure the health and safety of field sampling personnel and prevent damage to underground utilities during soil sampling, precautions must be taken to properly locate hazards such as gas lines, high-voltage electrical lines, water mains, communication lines, sewer lines, and so forth.

Before any intrusive work (including hand-auger borings) can begin at Holloman Air Force Base (AFB), sampling locations at each site must be cleared and a proper digging permit must be obtained.

2.0 EQUIPMENT AND MATERIAL NEEDS

- Wooden stakes, lathes, hubs, surveyor flags, and/or spray paint;
- Small sledge-type hammer;
- Permanent marker;
- Site maps from Section 2; and
- Base Civil Engineering Clearance Request (Air Force Form #103).

3.0 METHODOLOGY

A) Begin the site clearance procure by locating and marking all soil boring locations at each site, using the following guidelines:

- If possible, procure ahead of time utility maps so that the preliminary positioning of sample locations will avoid underground obstructions.
- Visually scan each sample location to be sure that there are no obvious underground lines or obstructions.

- Pound the flag and the hub/stake firmly into the ground, making sure that it is clearly marked with the site number and the borehole number (DP-01). If the location is on a paved surface, it should be marked with spray paint.

B) To obtain all utility clearances, site tours must be completed with appropriate representatives of the Base utilities (electric, plumbing, and Army cable) and New Mexico One Call.

New Mexico One Call coordinates the location of on-Base utilities, including US West phone lines, Simmons' cable lines, and Standard Transport pipe fuel lines. They will provide you with a control number and submit locator requests for you. New Mexico One Call can be reached at (800) 321-2537.

- During the site tours, have the locators mark utility locations with flags or spray paint.

- If possible, obtain a blanket site clearance to cover possible additional boring locations at the site. (For certain utilities, this may not be possible. In which case, inquire about the procedure necessary to gain additional clearances).

- If obstructions exist or if a borehole must be moved to avoid utilities, it should be relocated to a position that satisfies the intent of the original location.

C) To obtain the actual digging permit, a Base Civil Engineering Clearance Request Forms (AF103) must be completed and signed by appropriate parties. (Note that the locators should also sign the form in the appropriate space, as well as initial the site figures.) This process is usually expedited through coordination with representative of Civil Engineering's Environmental Flight (CEV). Once a digging permit has been issued, it is valid for one month.

4.0 COMMENTS

- Proper preparation in the initial location and staking is critical for expediting the sampling process. If sampling locations are not properly marked and cleared, significant costs could be incurred through delays while waiting for drilling permits.

- NM One Call requires a 48-hour advance notice before drilling may proceed.

- Utility locators may require information about how long the job will last, the type of marker being used, and the location of the boreholes. Be prepared to provide the various utility locators and signatories on the drilling permit with multiple copies of site figures and location maps.

- When doing any intrusive work on the Base, the contractor must have a valid permit on hand.

SOP HAFB-4
DIRECT PUSH SAMPLING FOR SOIL AND GROUNDWATER

1.0 OBJECTIVE

Direct push technology (DPT) will be used to rapidly collect soil and water samples. This technique provides for collection of undisturbed samples and does not generate soil cuttings. This SOP discusses the DPT method only; for actual soil and groundwater sampling procedures. Please refer to the appropriate SOPs for soil and groundwater sampling.

2.0 EQUIPMENT AND MATERIAL NEEDS

The DPT operator will need a copy of the subcontractor work plan, waste containers and appropriate health and safety gear. The DPT subcontractor will provide all additional equipment and materials. The DPT subcontractor should be equipped with a rig capable of pushing 20 ft and collecting soil and groundwater samples from any interval within that depth. Equipment should include at minimum the following items:

- Hydraulic ram with hammer assembly;
- 1- to 1.5-inch diameter drill rods;
- Piston-type, split-spoon, or equivalent soil sampling device that allows for lithologic characterization and retrieval of at least 400 mL of sample volume;
- GeoProbe, Hydrocone, bailer, Teflon tubing and peristaltic pump, or equivalent water sampling device;
- Small diameter PVC riser and screen to make temporary wells if recovery is too slow;
- Decontamination equipment; and
- Health and safety equipment, as outlined in the SSHP.

3.0 METHODOLOGY

A) Verify that the subcontractor has the necessary drilling and sampling equipment, as well as proper decontamination supplies.

B) Confirm that sampling locations are staked and that the clearances from all on-Base and off-Base utilities have been obtained. Do not begin the sampling until proper digging permits have been obtained and all of the utilities have been marked.

C) Locate the sample location and position the DPT rig. If the sample point is on thick asphalt or concrete, the DPT subcontractor will use hammer-drill or equivalent to drill a hole through the pavement.

D) Verify that the sampling tip has been properly decontaminated.

E) For soil sampling, hydraulically advance the sampler to above the target sample interval, unlock the piston point, and advance the sampling device through the sampling interval:

- ☐ Pull the rods using the hydraulic apparatus and remove the sample insert or split spoon.
- ☐ Log the soil and collect the required samples as specified in the field sampling plan.

F) Continue sampling at additional depth intervals or abandon the borehole, as appropriate for the location.

G) If groundwater sampling is necessary, advance the sampler into the water table and collect a sample with the sampling device.

H) Collect and manage all wastes as specified in IDW SOP.

l) Abandon all boreholes and repair pavement before moving to a new site (see the SOP for abandonment).

4.0 COMMENTS

- If a buried object impedes the DPT sampler or if an insufficient sample volume is recovered, reposition the rig in a location to satisfy the intent of the original sample point and try again. Note this on the borehole logging form.

- If the total recovered sample volume is insufficient for both screening and laboratory analysis, a second hole will be pushed as close as possible to the original hole and an additional sample will be taken from the same depth interval. The two samples will be composited prior to sampling for chemical analysis.

- If a situation arises in which the groundwater recharge is too slow to allow sampling, a PVC well can be inserted temporarily for sampling at a later time.

SOP HAFB-5
SOIL SAMPLING FOR CHEMICAL ANALYSIS

1.0 OBJECTIVE

Soil samples will be collected for chemical analysis to enable determination of the nature and extent of contamination in soil. Groundwater samples will be collected from monitoring wells or from with inert tubing through the direct push sampling methods.

The following procedures were designed to ensure consistent and high quality data collection and are in accordance with EPA procedures for sample collection as detailed in the following document:

EPA. 1991. *Environmental Compliance Branch, Standard Operating Procedures and Quality Assurance Manual* (SOPQAM), U.S. Environmental Protection Agency, Region IV, Environmental Services Division, Athens, Georgia.

2.0 EQUIPMENT AND MATERIAL NEEDS

- Appropriate number and types of sample containers (see Table HAFB5-1);
- Precleaned stainless steel sampling spoons and knife;
- Sample coolers and ice;
- Appropriate field documentation forms and an indelible ink pen;
- Sampling equipment decontamination supplies;
- Waste containers;
- Health and safety equipment, as specified in the SSHP.

3.0 METHODOLOGY

A) Verify that the subcontractor has the necessary drilling and sampling equipment, as well as proper decontamination supplies.

B) Confirm that sampling locations are staked and that the clearances from all on-Base and off-Base utilities have been obtained. Do not begin the sampling until proper digging permits have been obtained and all of the utilities have been marked.

C) Locate the sample location and position the DPT rig. If the sample point is on thick asphalt or concrete, the DPT subcontractor will use hammer-drill or equivalent to drill a hole through the pavement.

D) Verify that the sampling tip has been properly decontaminated, as specified in decontamination SOP before beginning penetration.

E) For soil sampling, hydraulically advance the sampler to above the target sample interval, unlock the piston point, and advance the sampling device through the sampling interval:

- □ Pull the rods using the hydraulic apparatus and remove the sample insert or split spoon.
- ■ Log the soil and collect the required samples as specified in Field Sampling Plan (FSP).

F) Continue sampling at additional depth intervals or abandon the borehole, as appropriate for the location. To determine if sufficient depth has been covered, see the FSP section of this document.

G) If groundwater sampling is necessary, advance the sampler into the water table and collect a sample with the sampling device as specified in appropriate SOP.

H) Collect and manage all wastes as specified in the appropriate SOP.

I) Abandon all boreholes and repair pavement before moving to a new site as specified in appropriate SOP.

4.0 COMMENTS

- The supervising geologist should be prepared and have all the supplies available on site to conduct all planned sampling at each site.
- Container and preservation requirements for various analytical methods are detailed in Table HAFB5-1.

TABLE HAFB5-1
CONTAINER AND PRESERVATION REQUIREMENTS FOR SOIL SAMPLING

REFERENCE METHOD	PARAMETER	CONTAINER[1]	SAMPLE PRESERVATION[2]	MAXIMUM HOLDING TIME[3] EXTRACTION	ANAL
EPA 8015	TPH-gas/diesel/BTEX	1.4 oz wide mouth jar, G	Ice to 4°C	–	14d
EPA 418.1	TRPH	1x8 oz wide mouth jar, G	Ice to 4°C	–	14 d
EPA 8260	Volatile Organics	2x40 mL G, Septa vial	Ice to 4°C	–	14 d
EPA 8270	B/N/A	1x8 oz wide mouth jar, G	Ice to 4°C	7 d	40 d
TAL 6000/7010 series	Metals	1x8 oz wide mouth jar, G	Ice to 4°C	–	6 months
SW-846:9045	pH	1x2 oz wide moth jar, G	Not specified	–	ASAP
EPA 8080	PCBs/Pesticides	1x8 oz wide mouth jar, G	Ice to 4°C	7 d	40 d
Full suite (8240, 8270, 6000/7010)	TCLP	2x8 oz wide mouth jar, G	Ice to 4°C	–	14d

1 All containers must have Teflon-lined seals (Teflon-lined septa for all VOA vials). G= Glass, P = High-density polyethylene.
2 Container volume may vary slightly depending upon laboratory specific requirements.
3 When only one holding time is given, it implies total holding time from sampling until analysis.

SOP HAFB-6
PROCEDURE FOR FIELD SCREENING OF VOLATILE ORGANICS

1.0 OBJECTIVE

Soil samples can be screened in the field for relative concentrations of total volatile organic constituents (VOCs) rapidly and inexpensively. It is important to note, however, that the screening technique is relative and will not quantify the exact concentration of the particular constituents present in the sample matrix. The procedure is only used to determine the relative concentrations of VOCs between sets of soil samples. For example, if 10 soil samples are collected vertically from one soil boring, the screening technique can be used to determine which samples may have relatively higher concentrations of VOCs with respect to the other samples. Section 2.0 covers equipment required to perform the screening. Section 3.0 presents the steps required to perform the sampling.

2.0 EQUIPMENT AND MATERIAL

The following equipment is required for field VOC screening:

- A photoionization detector (PID) or a flame ionization detector (FID);
- Sample containers such as glass jars and aluminum foil or resealable plastic bags; and,
- Calibration gas for the FID or PID (Isobutylene for PIDs, methane for FIDs).

3.0 METHODOLOGY

The following steps are employed when screening soil samples for total concentrations of VOCs. The procedure assumes that a fraction of the soil sample has already been collected using the soil sample procedure SOPs.

A) Place a fraction of the soil sample collected in a glass jar and cover the jar mouth with aluminum foil or place the sample in a resealable plastic bag. Place the samples in a warm place or area of stable temperature such as a building or temperature controlled environment.

B) Allow all the samples to equilibrate to the temperature-controlled environment.

C) Turn the PID and FID on and calibrate the instrument using the appropriate calibration gas (i.e. methane for a FID and isobutylene for a PID) using the procedures specified by the manufacturer.

D) Insert the probe from the PID or FID into the headspace of the jar (i.e., through the aluminum foil lined lid or through the plastic bag and collect a sample of the air in the headspace of the jar.

E) Observe and record the headspace measurement as parts per million (ppm) in the field notebook or soil boring log. Note which type of instrument and the calibration gas that was used.

F) Repeat steps D and F until all the samples have been screened.

4.0 COMMENTS

- Obtaining a good sample for chemical analysis for VOCs is the first priority.
- Field screening the sample for VOCs using a PID or FID is second priority.
- Transcribing the lithologic descriptions and collecting geotechnical samples is the last priority.

SOP HAFB-7
LITHOLOGIC DESCRIPTION AND GEOTECHNICAL SAMPLING

1.0 OBJECTIVE

Lithologic logging will be performed to define the subsurface geology. All soils will be described using the Unified Soils Classification System (ASTM Designation D 2488-84: Standard Practice for Description and Identification of Soils [Visual-Manual Procedure]).

2.0 EQUIPMENT AND MATERIAL NEEDS

- ☐ Tape measure;
- ☐ Munsall soil color chart;
- ☐ Hand lens;
- ☐ Knife or spatula;
- ☐ Dropper with 10% HCl for calcium carbonate test;
- ☐ LaMotte soil texture kit or small vial;
- ☐ Water;
- ☐ Borehole log forms (Attached); and
- ☐ Health and safety equipment, as specified in the SSHP.

3.0 METHODOLOGY

A) Note penetration rates and comments in "remarks" section of logging form (e.g., "easy penetration", "hammering required", "2 ft in 3 minutes", etc.). If using a drop hammer, record blow counts.

B) Measure entire sample length and record recovery (as total footage recovered over the total length that sampler was pushed) to nearest tenth of a foot. Mark lithologic changes on logging form.

C) Separate a small, representative portion of each distinct soil to be identified.

D) Identify the color using the Munsall chart.

E) Identify the soil type using the field tests outlined in the ASTM guidance. All required tests considered appropriate for soil type should be performed (i.e. tests for fine-grained soils, such as plasticity, need not be performed on coarse-grained soil).

F) Record descriptions of the soil on the borehole log form. To facilitate the comparison of logs, all descriptions should use the following order and style:

- ☐ Soil type (*Silty SAND w/Clay*);
- ☐ Soil Color (*Moderate yellow brown (10YR5/4)*;
- ☐ Moisture content;
- ☐ Angularity and shape of particles (if a sand or gravel);
- ☐ Consistency;
- ☐ Cementation;
- ☐ Structure;
- ☐ Dry strength;
- ☐ Dilatancy;
- ☐ Toughness;
- ☐ Plasticity;
- ☐ Miscellaneous descriptors (roots, nodules, odors, texture percentages from the LaMotte kit, etc.);

- USCS Code (*SM*).

G) Note all visible contamination, PID/FID measurements, odor, or any observed evidence of contamination in the sample.

H) As necessary, identify the percentages of sand, silt, and clay in each sample using a LaMotte soil texture kit, or by settling using a small vial or bottle.

I) The sample should be placed in a soil jar or steel tube and sealed with as little air as possible (Table A8-1).

J) Label the contained for shipment to a lab for geotechnical grain size distribution (without the hydrocarbons portion of the test) (ASTM D421 and D422). Atterberg Limits (ASTM D4318), and moisture content (ASTM D2216).

4.0 COMMENTS

- Obtaining a good sample for chemical analysis is the first priority; collect chemical samples for volatile organic compounds (VOCs) before logging the soil core or taking geotechnical samples.

- Because visible contamination and field screening by FID/PID is used to define extent of contamination, it is essential that all observations concerning odor and staining and PID or FID readings are recorded on the logging form.

- Consistent logging is important for accurate characterization of site geology. Although the geologist may need to use his/her professional judgement to infer contacts and lithology, using the tests listed in the ASTM method will ensure consistent results.

TABLE B7-1
CONTAINER AND PRESERVATION
REQUIREMENTS FOR GEOTECHNICAL

Reference Method	Parameter	Minimum Volume	Container
ASTM D4318	Atterberg Limits	100 grams	4 oz glass jar[1]
ASTM D2216	Moisture content	50-100 grams	4 oz glass jar[1]
ASTM D421 & 422	Grain size	30-40 grams	2- to 4- oz glass jar[1]

[1] OK to combine these analyses into a larger container

SOP HAFB-8
GROUNDWATER SAMPLING FOR CHEMICAL ANALYSIS

1.0 OBJECTIVE

Water samples will be collected for chemical analysis to enable determination of the nature and extent of contamination in groundwater. Groundwater samples will be collected from monitoring wells or from with inert tubing through the direct push sampling methods.

The following procedures were designed to ensure consistent and high quality data collection and are in accordance with EPA procedures for sample collection as detailed in the following document:

EPA. 1991. *Environmental Compliance Branch, Standard Operating Procedures and Quality Assurance Manual* (SOPQAM), U.S. Environmental Protection Agency, Region IV, Environmental Services Division, Athens, Georgia.

2.0 EQUIPMENT AND MATERIAL NEEDS

- Appropriate number and types of sample containers (see Table HAFB8-1);
- Precleaned stainless steel sampling spoons and knife;
- Sample coolers and ice;
- Appropriate field documentation forms and an indelible ink pen;
- Sampling equipment decontamination supplies;
- Waste containers;
- Health and safety equipment, as specified in the SSHP.

3.0 METHODOLOGY

A) Ensure that all equipment is properly calibrated and operating by following the manuals provided by the equipment manufacturer. Record results of the equipment in the logbook.

B) Calculate the approximate volume of the inert tubing (Teflon) using the formula

$V = 3.1415 \times r^2 \times \text{Length} \times 7.48\ \text{gal/ft}^3$.

Or if the tubing is ¼-inch diameter, simply multiply the tubing length by 0.0102 gal/foot.

C) Attach the peristaltic pump to the tubing as indicted in the pump instructions.

D) Purge the tubing slowly at first to avoid entraining air in the tube. Purge the appropriate volume and store it in the appropriate waste container.

E) Fill sample bottles in the following order:

- Volatile organic compounds
- Semi-volatile organic compounds
- Metals
- Wet tests,

F) Place sample containers on Ice and handle as indicted in the appropriate SOP.

G) When sampling is complete, remove tubing from the DPT rods and dispose of all IDW as directed in the SOP.

H) Abandon the boring as directed in the appropriate SOP.

4.0 COMMENTS

- The supervising geologist should be prepared and have all the supplies available on site to conduct all planned sampling at each site.
- Container and preservation requirements for various analytical methods are detailed in Table HAFB5-1.

TABLE HAFB8-1
CONTAINER AND PRESERVATION REQUIREMENTS FOR GROUNDWATER SAMPLING

REFERENCE METHOD	PARAMETER	CONTAINER[1]	SAMPLE PRESERVATION[2]	MAXIMUM HOLDING TIME[3] EXTRACTION	ANAL
EPA 8015	TPH-gas/diesel/BTEX	500 ml brown glass bottle	Ice to 4°C	--	14d
EPA 8260	Volatile organic compounds	3x40 mL G, Septa vials	Ice to 4°C, pH <2 with HCl	--	14 d
EPA 8270	B/N/A	2 x 1 L brown glass	Ice to 4°C	7 d	40 d
TAL 6000/7010 series	Metals	500 ml plastic bottle	Ice to 4°C pH <2 with HNO3	--	6 months
SW-846:9045	pH	500 ml plastic	Ice to 4°C	--	24 hrs
EPA 8080	PCBs/Pesticides	2 x 1 L brown glass	Ice to 4°C	7 d	40 d
xxxx	Radionuclides	1 L plastic	Ice to 4°C	--	14d

1 All containers must have Teflon-lined seals (Teflon-lined septa for all VOA vials). Glass = brown glass, Plastic = High-density polyethylene.
2 Container volume may vary slightly depending upon laboratory specific requirements.
3 When only one holding time is given, it implies total holding time from sampling until analysis.

SOP HAFB-9

FIELD MANAGEMENT OF INVESTIGATION-DERIVED WASTE (IDW)

1.0 OBJECTIVE

To collect and manage IDW in accordance with state and federal regulations, this SOP provides easy-to-follow procedures for characterizing, handling, storing and disposing of IDW generated during the additional characterization program. IDW management techniques emphasize waste minimization.

2.0 EQUIPMENT AND MATERIAL NEEDS

- DOT-approved drums and containers;
- IDW "Analysis Pending" labels (Attached);
- "Hazardous Waste" labels and Non Hazardous labels (Attached);
- Indelible markers (i.e., Sharpie);
- Clear adhesive tape;
- Ratchet, socket, and crescent wrench for opening/closing drums;
- PPE;
- Plastic buckets for carrying purge water to drums;
- Absorbent pads or booms for cleaning up spills;
- Wooden pallets;
- Waste inventory form (Attached); and
- PID or FID.

3.0 METHODOLOGY

3.1 SOIL AND WATER IDW

A) Conduct sampling in accordance with the soil and groundwater sampling SOPs.

B) If soil is stained, place excess soil (and any excess water sample) in appropriately sized DOT-approved drums or cans. DO NOT PUT SOIL AND WATER IN SAME CONTAINER.

C) Place an adhesive label on the side of the container. Using an indelible marker, write the following information on the label

- The phrase "Analysis Pending"
- Accumulation start date
- Name of waste (e.g., soil from soil or well boring ID numbers)
- Name and phone number of Holloman AFB contact (CES/CEV)

D) When label is complete, cover it with a piece of clear adhesive tape.

E) If soil is not stained, conduct VOC screening with a PID or FID.

F) If no VOCs are detected in headspace analysis, spread excess soil and water (if any) around borehole.

G) If VOCs are detected in the soil, place excess soil and water (if any) in DOT-approved drums, and label the drum (or container) in accordance with step C) above. DO NOT PUT SOIL AND WATER IN SAME CONTAINER.

H) If the site is developed and will not accommodate the spreading of soils then soils containing TPH concentration less than 940 ppm will be spread at a site to be designated by the Base.

I) If soils are containerized move to IDW drum storage area.

J) Waste characterization will be conducted utilizing previously collected soil analytical results and additional characterization results. No soil generated during the POL remediation activities at the SWMUs was characterized as hazardous waste. If soils contain TPH in excess of 940 ppm, arrangements will be made for off-site disposal at a permitted petroleum-contaminated soil disposal facility. Decontamination solutions will either be spread on site or placed in the Base sanitary sewer system, following approval from the Base.

3.2 PPE AND DISPOSABLE SAMPLING EQUIPMENT WASTE

A) Remove excess solid and liquid waste from PPE and disposable sampling equipment.

B) Place all PPE and sampling equipment to be disposed of in sealed plastic trash bags.

C) Dispose of trash bags in a dumpster at the IDW staging area.

D) If a Base dumpster is not located near the IDW staging area, arrange for one that can be used during the course of the investigation.

SOP B-10
BOREHOLE ABANDONMENT AND SITE RESTORATION

1.0 OBJECTIVE

All boreholes must be sealed to prevent the spread of contaminants with depth and to eliminate direct pathways from the surface to the subsurface and groundwater. Surface materials such as asphalt and cement that have been drilled or pushed through must also be repaired to a satisfactory condition.

2.0 EQUIPMENT AND MATERIAL NEEDS

- Bentonite chips or granular bentonite and funnel;
- Cold-patch asphalt material and quick-set concrete;
- Ample amounts of water; and
- Health and safety equipment, as specified in the SSHP.

3.0 METHODOLOGY

In general, borehole abandonment will be completed by the DPT or HSA subcontractor under supervision of the rig geologist. The subcontractor will supply all necessary materials listed above. The contractor, however, may need small amounts of bentonite to seal hand-auger boreholes.

A) After a boring has been completed by **DPT technique**, leave the drive rods in place pending abandonment.

B) Add bentonite chips or granular bentonite slowly into the top of the drive rods using a funnel. As the rods are being slowly pulled from the borehole, add bentonite to complete the seal to the surface.

C) If the rods have been driven into groundwater, it will not be possible to seal the borehole through the rods. (The bentonite chips will stick to the inside of

the rods, clogging the end). In this case, carefully extract the rods and slowly add bentonite chips, being careful not to allow bridging.

D) Hydrate the seal using ample amounts of potable water.

E) If the borehole is through asphalt or concrete, leave the seal below the bottom of the pavement to allow for sufficient fill and patching material.

APPENDIX J

QUALITY ASSURANCE PROJECT PLAN

DRAFT
QUALITY ASSURANCE PROJECT PLAN ADDENDUM
SUPPLEMENTAL RCRA FACILITY INVESTIGATION
HOLLOMAN AIR FORCE BASE
ALAMOGORDO, NEW MEXICO

Air Force Center for Environmental Excellence
Brooks City-Base, Texas

July 2005

DRAFT
QUALITY ASSURANCE PROJECT PLAN ADDENDUM
SUPPLEMENTAL RCRA FACILITY INVESTIGATION
HOLLOMAN AIR FORCE BASE
ALAMOGORDO, NEW MEXICO

Prepared for

U.S. Air Force Center for Environmental Excellence
Brooks City-Base, Texas

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Prepared by

HydroGeoLogic, Inc.
1155 Herndon Parkway, Suite 900
Herndon, VA 20170

July 2005

REPORT DOCUMENTATION PAGE

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This Report presents the Preliminary Draft Supplemental RFI QAPP Addendum for LF-10, LF-19, LF-21, LF-22, LF-23, LF-29, DP-30/SD-33, and SS-39 at Holloman AFB, New Mexico. The QAPP presents information related to the field and analytical quality control requirements for additional investigation at the aforementioned Holloman AFB sites.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCEE	U.S. Air Force Center for Environmental Excellence
ASTM	American Society for Testing and Materials
Bhate	Bhate Environmental Associates, Inc.
°C	degrees Celsius
CCC	calibration check compound
CLP	Contract Laboratory Program
COC	chain-of-custody
COPC	contaminant of potential concern
DoD	Department of Defense
DQO	data quality objective
FSP	Field Sampling Plan
EPH	extractable petroleum hydrocarbons
HCl	hydrochloric acid
HGL	HydroGeoLogic, Inc.
HNO_3	nitric acid
MADEP	Massachusetts Department of Environmental Protection
MDL	method detection limit
mL	milliliter
MQL	method quantitation limit
NA	not applicable
$Na_2S_2O_3$	sodium thiosulfate
NELAP	National Environmental Laboratory Accreditation Program
NFA	no further action
NFG	National Functional Guidelines
OP	organophosphorus
PCB	polychlorinated biphenyl
PID	photoionization detector
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
QSM	Quality Systems Manual

r	correlation coefficient
%RSD	percent relative standard deviation
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAP	Sampling and Analysis Plan
SOP	standard operating procedure
SPCC	system performance check compound
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TPH	total petroleum hydrocarbons
TCLP	toxicity characteristic leaching procedure
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
VPH	volatile petroleum hydrocarbons

DRAFT
QUALITY ASSURRANCE PROJECT PLAN ADDENDUM
SUPPLEMENTAL RCRA FACILITY INVESTIGATION
HOLLOMAN AIR FORCE BASE
ALAMOGORDO, NEW MEXICO

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) Addendum is designed to provide specific guidance and quality assurance/quality control (QA/QC) requirements and evaluation criteria for the generation of environmental data of known quality for use in making site-specific decisions. HydroGeoLogic, Inc. (HGL) prepared this QAPP Addendum on behalf of Holloman Air Force Base (AFB) under AFCEE Contract No. FA1624-03-D-8602, Task Order No. 037. This QAPP Addendum is intended to provide project-specific guidance that supplements the guidance and requirements presented in the *Basewide Quality Assurance Project Plan* (Bhate Environmental Associates, Inc. [Bhate], 2003). The purpose of the Basewide QAPP is to provide a consistent overall quality framework under which a wide variety of environmental projects can be conducted with project-specific information contained in a QAPP Addendum. The Basewide QAPP was written in accordance with the requirements of comply with the U.S. Army Corps of Engineers (USACE) document EM-200-1-3, *Requirements for the Preparation of Sampling and Analysis Plans* (USACE, 2001) and the U.S Environmental Protection Agency (USEPA) document QA/R-5, *Requirements for Quality Assurance Project Plans* (USEPA, 2001).

Where applicable, this QAPP Addendum incorporates the requirements of Appendix 4-B of the *Resource Conservation and Recovery Act (RCRA) Hazardous Waste Facility Operating Permit* for Holloman AFB (USEPA Permit NM6572124422), issued in February 2004. Among the requirements of the Holloman AFB RCRA Permit is to employ the sampling strategy and procedures in accordance with the the most recent version of USEPA Region 4 Environmental Compliance Branch *Standard Operating Procedure and Quality Assurance Manual* (USEPA Region 4, 2001). This QAPP Addendum also incorporates the relevant requirements of the *Department of Defense (DoD) Quality Systems Manual for Environmental Laboratories*, Final Version 2 (QSM) (DoD Data Quality Workshop, 2002).

Note that the information presented in this QAPP Addendum is intended to supplement the Basewide QAPP, and the term "QAPP" used throughout this QAPP Addendum indicates both documents together unless otherwise specified. This QAPP Addendum, in conjunction with the RCRA Facility Investigation (RFI) Field Sampling Plan (FSP) presented as Appendix A of the project Work Plan, constitutes the RFI Sampling and Analysis Plan (SAP).

This QAPP is a dynamic document that will be updated as necessary to reflect current investigation and remediation activities at the sites. This QAPP establishes the basic QC methodology to be applied during site activities and also presents the task-specific information

necessary to conduct on-site investigation and sample analysis activities. If future phases of work require supplemental QC information, this information will be incorporated into an updated version of this QAPP Addendum.

1.1 BASE HISTORY

Refer to Section 1.1 of the Basewide QAPP and Work Plan.

1.2 BASE DESCRIPTION

Refer to Section 1.2 of the Basewide QAPP and Section 1.1 of the Work Plan.

1.3 SITE DESCRIPTION

This QAPP addendum supports the Supplemental RFI Work Plan for the following solid waste management units (SWMUs):

LF-10 / SWMUs 101 and 109	Old Main Base Landfill
LF-19 / SWMU 105	Golf Course Landfill
LF-21 / SWMU 116	West Area Landfill No. 2
LF-22 / SWMU 115	West Area Landfill No. 1
LF-23 / SWMU 108	MOBSS Landfill
LF-29 / SWMU 104	Former Army Landfill
DP-30/SD-33 / SWMU 113B	Grease Trap/Cooking Grease Disposal Pits
SS-39 / SWMUs 165/177/179/181	Missile Fuel Spill Area

Detailed site descriptions are provided in Section 2 of the Work Plan.

2.0 PROJECT OBJECTIVES

The primary objective of the Supplemental RFI activities that will be performed at the subject sites is to obtain technically valid and defensible environmental data that will meet or exceed the project-specific data quality objectives (DQOs) that are presented in Section 3. In order to meet this objective, project personnel, including subcontractors, must be familiar with the contents of this QAPP and other project planning documents, including the FSP and Work Plan. Laboratories performing analyses in support of project activities must follow all provisions of this QAPP unless an approved variance allows for an alternative approach. Project laboratories will be required to have current accreditation under the National Environmental Laboratory Accreditation Program (NELAP) and be experienced in performing analyses in support of USACE and U.S. Air Force Center for Environmental Excellence (AFCEE) projects.

The data that is generated by project activities will be used to support decisions and conclusions concerning site conditions, nature and extent of contamination, potential fate and transport of any contamination, and risk assessments. These conclusions will also be used to justify and plan future activities at the sites.

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3.0 DATA QUALITY OBJECTIVES AND QUALITY PROGRAM

DQOs were developed to optimize and describe the data collection objectives for investigation activities at the seven disposal sites that are the subject of this RFI. The DQO process, as described in *Guidance for the Data Quality Objectives Process* (USEPA, 2000), is subdivided into seven steps:

- State the problem
- Identify the decisions
- Identify inputs to the decisions
- Define study boundaries
- Develop decision rules
- Specify limits on decision errors
- Optimize study design.

Each of the above steps is discussed in detail in the following sections. Due to the nature of the problem to be studied, the statistical components of the USEPA guidance document have been reduced or eliminated.

3.1 PROBLEM STATEMENT

Currently, the subject sites included in this project cannot be accepted for no further action (NFA). Determining the contamination present at the sites, assessing the potential for on-going release of any site contamination, and assessing site impact on groundwater are among the tasks critical to achieving site closure. Thus, the current problem has three components:

1. Establish the extent of the landfill areas;
2. Fully define the nature and extent of contamination at each of the seven sites; and
3. Provide data critical to the final remedy selection at each site.

3.2 IDENTIFY THE DECISIONS

Decisions necessary to achieve the objectives of the investigation at each site are related to assessing current site conditions. On a site-specific basis, the objective of all site activities under this project is to answer the following questions:

1. Is remediation warranted at the site?
2. What remedy is appropriate?

In order to answer the principal questions, the following questions must be answered on a site-specific basis:

1. What is the extent of the waste materials disposed at the site?
2. What is the vertical and lateral extent of contamination at the site?

3.3 IDENTIFY INPUTS TO THE DECISIONS

An understanding of the waste, geologic, hydrologic, and lithologic characteristics of the study area is essential for interpreting the results of the chemical analysis data. While data from previous investigative activities at the site are available, additional geologic, lithologic, and hydrologic data will be obtained during field sampling. These data will support most site decisions listed above. Inputs to answering the questions above will consist of site observations and data generated from trenching, soil borings, soil gas sampling, geophysical surveys, monitoring well installation, and ground water sampling. Trenching and soil borings will be used for lithological and waste characterization, and will provide sample material for laboratory analysis.

The analytical chemistry data generated during site investigations are the most critical inputs to the site decisions listed above. Sample results from soil and groundwater sampling will be used in the formulation of site decisions. The analytes selected for each site are identified in the Work Plan. These analytes were selected based on the information available about the potential containments at each site. The analytical methods selected will be required to meet the sensitivity requirements presented in Section 5.

3.4 DEFINE STUDY BOUNDARIES

The contamination that is the primary focus of this project originated from activities at the former landfills/disposal pits. The lateral boundary of each study area includes the area of the individual sites and the area immediately adjacent to the sites. Disposal area boundaries will be established during the geophysical survey. SS-39 activities will focus on delineating the nature and extent of volatile organic compound (VOC) contamination in soil and groundwater.

3.5 DEVELOP DECISION RULES

There are three rules regarding the application of data in reaching decisions:

1. Only analytical data that have been reviewed or validated and identified as acceptable, in accordance with this QAPP, may be used to support a decision. *Rationale*: Data of unacceptable quality may have biases or more serious issues (false positive or false negative results) that could contribute to decision errors. Project completeness goals (see Section 6.4) have been developed in order to ensure that the overall data set will be of sufficient quality to support project decisions.

2. Whenever duplicate samples are collected, the average concentration found in the duplicate pair will be the value used in supporting a decision. *Rationale*: Using the average concentration to support a decision takes into account all sample data and variability.

3. When making calculations using contaminant of potential concern (COPC) concentrations, the concentration of non-detected analytes will be represented by one-half the analyte-specific method quantitation limit (MQL). *Rationale*: Using a concentration of 0 for non-detected analytes may lead to an underestimation of risk for those analytes that are actually present in the environment but at concentrations below the analyte-specific MQL. To prevent this underestimation of risk, the conservative approach is to assign a default value for all non-detected analytes. As the MQL is the lowest concentration that will be reported for non-detected analytes, half this value will be selected and assigned to non-detected results.

Specific decisions will be based on the following rules.

1. *What is the extent and nature of the waste materials disposed at the site?* The extent and nature of the waste materials present at each site will assist in determining whether the site has a potential to impact the subsurface soil and groundwater.

2. *What is the vertical and lateral extent of contamination at the site?* The extent of contamination at each site will be used to determine the impact of the site on the environment and to calculate risk to human and environmental receptors under a variety of selected scenarios. This information will also be used to provide the primary information source for determining the appropriate corrective action (including possible NFA) at each site.

3.6 SPECIFY LIMITS ON DECISION ERRORS

The statements below describe the null hypotheses for the RFI.

- Contaminant concentrations at the site pose an unacceptable risk to human health or the environment.
- The subject site is the source of contamination.

Decision errors may occur through two scenarios.

- A false acceptance decision error would be to conclude that the null hypothesis is true, when in fact, it is not. The consequences of this decision error would be to incur unnecessary expense to study, monitor, and remediate contamination that does not exist or does not pose a threat.

- The second type of decision error is a false rejection error. In that case, the error would be to conclude that the null hypothesis is false when, in fact, it is true. The consequences of this decision error would be to not study, monitor, or remediate the full extent of contamination. This scenario may pose a potential threat to human health or the environment.

Both types of errors are limited by the decision rules. Decisions are not based on a single data point, but rather on the entire body of data available. Consequently, a large number of data errors would have to occur across several locations to bias the decision towards a false acceptance or false rejection conclusion. The probability of simultaneous occurrences of error at a large number of measuring points and over an extended period is very low.

The requirement that decisions be based only on data that have been accepted through the data review and validation process also serves to limit the occurrence of decision errors.

3.7 OPTIMIZE THE STUDY DESIGN

Data from each phase of work at each site will be evaluated to determine whether changes in the sampling or analytical methodology are warranted. If it is decided that changes are warranted, the changes will be incorporated into this QAPP by addendum, as appropriate.

4.0 DATA CATEGORIES

Refer to Section 4.0 of the Basewide QAPP.

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5.0 QUALITY CONTROL OBJECTIVES

Refer to Section 5 of the Basewide QAPP. The project-specific DQOs are presented in Section 3 of this QAPP Addendum. The project investigative activities, required analyses, and associated level of data quality (screening or definitive) are presented in Table 5.1. The project method analyte lists and method sensitivity requirements are presented in Tables 5-1 and 5-2 of the Basewide QAPP.

Table 5.1
Project Data Requirements

Sampling Matrix	Parameters	Method	Field/ Lab	Intended Use	Quality Level
Groundwater Monitoring					
Atmospheric	Volatile organic vapors	PID	Field	Health and safety monitoring	Screening
Groundwater	VOCs (site-specific list)	SW8260B	Lab	Determine concentration of contaminants	Definitive
Groundwater	Perchlorate	SW8321A (modified)	Lab	Determine concentration of contaminants	Definitive
Groundwater	Water quality parameters[2]	Varies (real-time or on-site probe)	Field	1) Stabilization check; 2)Determine groundwater conditions	Screening
Soil Gas					
Atmospheric	Volatile organic vapors	PID	Field	Health and safety monitoring	Screening
Soil gas	VOCs	SW8260B (modified)	Field	Locate potential hot spots of subsurface contamination	Screening
	Methane	Real-time meter	Field	Locate potential hot spots of subsurface contamination	Screening
Subsurface Soil Sampling					
Atmospheric	Volatile organic vapors	PID	Field	1) Health and safety monitoring; 2) Screening soil cores for sample collection	Screening
Subsurface Soil	VOCs SVOCs OP Pesticides Herbicides PCBs TPH Metals/mercury	SW8260B SW8270B SW8141A SW8151A SW8082 MADEP VPH/EPH SW6010B/7471A	Lab	Determine concentration of contaminants	Definitive

Table 5.1 (continued)
Project Data Requirements

Sampling Matrix	Parameters	Method	Field/ Lab	Intended Use	Quality Level
Waste Characterization					
Waste (solid and liquid)	TCLP Extraction	SW1311	Lab	Generate a sample extract for analysis	NA
	Toxicity characteristic	40 CFR 261.24		Determine waste characteristics	Definitive[3]
	Ignitability characteristic	40 CFR 261.21			Screening
	Corrosivity characteristic	40 CFR 261.22			Screening
	Reactivity characteristic	40 CFR 261.23			Screening

[1] LTM will continue at the two listed sites in conjunction with the field activities performed in support of the Supplemental RFI.
[2] Water quality parameters include: temperature, pH, oxidation-reduction potential, conductance, dissolved oxygen, and turbidity.
[3] Waste analysis for the toxicity characteristic will be performed by definitive methods but will not undergo data validation.

PID = Photoionization detector
VOCs = Volatile organic compounds
SVOCs = Semivolatile organic compounds
OP = Organophosphorus
PCBs = Polychlorinated biphenyls
TPH = Total petroleum hydrocarbons
MADEP = Massachusetts Department of Environmental Protection
VPH = Volatile petroleum hydrocarbons
EPH = Extractable petroleum hydrocarbons
TCLP = Toxicity characteristic leaching procedure
CFR = Code of Federal Regulations

6.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPLETENESS, AND ACCURACY

Refer to Section 6.0 of the Basewide QAPP.

6.1 PRECISION

Refer to Section 6.1 of the Basewide QAPP. Precision criteria for definitive methods are not established in the Basewide QAPP and the laboratory's internally generated control limits are acceptable.

6.2 ACCURACY

Refer to Section 6.2 of the Basewide QAPP. Accuracy criteria for definitive methods used for this project are presented in Section D of Appendix C of the Basewide QAPP. In cases where the analytes listed in Tables 5-1 and 5-2 of the Basewide QAPP do not match those listed in Appendix C of the Basewide QAPP, the analytes listed in Tables 5-1 and 5-2 take precedence. For any analytes and methods that required for this project but are not included in Appendix C of the Basewide QAPP, the laboratory's internally generated control limits are acceptable.

6.3 REPRESENTATIVENESS

Refer to Section 6.3 of the Basewide QAPP. Representativeness of data is also evaluated by an examination of the results in the associated blanks. Concentrations of target analytes in these blanks can indicate that corresponding detections in environmental samples are artifacts of the sampling, shipping, storage, preparation, or analytical processes rather than representative of the concentrations at the site.

6.4 COMPLETENESS

Refer to Section 6.4 of the Basewide QAPP. Data completeness will be calculated on a per-site and per-matrix basis.

6.5 COMPARABILITY

Refer to Section 6.5 of the Basewide QAPP.

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7.0 DETECTION/QUANTITATION LIMITS AND CALIBRATION REQUIREMENTS

7.1 DETECTION AND QUANTITATION LIMITS

Refer to Section 7.1 of the Basewide QAPP.

7.1.1 Instrument Detection Limit

Refer to Section 7.1.1 of the Basewide QAPP.

7.1.2 Method Detection Limit

Refer to Section 7.1.2 of the Basewide QAPP.

7.1.3 Method Quantitation Limit

Refer to Section 7.1.3 of the Basewide QAPP. MQLs for definitive methods used to support this project will be set at the levels presented in Tables 5-1 and 5-2 of the Basewide QAPP.

7.1.4 Method Reporting Limit

Refer to Section 7.1.4 of the Basewide QAPP.

7.2 INSTRUMENT CALIBRATION FOR DEFINITIVE METHODOLOGIES

Refer to Section 7.2 of the Basewide QAPP. Analyte calibration data that do not meet method percent relative standard deviation (%RSD) requirements may be fitted to calibration curves with correlation coefficient (r) of at least 0.995.

Note that the initial and continuing calibrations for methods SW8260B (VOCs) and SW8270C (semivolatile organic compounds [SVOCs]) must contain all system performance check compounds (SPCCs) and calibration check compounds (CCCs) required by the analytical method even if the analysis is performed for an abbreviated analyte list that does not include these compounds as analytes of concern. If an abbreviated SVOCs analyte list does not include any acid fraction or base/neutral fraction analytes, the corresponding fraction-specific SPCCs and CCCs may be eliminated from the calibration data.

For the analysis of polychlorinated biphenyls (PCBs), the initial five-point calibration and second source calibration verification will, as a minimum, contain a mixture of Aroclor 1016 and 1260. Retention times will be set during the initial five-point calibration. The initial and daily calibration verifications will also be performed using the Aroclor 1016/1260 mixture. Single standards of each of the other five Aroclors are required to aid the analyst in pattern recognition. If an Aroclor 1016/1260 standard has been used to validate the linearity of the detector, single standards of the remaining five Aroclors may be used to determine the

response factor for each Aroclor. The concentrations of the individual Aroclor standards should be at or below the middle of the linear range of the detector. If an Aroclor other than 1016 or 1260 is detected (qualitatively identified above the method detection limit [MDL] based on peak pattern), report the result for that Aroclor, quantified in accordance with Sections 5 and 7 of Method 8082.

8.0 QUALITY CONTROL ELEMENTS

Refer to Section 8.0 of the Basewide QAPP. Project-specific MQLs for definitive methods are presented in Tables 5-1 and 5-2 of the Basewide QAPP. The precision and accuracy requirements associated with the method QC elements are discussed in Section 6 of this QAPP Addendum. QC elements that do not meet the acceptance criteria will trigger corrective action as required in the method-specific tables presented in Section B of Appendix C of the Basewide QAPP. Note that the QC elements, acceptance criteria, and corrective actions presented in Appendix C of the Basewide QAPP are project requirements and must be adhered to by the project laboratory; however, the qualification conventions presented in Appendix C of the Basewide QAPP are the required laboratory qualifications if corrective action is not performed or is not effective. The final qualification of the affected data points will be performed in accordance with the procedures and conventions presented in Section 14 of this QAPP Addendum.

8.1 LABORATORY CONTROL SAMPLE

Refer to Section 8.1 of the Basewide QAPP.

8.2 MATRIX SPIKE/MATRIX SPIKE DUPLICATES

Refer to Section 8.2 of the Basewide QAPP.

8.3 SURROGATES

Refer to Section 8.3 of the Basewide QAPP.

8.4 INTERNAL STANDARDS

Refer to Section 8.4 of the Basewide QAPP.

8.5 RETENTION TIME WINDOWS

Refer to Section 8.5 of the Basewide QAPP.

8.6 INTERFERENCE CHECK SAMPLE

Refer to Section 8.6 of the Basewide QAPP.

8.7 METHOD BLANK

Refer to Section 8.7 of the Basewide QAPP. Sample reanalysis is not required if an analyte is detected above the MQL in a method blank but is not detected in that sample.

8.8 SOURCE WATER BLANK

Refer to Section 8.8 of the Basewide QAPP.

8.9 EQUIPMENT BLANK

Refer to Section 8.9 of the Basewide QAPP.

8.10 TRIP BLANK

Refer to Section 8.10 of the Basewide QAPP.

8.11 FIELD DUPLICATES

Refer to Section 8.11 of the Basewide QAPP.

8.12 QUALITY ASSURANCE SAMPLE

Refer to Section 8.12 of the Basewide QAPP.

8.13 TEMPERATURE BLANK

Refer to Section 8.13 of the Basewide QAPP.

9.0 QUALITY CONTROL PROCEDURES

Refer to Section 9.0 of the Basewide QAPP.

9.1 HOLDING TIME EVALUATION

Refer to Section 9.1 of the Basewide QAPP.

9.2 CONFIRMATION OF IDENTIFICATION

Refer to Section 9.2 of the Basewide QAPP. If the laboratory standard operating procedures (SOPs) designate a primary detector or column, then the result from that column will be used as the definitive result for all detections (in accordance with Section 9.2 of the Basewide QAPP) unless a documented interference requires use of the secondary column to report the result. If the laboratory SOPs assign equal quantitative significance to both analytical columns/detectors, then the laboratory will report the higher of the two concentrations in accordance with Appendix C of the Basewide QAPP.

9.3 STANDARD MATERIALS

Refer to Section 9.3 of the Basewide QAPP.

9.4 SUPPLIES AND CONSUMABLES

Refer to Section 9.4 of the Basewide QAPP.

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10.0 FIELD SAMPLING PROCEDURES

Refer to Section 10.0 of the Basewide QAPP. Table 10.1 of this QAPP Addendum presents the analytical methods that may be performed in support of this project, along with container, preservation, and holding time requirements.

Table 10.1
Requirements for Containers, Preservation Techniques, Sample Volumes, and Holding Times

Name	Analytical Method	Container[a]	Preservation[b]	Minimum Sample Volume or Weight[c]	Maximum Holding Time
Oxidation-reduction potential	ASTM D1498	P, G	None required	N/A	Analyze immediately (field measurement)
Methane in soil gas	NA	NA	None required	NA	Analyze immediately (field measurement)
VOCs in soil gas	SW8260B (modified)	Hydrophobic cartridges	None required	2 cartridges	30 Days
Temperature	E170.1	P, G	None required	N/A	Analyze immediately (field measurement)
Turbidity	E180.1	P, G	4 °C	N/A	Analyze immediately (field measurement)
Dissolved oxygen	E360.1	G	None required	500 mL	Analyze immediately (field measurement)
Moisture (soil)	(SW-846)	G, T	4 °C	4 ounces	7 days
Reactivity	(SW-846)	P, G, T	4 °C	500 mL or 4 ounces	7 days
Ignitability	SW1020A (or SW1010)	G, T	4 °C	500 mL or 4 ounces	7 days
Corrosivity to steel	SW1110	G, T	4 °C	500 mL or 4 ounces	7 days
Toxicity characteristic leaching procedure (TCLP)	SW1311	G, T	4 °C	Sample size will depend on analyses to be performed after extraction; consult with laboratory to determine appropriate sample size prior to sampling	14 days to TCLP extraction and 14 days after extraction (VOCs); 14 days to TCLP extraction, 7 days to prep extraction and 40 days after extraction (SVOCs, pesticides, herbicides); 28 days to TCLP extraction and 28 days after extraction (mercury); 180 days to TCLP extraction and 180 days after extraction (metals)
Metals (except mercury)	SW6010B[e]	P, G, T	HNO_3 to pH<2, 4 °C	500 mL or 8 ounces	180 days (water and soil)

Table 10.1 (continued)
Requirements for Containers, Preservation Techniques, Sample Volumes, and Holding Times

Name	Analytical Method	Container[a]	Preservation[b]	Minimum Sample Volume or Weight[c]	Maximum Holding Time[d]
Mercury	SW7470A, SW7471A	P, G, T	HNO_3 to pH<2, 4 °C	500 mL or 8 ounces	28 days (water and soil)
Organochlorine pesticides	SW8081A	G, T	4 °C	1 liter or 8 ounces	7 days until extraction and 40 days after extraction (water); 14 days until extraction and 40 days after extraction (soil)
Polychlorinated biphenyls (PCBs)	SW8082	G, T	4 °C	1 liter or 8 ounces	7 days until extraction and 40 days after extraction (water); 14 days until extraction and 40 days after extraction (soil)
Organophosphorus pesticides	SW8141A	G, T	4 °C, pH 5-9	1 liter or 8 ounces	7 days until extraction and 40 days after extraction (water); 14 days until extraction and 40 days after extraction (soil)
Chlorinated herbicides	SW8151A or SW8321	G, T	4 °C	1 liter or 8 ounces	7 days until extraction and 40 days after extraction (water); 14 days until extraction and 40 days after extraction (soil)
Volatile organics (water)	SW8260B	G (Teflon™-lined septum)	4 °C; 0.008% $Na_2S_2O_3$; HCl to pH<2	2 x 40 mL	14 days; 7 days if unpreserved by acid
Volatile organics (soil)	SW8260B (collect by SW5035)	a) G (Teflon™-lined septum) b) G (Teflon™-lined septum) c) Syringe-type corer	a) 4 °C, $NaHSO_4$ to pH <2 b) 4 °C, methanol c) 4 °C	a) 2 x 5 gram b) 5 gram c) 3 x 5 gram Note: a 4 ounce sample must also be submitted for percent moisture determination	a) 14 days b) 14 days c) 2 days; 14 days if frozen to -10 °C within 2 days of collection
Semivolatile organics	SW8270C	G, T	4 °C, 0.008% $Na_2S_2O_3$	1 liter or 8 ounces	7 days until extraction and 40 days after extraction (water); 14 days until extraction and 40 days after extraction (soil)

Table 10.1 (continued)
Requirements for Containers, Preservation Techniques, Sample Volumes, and Holding Times

Name	Analytical Method	Container[a]	Preservation[b]	Minimum Sample Volume or Weight[d]	Maximum Holding Time
Perchlorate (water)	SW8321A (modified)[f]	P, G	4 °C	2 x 40 mL	28 days
Explosive residues	SW8330	P, G, T	4 °C	1 liter or 8 ounces	7 days until extraction and 40 days after extraction (water); 14 days until extraction and 40 days after extraction (soil)
Hydrogen ion (pH) in water	SW9040B	P, G	None required	N/A	Analyze immediately (field measurement
Hydrogen ion (pH) in soil	SW9045C	P, G	None required	N/A	7 days
Conductance	SW9050A	P, G	None required	N/A	Analyze immediately (field measurement)
Total volatile petroleum hydrocarbons (TVPH) in soil	MADEP VPH Method (May 2004)	a) G (Teflon™-lined septum) b) Syringe-type corer	a) 4 °C, methanol b) 4 °C	a) 2 x 15 gram b) 3 x 5 gram	a) 28 days b) 48 hours; 28 days if preserved by methanol within 48 hours of collection
Total extractable pertroleum hydrocarbons (TEPH)	MADEP EPH Method (May 2004)	G	HCl to pH<2, 4 °C	1 liter or 4 ounces	7 days until extraction and 40 days after extraction (water); 14 days until extraction and 40 days after extraction (soil)

[a] Polyethylene (P), glass (G) with Teflon™- lined cap (amber glass for water samples), unless otherwise noted; brass sleeves in the sample barrel, sometimes called California brass (T).

[b] No pH adjustment for soil.

[c] Preservation with 0.008 percent $Na_2S_2O_3$ or 0.6 g ascorbic acid is only required when residual chlorine is present in water samples.

[d] Samples for methods with compatible container and preservation requirements may be able to combined in a single container. HGL will coordinate with the laboratory prior to sampling to determine what combinations are possible that still meet minimum sample size requirements.

[e] Methods SW6020 or from the SW7000A series may be substituted on an analyte-specific basis to achieve the sensitivity requirements shown in Tables 5-1 and 5-2 of the Basewide QAPP.

[f] This is an ion chromatography/dual mass spectrometer method that has been selected to replace method E314.0 listed in the QAPP in order to address expected matrix interference (See Section 13.1)

ASTM	American Society for Testing and Materials	HNO_3	nitric acid
mL	milliter	HCl	hydrochloric acid
°C	degrees Celsius	$Na_2S_2O_3$	Sodium throsulfate
TCLP	toxicity characteristic leaching procedure		

10.1 GENERAL CONSIDERATIONS

Refer to Section 10.1 of the Basewide QAPP.

10.2 SAMPLE LOCATIONS

Refer to Section 10.2 of the Basewide QAPP.

10.3 DECONTAMINATION, CONTAINERIZATION, AND PRESERVATION

Refer to Section 10.3 of the Basewide QAPP.

10.4 SAMPLING PROCEDURES

Refer to Section 10.4 of the Basewide QAPP.

10.5 FIELD DOCUMENTATION

Refer to Section 10.5 of the Basewide QAPP.

10.5.1 Field Log Book

Refer to Section 10.5.1 of the Basewide QAPP.

10.6 DATA MANAGEMENT

Refer to Section 10.6 of the Basewide QAPP.

11.0 SAMPLE IDENTIFICATION AND CUSTODY

Refer to Section 11.0 (and subsections) of the Basewide QAPP. Equipment rinse blanks will be identified using the identification of the location sampled immediately prior to collection of the rinse blank plus the QC extension "-d" as described in Section 11.1.4 of the Basewide QAPP. Trip blanks will be identified using the identification of the first location listed on the associated chain of custody that has analysis for VOCs requested plus the QC extension "-c" as described in Section 11.1.4 of the Basewide QAPP.

Chain of custody (COC) forms provided by the laboratory or created by HGL will be used to document sample collection. These COC forms will contain information equivalent to the example COC form presented in Appendix D of the Basewide QAPP.

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12.0 CALIBRATION PROCEDURES

Refer to Section 12.0 of the Basewide QAPP.

12.1 LABORATORY INSTRUMENTS AND EQUIPMENT

Refer to Section 12.1 of the Basewide QAPP.

12.2 FIELD PROCEDURES

Refer to Section 12.2 of the Basewide QAPP.

12.2.1 Field Equipment Standards

Refer to Section 12.2.1 of the Basewide QAPP.

12.2.2 Field Equipment Calibration Procedures

Refer to Section 12.2.2 of the Basewide QAPP. If field meters from other manufacturers are used, they will be calibrated in accordance with the manufacturer's instructions. In cases where manufacturer's instructions conflict with the QAPP, the instructions from the manufacturer will take precedence over the QAPP requirements.

12.2.3 Field Equipment Calibration Frequency

Refer to Section 12.2.3 of the Basewide QAPP.

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13.0 ANALYTICAL METHODS AND PROCEDURES

Refer to Section 13.0 of the Basewide QAPP. The methods that will be used to analyze project samples are shown in Tables 5.1 and 10.1 of this QAPP Addendum.

13.1 DEFINITIVE DATA

Refer to Section 13.1 of the Basewide QAPP. Note that the data qualification conventions presented in Appendix C of the Basewide QAPP are guidance for laboratory data qualification. As the final qualifier for all data points will be determined by HGL or by a third-party data validator in accordance with Section 14, the application of these qualifiers by the laboratory is optional. The QC elements, acceptance criteria, and corrective actions presented in Appendix C of the Basewide QAPP are project requirements and must be adhered to by the project laboratory.

Perchlorate analysis will be performed by method SW8321A (modified), which replaces method E314.0 for perchlorate listed in the Basewide QAPP. Method SW8321A (modified) uses ion chromatography coupled with dual mass spectrometers in order to provide definitive identification of perchlorate ions in solution. This definitive identification is necessary because it is anticipated that the elevated dissolved solids concentrations in site groundwater could cause false positives or unacceptably elevated quantization limits if method E314.0 was used. Method SW8321A (modified) is not addressed in Appendix C of the basewide QAPP; the QC elements, acceptance criteria, corrective actions, and flagging conditions for method SW8321A (modified) are presented in Appendix A of this QAPP Addendum.

13.2 FIELD SCREENING

Refer to Section 13.2 and Table 13-3 of the Basewide QAPP.

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14.0 DATA REDUCTION, REVIEW, VERIFICATION, VALIDATION, REPORTING, AND RECORD MANAGEMENT

Refer to Section 14.0 of the Basewide QAPP.

14.1 DATA REVIEW, VALIDATION, AND REPORTING REQUIREMENTS FOR SCREENING DATA

Refer to Section 14.1 of the Basewide QAPP. Note that the information presented in the Basewide QAPP applies only to screening level data delivered by a laboratory. Screening level data that are generated by in-field measurements (e.g., water quality parameters, VOCs in air) will be documented in the field log books and the appropriate field documentation sheets.

14.2 DATA REVIEW, VALIDATION, AND REPORTING REQUIREMENTS FOR DEFINITIVE DATA

Definitive data review will be performed at a 100 percent sample frequency to determine the laboratory's compliance with the QC elements, acceptance criteria, and corrective actions presented in Section B of Appendix C of the Basewide QAPP. All data packages for definitive data will conform to the deliverable requirements of Section 14.2 of the Basewide QAPP.

14.2.1 Laboratory Turn-Around Time

Refer to Section 14.2.1 of the Basewide QAPP.

14.2.2 Laboratory Data Review

Refer to Section 14.2.2 of the Basewide QAPP.

14.2.3 Contractor Reduction, Validation, and Reporting

Definitive data will undergo a review by an HGL chemist or a subcontracted third-party validator. All definitive data will be required to undergo a review of the QC elements presented in Appendix C of the Basewide QAPP and meet the applicable acceptance criteria.

Data validation will be the equivalent of Level III data review and will be performed in accordance with the USEPA *National Functional Guidelines for Organic Data Review* (UESPA, 1999) and USEPA *National Functional Guidelines for Inorganic Data Review* (USEPA, 2004). Note that the National Functional Guidelines (NFG) are intended to be used in conjunction with analyses of aqueous and solid matrix samples performed in accordance with the USEPA Contract Laboratory Program (CLP) scope of work. The definitive methods selected for this project are from the USEPA Office of Solid Waste SW-846 series of methods. The SW-846 methods for VOCs, SVOCs, PCBs, and metals are performed using analytical principles similar to those applying to the corresponding CLP methods. Consequently, the QC evaluation criteria of the NFG are generally applicable to the evaluation of sample analyses by these methods. The other analytical methods used for this sampling event (organophosphorus

pesticides, herbicides, TPH, and perchlorate) do not have an associated CLP data validation protocol. With the exception of perchlorate, these methods are gas chromatography methods that are similar to the organochlorine pesticides method in the CLP scope of work. The relevant data review elements of the organochlorine pesticides NFG will be incorporated in the review of the results reported by these methods. Perchlorate data validation will incorporate the relevant data review elements of the NFG (as applicable to each QC element). In all cases, where this QAPP or the analytical methods specify different acceptance criteria than the NFG, the data will evaluated against the QAPP or method requirements. The final data qualifiers presented in Table 14.1 of this QAPP addendum will be applied to all project data as applicable. Note that the "J+" and "J-" qualifiers described in the Inorganic NFG will not be applied to project sample results in order to maintain consistency with the organic qualification conventions.

Table 14.1
Data Qualifiers

Qualifier	Description
<none>	The analyte was positively identified at the reported concentration.
J	The analyte was positively identified; the quantitation is an estimation.
R	The data are rejected due to deficiencies in the ability to analyze the sample and meet QC criteria.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
NJ	The analysis indicates the presence of an analyte that has been tentatively identified; the associated numerical value is an approximation.
U	The analyte was analyzed for, but not detected. The associated numerical value is the MRL. This qualifier is also applied to results that are considered to be artifacts based on contamination in associated blanks. In these cases, the numerical value is the higher of the reported analyte concentration or the MRL.
UJ	The analyte was analyzed for but not detected. The associated numerical value is the MRL, which is estimated due to deficiencies in the QC criteria. This qualifier is also applied to results that are considered to be artifacts based on contamination in associated blanks and are also affected by another QC issue. In these cases, the numerical value is the higher of the reported analyte concentration or the MRL.

14.3 ERPIMS DATA REPORTING

Refer to Section 14.3 of the Basewide QAPP.

14.4 RECORD MANAGEMENT

Refer to Section 14.4 of the Basewide QAPP.

15.0 PERFORMANCE AND SYSTEM AUDITS

Refer to Section 15.0 (and subsections) of the Basewide QAPP. HGL will perform field and laboratory audits at the discretion of the HGL Project Manager and as required.

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16.0 PREVENTATIVE MAINTENANCE

Refer to Section 16.0 (and subsections) of the Basewide QAPP. Manufacturer's instructions will be used to supplement the information presented in the Basewide QAPP.

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17.0 CORRECTIVE ACTIONS

Refer to Section 17.0 (and subsections) of the Basewide QAPP.

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18.0 QUALITY ASSURANCE REPORTS

Refer to Section 18.0 (and subsections) of the Basewide QAPP. Laboratory corrective action reports must be included in the analytical reports that contain data for the affected sample analyses.

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19.0 REPORTING REQUIREMENTS

Refer to Section 19.0 (and subsections) of the Basewide QAPP. HGL will report to the AFCEE Project Manager as required by HGL's scope of work.

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20.0 REFERENCES

Refer to Section 20.0 of the Basewide QAPP. The following references replace the previous editions of the associated USEPA references:

U.S. Environmental Protection Agency (USEPA), 2004. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review.

U.S. Environmental Protection Agency (USEPA), 2004. 2004 Edition of the Drinking Water Standards and Health Advisories.

The following references are added:

Department of Defense Data Quality Workshop, 2002. Quality Systems Manual for Environmental Laboratories, Final Version 2.

USEPA Region 4, 2001. Standard Operating Procedure and Quality Assurance Manual, Environmental Compliance Branch.

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APPENDIX A.1

QC REQUIREMENTS FOR PERCHLORATE ANALYSIS (MODIFIED METHOD SW8321A)

TABLE A.1
Summary of Calibration and QC Procedures for Perchlorate by Method SW8321A (Modified)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Demonstrate acceptable analyst ability	Prior to using any test method and at any time there is a significant change in instrument type, personnel, or test method (see Section C of Basewide QAPP Appendix C).	QC acceptance criteria established by laboratory SOP	Recalculate results; locate and fix problem, then rerun demonstration for those analytes that did not meet criteria (see Section C.1.f of Basewide QAPP Appendix C).	NA	This is a demonstration of analyst ability to generate acceptable accuracy and precision using four replicate analyses of a QC check sample (e.g., LCS or PT sample). No analysis shall be allowed by analyst until successful demonstration of capability is completed.
MDL study	At initial set-up and subsequently once per 12 month period; quarterly MDL verification checks	See 40 CFR 136B. MDL verification checks must produce a response at least 3 times greater than instrument noise level.	Run MDL verification check at higher level and raise MDL; or reconduct MDL study.	NA	Samples cannot be analyzed without a valid MDL
Tuning with polyethylene glycol (PEG) mass calibration solution	Prior to calibration and after preventative or corrective maintenance.	All required masses must be present[a]	Correct problem then repeat initial calibration	Flagging criteria are not appropriate.	Problem must be corrected. No analysis may be performed until mass calibration has passed.
Multipoint calibration (minimum 5 standards)	Initial calibration prior to analysis and periodically as required	option 1 linear – least squares regression r > 0.995 option 2 non-linear – COD ≥ 0.990 (6 points will be used for second order)	Correct problem then repeat initial calibration	Flagging criteria are not appropriate.	Problem must be corrected. No analysis may be performed until initial calibration has passed.
Second-source calibration verification	Once after each multipoint calibration	Value of second source within 80-120% of expected value (initial source)	Correct problem then repeat initial calibration	Flagging criteria are not appropriate.	Problem must be corrected. No analysis may be performed until initial calibration has passed.
Initial calibration verification	Prior to each analytical sequence	Instrument response within 70-130% of expected value	Correct problem then repeat initial calibration	Flagging criteria are not appropriate.	No analysis may be performed without verifying initial calibration.
Reporting limit verification (RLV) standard	Prior to each analytical sequence	Instrument response within 50-150% of expected value using a standard at or below the MQL	Correct problem then repeat initial calibration	Flagging criteria are not appropriate.	No analysis may be performed without verifying reporting limit.

TABLE A.1 (continued)
Summary of Calibration and QC Procedures for Perchlorate by Method SW8321A (Modified)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Continuing calibration verification	After every 10 samples and at the end of the analysis sequence	Instrument response within 70-130% of expected response, alternately using 0.5 μg/L and 1.0 μg/L standards	Correct problem then repeat initial calibration	Apply Q to all results for the specific analyte(s) in all samples since the last acceptable calibration verification	
Method blank	One per analytical batch	No analytes detected >1/2 RL	Correct problem, then see criteria in Box D-4. If required, reprepare and analyze method blank and all samples processed with the contaminated blank	Apply B to all results for the specific analyte(s) in all samples associated with the blank	
LCS	One LCS per analytical batch	Instrument response within 70-130% of expected response; if LCSD performed, RPD <30%	Correct problem then reprepare and reanalyze the LCS and all samples in the associated batch.	If corrective action fails, apply Q to all results for the specific analyte(s) in all samples in the associated batch	
MS/MSD	As required by the project-specific FSP	Instrument response within 50-150% of expected response; RPD < 40%	Examine the project-specific DQOs. Contact the client as to additional measures to be taken.	For the specific analyte(s) in all samples collected from the same site matrix as the parent, apply J if acceptance criteria are not met.	For matrix evaluation only.
Internal standards	Each sample, blank, and standard	Instrument response within 50-150% of expected response	Dilute sample and reanalyze.	If corrective action fails, apply J to all results for the specific analyte(s) in affected sample	
Ion abundances	Each sample, blank, and standard	Cl^{35}:Cl^{37} ion ratio of 1.5-4.6	NA	Apply Q to all results for the specific analyte(s) in affected sample	
Retention time	Each sample, blank, and standard	Within ±0.5 minutes of the RT in the initial calibration	Review chromatography. If identification is in doubt, additional analysis may be required, including dilutions or spike additions to confirm identification.	If identification cannot be confirmed, apply Q to all results for the specific analyte(s) in affected sample	
Results reported between MDL and RL	NA	NA	NA	Apply J to all results between MDL and RL	

[a] The 22 required masses (in amu) are: 89.06, 133.09, 177.11, 221.14, 239.15, 283.18, 327.20, 371.23, 415.25, 459.28, 503.31, 564.36, 608.39, 652.41, 696.44, 740.46, 784.49, 828.52, 872.54, 916.57, 960.60, and 1004.62.