LOCATIONS AND MONITORING WELL COMPLETION LOGS OF WELLS SURVEYED BY U.S. GEOLOGICAL SURVEY AT AIR FORCE PLANT 4 AND NAVAL AIR STATION, JOINT RESERVE BASE, CARSWELL FIELD, FORT WORTH AREA, TEXAS

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VERTICAL DATUM, ABBREVIATIONS, AND ACRONYMS

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Abbreviations:

ft, feet
in., inches
mR/hr, millirems per hour
ppm, parts per million

Acronyms:

AFP4, Air Force Plant 4
ASC, U.S. Air Force Aeronautical Systems Center, Environmental Management Directorate
GOCO, Government-Owned Contractor-Operator
LEL, lower explosive limit
NAD, North American Datum
NAS, Naval Air Station, Joint Reserve Base, Carswell Field
OVA, organic vapor analyzer
RAD, radiation
USCS, Unified Soil Classification Symbol
USEPA, U.S. Environmental Protection Agency
USGS, U.S. Geological Survey

Locations and Monitoring Well Completion Logs of Wells Surveyed by U.S. Geological Survey at Air Force Plant 4 and Naval Air Station, Joint Reserve Base, Carswell Field, Fort Worth Area, Texas

By M.D. Williams *and* E.L. Kuniansky

Abstract

Completion logs are presented for 16 monitoring wells installed by the U.S. Geological Survey at Air Force Plant 4 and Naval Air Station, Joint Reserve Base, Carswell Field, in the Fort Worth area, Texas. Natural gamma-ray logs are presented for selected monitoring wells. Also included are survey data for eight wells installed by Geo-Marine, Inc.

INTRODUCTION

Air Force Plant 4 (AFP4) in the Fort Worth area, Texas (fig. 1), is a Government-Owned Contractor-Operator (GOCO) facility for building aircraft. AFP4 has been in operation since World War II. Ground-water contamination of the surficial terrace alluvial aquifer has occurred at AFP4 and adjacent Naval Air Station, Joint Reserve Base, Carswell Field (NAS) (Geo-Marine, Inc., 1995; RUST Geotech, 1995). In August 1990, AFP4 was placed on the U.S. Environmental Protection Agency (USEPA) National Priorities List as a Superfund clean-up site. At the request of the U.S. Air Force Aeronautical Systems Center, Environmental Management Directorate (ASC), the U.S. Geological Survey (USGS) installed 16 monitoring wells at NAS and along Lake Worth adjacent to AFP4 (fig. 1). Additionally, the USGS completed surveying for eight wells installed at NAS (fig. 1) by Geo-Marine, Inc.

The purpose of this report is to document the locations of the 16 monitoring wells and to present well completion logs of all monitoring wells and natural gamma-ray logs of selected monitoring wells. Survey data for the wells installed by Geo-Marine, Inc., also are included. The data presented in this report were collected as part of the Remedial Investigations and the ground-water monitoring at AFP4 for the U.S. Air Force Installation Restoration Program.

MONITORING WELLS DRILLED BY U.S. GEOLOGICAL SURVEY

According to the Field Sampling, Analysis, and Testing Plan submitted by Bartolino (1993), several investigation sites were selected for drilling monitoring wells. For drilling purposes, these sites were identified with either a P (Paluxy aquifer) or T (terrace alluvial aquifer) followed by a sequence number. These numbers were used in the field for hole locations. Some holes subsequently were abandoned and plugged because they were unsuitable for well installation. The hole number should not be confused with the well number. The well numbers were assigned by J.R. Bartolino on the basis of the nomenclature of 1993, which ensured unique numbers for each well (drilling contractor, arbitrary sequence number, hydrologic unit). Ten wells were installed by the USGS at AFP4 and NAS. Additionally, one set of three nested wells (completed in the upper, middle, and lower zones of the Paluxy aquifer) was installed at the National Guard Armory, and a second set of three nested wells was installed along Lake Worth on public land (fig. 1). These nested wells were located to provide additional sampling points in the area of the domestic wells west of AFP4 (Kuniansky and others, 1996, fig. 2) as requested by the Remediation Program Manager for ASC, Fred Oelrich.

All shallow wells in the terrace alluvial aquifer were drilled using a hollow stem auger. The deeper wells in the middle and lower zones of the Paluxy aquifer were drilled using mud rotary. Wells drilled in the upper zone of the Paluxy were drilled using air rotary.

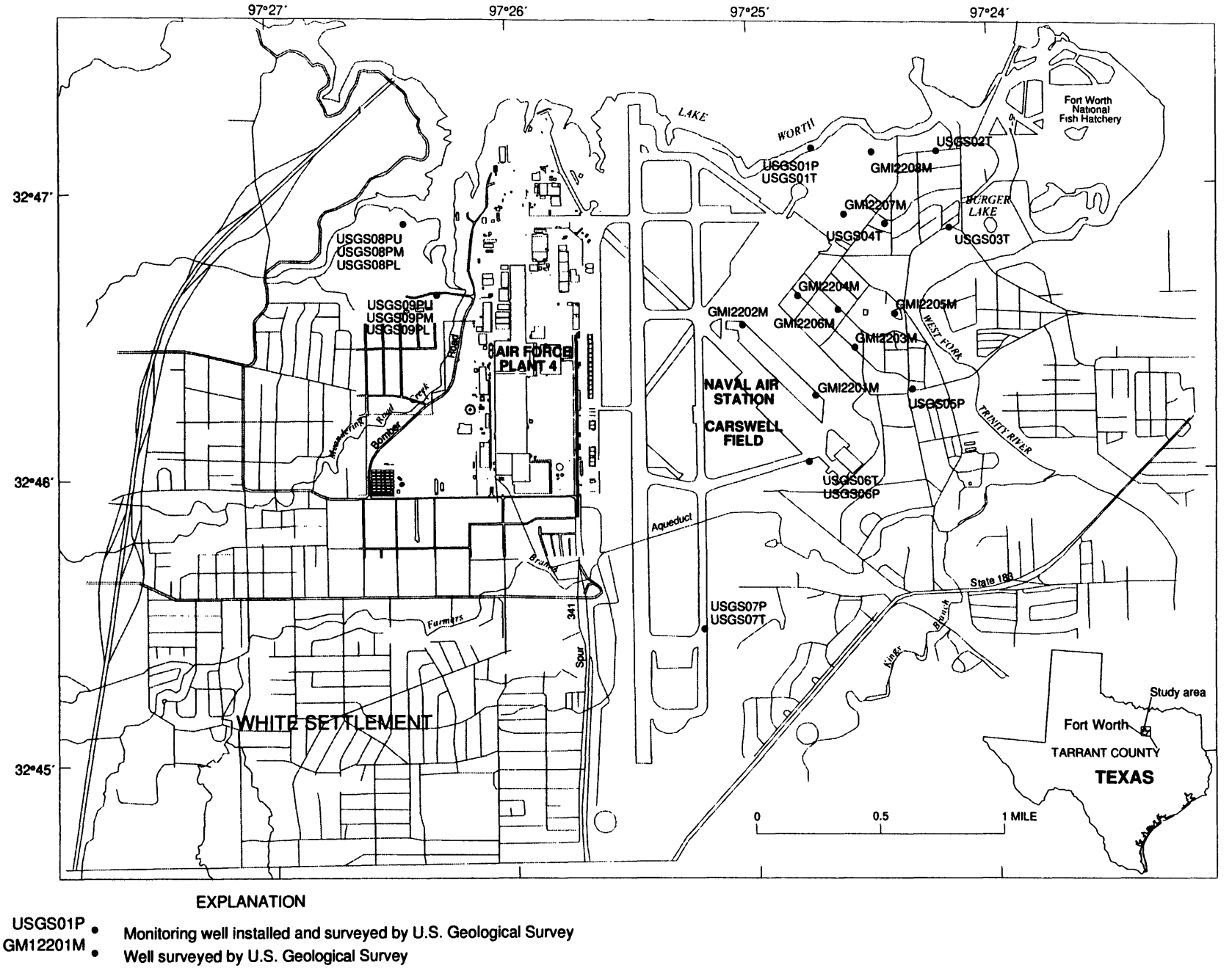

Figure 1. Location of study area and wells installed or surveyed by U.S. Geological Survey.

This information is provided on each well completion log (appendix A). Wells were logged by USGS geologists J.R. Bartolino, Eloise Kendy, and G.A. Rivers. Drilling began in November 1993 and was completed in January 1994.

Natural gamma-ray logs (appendix B) were collected in September 1995 at selected monitoring wells by E.L. Kuniansky (USGS) and Ruben Martinez (Parsons Engineering Sciences, Denver, Colo.)

WELLS SURVEYED BY U.S. GEOLOGICAL SURVEY

Surveying was done using a first order triangulation station for latitude and longitude according to horizontal datum—North American Datum (NAD) 1983—for the wells shown in figure 1. The first order station used is Carrico, latitude 32°52'46.47436"N, longitude 097°25'32.03501"W. Wells USGS07T and USGS01T were the control points on NAS that were brought in using two instruments. These locations approach first order quality with precision being estimated at 0.08 ppm (Trimble Navigation, 1991, chap. 4). The Northing and Easting are provided in state plane coordinates, Texas North Central zone 4202. Surveying was done by D.A. Brown and G.A. Rivers (USGS) during February 9–11, 1994 and March 30–April 6, 1994.

Vertical datums used were referenced to mean sea level (msl) with accuracy to 0.05 ft. The U.S. Department of Commerce, Coast and Geodetic Survey (1979) established six benchmarks at NAS for vertical control.

Survey data for wells installed by the USGS are listed in table 1. Well USGS08PL, one of a set of nested wells, shows an approximate location. The location shown for USGS08PL is the location for USGS08PM. Survey data for wells installed by Geo-Marine, Inc., are listed in table 2.

Table 1. Survey data for monitoring wells installed by U.S. Geological Survey

Well no.	Hole no.	Land surface (ft above msl)	Measuring point (ft above msl)	Northing	Easting	Latitude (NAD 1983)	Longitude (NAD 1983)
USGS01P	P3–C	604.97	604.83	6970387.260	2297664.372	32°47'07.786"N	097°25'43.898"W
USGS01T	P3–A	604.97	604.77	6970383.711	2297660.564	32°47'07.75127"N	097°25'43.94303"W
USGS02T	P4	604.57	604.23	6970326.565	2300333.854	32°47'06.915"N	097°25'12.635"W
USGS03T	T3	575.23	575.11	6968690.574	2300609.179	32°46'50.699"N	097°25'09.607"W
USGS04T	T7	605.12	604.88	6968758.854	2299177.893	32°46'51.520"N	097°25'26.364"W
USGS05P	P7	576.75	576.80	6965287.947	2299736.320	32°46'17.119"N	097°25'20.240"W
USGS06P	T4–C	606.57	606.47	6963771.976	2297557.639	32°46'02.339"N	097°25'45.938"W
USGS06T	T4–A	606.64	606.49	6963763.623	2297541.330	32°46'02.258"N	097°25'46.130"W
USGS07P	P6–C	632.48	632.06	6960150.744	2295249.942	32°45'26.739"N	097°26'13.394"W
USGS07T	P6–A	632.52	632.45	6960168.206	2295245.799	32°45'26.91220"N	097°26'13.44044"W
USGS08PL	P1–L	636.71	638.71	[1]6968817.36	[1]2288965.88	[1]32°46'53.120"N	[1]097°27'26.221"W
USGS08PM	P1–M	636.74	638.57	6968817.360	2288944.883	32°46'53.120"N	097°27'26.221"W
USGS08PU	P1–U	636.82	637.95	6968826.038	2288943.602	32°46'53.206"N	097°27'26.235"W
USGS09PL	P2–L	631.64	631.49	6967334.994	2289687.935	32°46'38.379"N	097°27'17.690"W
USGS09PM	P2–M	631.82	631.75	6967336.210	2289678.015	32°46'38.392"N	097°27'17.805"W
USGS09PU	P2–U	632.08	631.81	6967337.726	2289668.015	32°46'38.408"N	097°27'17.923"W

[1]Approximate location.

Table 2. Survey data for wells installed by Geo-Marine, Inc.

Well no.	Land surface (ft above msl)	Measuring point (ft above msl)	Northing	Easting	Latitude (NAD 1983)	Longitude (NAD 1983)
GMI2201M	606.86	606.62	6965108.032	2297688.404	32°46'15.546"N	097°25'44.247"W
GMI2202M	619.12	619.19	6966618.789	2296186.659	32°46'30.646"N	097°26'01.656"W
GMI2203M	604.91	607.99	6966205.754	2298538.600	32°46'26.322"N	097°25'34.158"W
GMI2204M	608.08	610.71	6967236.378	2297339.713	32°46'36.641"N	097°25'48.077"W
GMI2205M	581.45	584.36	6966926.165	2299431.281	32°46'33.360"N	097°25'23.616"W
GMI2206M	604.19	606.77	6966990.331	2298185.828	32°46'34.121"N	097°25'38.196"W
GMI2207M	602.86	605.63	6969004.570	2298321.745	32°46'54.038"N	097°25'36.363"W
GMI2208M	604.12	606.92	6970309.448	2298970.700	32°47'06.884"N	097°25'28.605"W

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APPENDIX A.
MONITORING WELL COMPLETION LOGS

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Mud rotary

Well no. USGS01P

Project: 464814700 NAS/AFP4 **Hole no.: P3–C**

Location: NW of Boy Scout Lodge

Northing:	6970387.260	Easting:	2297664.372
Ground elevation (ft msl):	604.97	Lat/Long:	3247080972544
Hole depth (ft):	114	How determined:	Survey
MP height (ft):	604.83	Well depth (ft):	114
Surface bit size (in.):	9 7/8 OD	MP description:	Top of 2-in. PVC riser
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):	N/A	Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok	6.0	0	to	22.5
Blank casing: PVC flush joint Tri-Lok		--	to	--
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	103.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	103.5	to	113.5
End cap: PVC flush joint Tri-Lok	2.0	113.5	to	114
Surface seal: concrete	0.0	3	to	22.5
Upper seal: cement grout w/4–8% bentonite	0.0	--	to	--
Lower seal: bentonite grout	0.0	3	to	85
Secondary sand pack: washed silica sand - 30–70	0.0	85	to	88
Primary sand pack: washed silica sand - 10–20	0.0	88	to	114

Date drilled: 12/10 to 12/12/93 Logged by: G.A. Rivers

MONITORING WELL COMPLETION LOG USGS01P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0		CL	Topsoil, dark brown (10 YR 3/3).	
1.0		CL	Clay, reddish brown (5 YR 4/4) sandy.	T II -0.2/-0.2
2.0				CGI 0/0
3.0				RAD 0/0
4.0				
5.0				
6.0				
7.0				T II -0/-0.8
8.0				CGI 0/0
9.0		SC	Sandstone, reddish brown (7 YR 3/4), poorly sorted, angular to subangular grains. Some slightly frosted and clear quartz grains, noncalcareous cement.	RAD 0/0
10.0				
11.0				
12.0				T II -1.0/-0.8
13.0				CGI 0/0
14.0				RAD 0/0
15.0				
16.0		SC	As above with increasing number of coarse grains.	
17.0		LST	Limestone, white (2.54), hard, interbedded w/gray-white (2.54 N 7/0).	T II -1.1/-.
18.0				CGI 0/0
19.0				RAD 0/0
20.0		CL	22 ft—Sandy clay.	
21.0				
22.0				T II -2.2/-2
23.0				CGI 0/0
24.0		LST	Limestone, gray to light gray (7.5 YR /N5-5 YR/7/1), hard, mottled, w/fossil fragments. Top of Walnut at 24 ft.	RAD 0/0
25.0				
26.0				
27.0				T II -2.2/-
28.0		LST	As above interbedded w/dark gray (7.5 YR N4/0), clay and dark gray (7.5 YR N5/0), dense limestone.	CGI 0/0
29.0				RAD 0/0
30.0				
31.0				T II -2.21 -
32.0				CGI 0/0
33.0				RAD 0/0
34.0				
35.0				

MONITORING WELL COMPLETION LOG USGS01P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
36.0				T II -2.3/-2
37.0				CGI 0/0
38.0				RAD 0/0
39.0				
40.0				
41.0				T II -2.2/-2
42.0				CGI 0/0
43.0				RAD 0/0
44.0				
45.0				
46.0				T II -2.3/-2
47.0		CL	Clay, light gray (5 YR 7/1), calcareous, w/very fine quartz sand grains. Top of Paluxy at 47 ft.	CGI 0/0 RAD 0/0
48.0				
49.0				
50.0				
51.0				
52.0				T II -2.3/-2
53.0				CGI 0/0
54.0				RAD 0/0
55.0				
56.0				T II -2.3/-1
57.0				CGI 0/0
58.0				RAD 0/0
59.0				
60.0				
61.0				T II -2.3/0
62.0				CGI 0/0
63.0				RAD 0/0
64.0				
65.0				
66.0		CL	Clay, greenish gray (5G 6/1), w/very fine sand grains.	T II -2.0/1
67.0				CGI 0/0
68.0				RAD 0/0
69.0				
70.0				
71.0				T II -1.9/1
72.0				CGI 0/0
73.0				RAD 0/0
74.0				

MONITORING WELL COMPLETION LOG USGS01P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
75.0				
76.0				
77.0				
78.0				
79.0				
80.0				
81.0				T II -2.2/1.0
82.0				CGI 0/0
83.0		CL	Clay, sandy, dark gray (5Y 4/1), w/pyrite nodules and coal.	RAD 0/0
84.0				
85.0				
86.0				T II -2.2/1.5
87.0				CGI 0/0
88.0				RAD 0/0
89.0				
90.0				
91.0				
92.0		CL	As above.	T II -2.2/1.0
93.0				CGI 0/0
94.0				RAD 0/0
95.0				
96.0				T II -2.3/1
97.0				CGI 0/0
98.0				RAD 0/0
99.0				
100.0				
101.0		SW	Sand, gray (5Y 6/1), well sorted, well rounded, fine grained, indurated to friable.	T II -2.3/1
102.0				CGI 0/0
103.0				RAD 0/0
104.0				
105.0				
106.0				T II -2.3/-1
107.0				CGI 0/0
108.0				RAD 0/0
109.0				
110.0				
111.0				
112.0				T II -2.3/1
113.0				CGI 0/0
114.0			TD at 114 ft. As above.	RAD 0/0
115.0				

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Hollow Stem Auger

Well no. USGS01T

Project: 464814700 NAS/AFP4

Hole no.: P3–A (Terrace)

Location: NW of Boy Scout Lodge

Northing:	6970383.711	Easting:	2297660.564
Ground elevation (ft msl):	604.97	Lat/Long:	3247080972544
Hole depth (ft):	20.5	How determined:	Survey
MP height (ft):	604.77	Well depth (ft):	20.5
Hollow-stem auger size (in.):	8 5/8 ID X 4 1/4 OD	MP description:	Inside edge of 2-in. casing
Auger head size (in.):	8 5/8 / 4 1/4 ID/OD	Slot size:	0.020
Coring bit size (in.):		Reaming bit size (in.):	8 5/8

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok		--	to	--
Blank casing: PVC flush joint Tri-Lok	10.0	--	to	--
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	10
Screen: PVC slotted Tri-Lok, 0.020	2.0	10	to	20
End cap: PVC flush joint Tri-Lok	2.0	20	to	20.5
Surface seal: concrete	0.0	0	to	2.5
Upper seal: cement grout w/4–8% bentonite	0.0	--	to	--
Lower seal: bentonite grout	0.0	2.5	to	6
Secondary sand pack: washed silica sand - 30–70	0.0	6	to	9
Primary sand pack: washed silica sand - 10–20	0.0	9	to	20.5

Date drilled: 11/10/93 at 0900 Logged by: J.R. Bartolino

MONITORING WELL COMPLETION LOG USGS01T				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0		CL	Silty clay - topsoil - poorly sorted, plastic dark yellowish brown (10 YR 3/4).	T II -1.0/-1.0 CGI 0/0 RAD 0/0
1.0				
2.0				
2.5		SC	Silty clay w/increasing amount clay w/<1% white, med-sand sized grains of caliche/limestone, plastic reddish brown (5 YR 4/4).	T II -0.7/-0.7 CGI 0/0 RAD 0/0
3.0				
4.0		SC	Same, sand size increasing to coarse sand, yellowish red (5 YR 4/6).	
5.0				T II -0.7/-0.6
6.0				CGI 0/0
7.0				RAD 0/0
8.0				
9.0				
10.0				T II 2.5/2.0
11.0		SC	Silty to clayey fine grained sand, poorly sorted, slightly plastic, saturated, <1% white med-sand sized grains, reddish brown (5 YR 5/4).	CGI 0/0 RAD 0/0
12.0				
13.0			Water?	
14.0		SC	Silty to clayey med sand, better sorted than above, more coarse sand - 1–2%, strong brown (7.5 YR 5/6).	
15.0				
16.0				T II 1.0/2.1
17.0				CGI 0/0
18.0				RAD 0/0
18.5		GM	Weathered limestone gravel, dry white (2.5 Y 8/2) angular to subrounded clasts of limestone and some shale—clasts to 2.0 in. Limestone, fine grained, gray (2.5 Y N 5); shale, mottled, dry, light yellowish brown (2.5 Y 6/4), Walnut 20.5?	
19.0				T II -0.4/3.0
20.0				CGI 0/0
20.5		TD		RAD 0/0

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Hollow Stem Auger

Well no. USGS02T

Project: 464814700 NAS/AFP4

Hole no.: P4

Location: End of visiting officers' quarters (VOQ)

Northing:	6970326.565	Easting:	2300333.854
Ground elevation (ft msl):	604.57	Lat/Long:	3247070972513
Hole depth (ft):	48	How determined:	Survey
MP height (ft):	604.23	Well depth (ft):	30.5
Hollow-stem auger size (in.):	4 1/4 ID X 8 5/8 OD	MP description:	Inside edge of casing
Auger head size (in.):	8 5/8 OD	Slot size:	0.020
Coring bit size (in.):	N/A	Reaming bit size (in.):	8 5/8

TYPE	DIA (In. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok		--	to	--
Blank casing: PVC flush joint Tri-Lok	10.0	--	to	--
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	15
Screen: PVC slotted Tri-Lok, 0.020	2.0	15	to	30
End cap: PVC flush joint Tri-Lok	2.0	30	to	30.5
Surface seal: concrete	0.0	0	to	2
Upper seal: Portland cement grout w/3–6% volclay bentonite	0.0	2	to	9
Lower seal: volclay bentonite grout	0.0	9	to	13
Secondary sand pack: washed silica sand - 30–70	0.0	13	to	4
Primary sand pack: washed silica sand - 10–20	0.0	14	to	31
Native sand backfill (cave-in)		31	to	48

Date drilled: 11/17 to 11/18/93

Logged by: Eloise Kendy

MONITORING WELL COMPLETION LOG USGS02T				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0		SC	Topsoil: sand, silty, clayey, fine-grained, well-sorted, damp, dark yellowish brown (10 YR 4/4).	T II -1.2/-0.8
1.0		SC	Sand, silty, clayey, fine-grained, well-sorted, damp, strong brown (7.5 YR 5/8).	CGI 0/0 RAD 0/0
2.0				
2.5		SC	Same texture, dark yellowish brown (10 YR 4/4).	
3.0		CL	Clay, silty-sandy, slightly plastic, getting drier w/depth, reddish brown (5 YR 4/4).	T II -1.1/-0.4
4.0				CGI 0/0
5.0				RAD 0/0
6.0				
7.0				
8.0		CL	Clay, sandy, silty, slightly plastic, yellowish red (5 YR 5/6).	
9.0				
10.0				T II -0.7/-0.5
11.0				CGI 0/0
12.0		SM	Sand, silty, clayey, fine-grained; rad (2.5 YR 4/6). 1% gravel, limestone or caliche, white, angular. One quartz grain at 13 ft, rounded, 0.5-in. diameter.	RAD 0/0
13.0				
14.0				
14.5		SW	Sand, fine to med-grained, subrounded, little coarse sand. Yellowish red (5 YR 5/8). Water at 15–16 ft.	T II -0.8/-0.3
15.0				CGI 0/0
16.0				RAD 0/0
17.0				
18.0				
19.0				
20.0		SP	Sand, fine to coarse-grained, subangular to subrounded, yellowish red (5 YR 5/8).	
20.5				
21.0				
22.0				
23.0		SP	Same, plus gravel 3–5%, angular, fossil fragments to 0.5-in. diameter saturated.	T II -0.9/-0.8
24.0			No returns. More drilling pressure, some drilling "chatter."	CGI 0/0
25.0		SP	Soft again. Sand, same as 23–24: poorly sorted, saturated.	RAD 0/0
26.0				
27.0				
28.0		SP	Sand, fine to med-grained, reddish yellow (7.5 YR 6/6) w/3–5% white fossil fragments including 0.5 in. *Gryphaea*. Little silt.	T II -0.4/-0.2

MONITORING WELL COMPLETION LOG USGS02T				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
29.0				CGI 0/0
30.0				RAD 0/0
31.0				
32.0				
33.0				
34.0				
35.0				
36.0				
37.0			More drilling pressure but some returns.	T II -0.8/-0.3
38.0				CGI 0/0
39.0				RAD 0/0
40.0				
41.0				
42.0				
43.0		SP	Sand, fine to med-grained, strong brown (7.5 YR 5/8); 5% fossil fragments to 0.5-in. diameter, light gray; occasional clay lenses; little sandstone gravel, rounded, light gray (7.5 YR N7/).	
44.0				T II -05/0
				CGI 0/0
				RAD 0/0
45.0			Increased drilling pressure. Probably weathered limestone. Top Walnut.	
46.0				T II -0.5/-0.3
47.0				CGI 0/0
48.0			Hard drilling. Probably Walnut Fm. cuttings on bottom auger include sand as above and gravel, limestone and coquina to 2.75-in. diameter, angular to subrounded, brownish yellow (10 YR 6/8) to light gray (10 YR 7/2). Dry. Bivalves, including oyster fossil, in coquina. TD. In Walnut at TD.	RAD 0/0
49.0				
50.0				
51.0				
52.0				

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Hollow Stem Auger

Well no. USGS03T

Project: 464814700 NAS/AFP4 **Hole no.: T3**

Location: On Stratofortress Ct., across from Berger Ln.

Northing:	6968690.574	Easting:	2300609.179
Ground elevation (ft msl):	575.23	Lat/Long:	3246510972510
Hole depth (ft):	48	How determined:	Survey
MP height (ft):	575.11	Well depth (ft):	8.5
Hollow-stem auger size (in.):	4 1/4 ID X 8 5/8 OD	MP description:	Inside edge of casing
Auger head size (in.):	8 5/8 / 4 1/4 ID/OD	Slot size:	0.020
Coring bit size (in.):	N/A	Reaming bit size (in.):	8 5/8

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok		--	to	--
Blank casing: PVC flush joint Tri-Lok	10.0	--	to	--
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	5.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	5.5	to	8.0
End cap: PVC flush joint Tri-Lok	2.0	8.0	to	8.5
Surface seal: concrete	0.0	0	to	2
Upper seal: cement grout w/4–8% bentonite	0.0	2	to	3
Lower seal: volclay bentonite grout	0.0	3	to	3.5
Secondary sand pack: washed silica sand - 30–70	0.0	3.5	to	4.5
Primary sand pack: washed silica sand - 10–20	0.0	4.5	to	8.5

Date drilled: 11/09/93 at 1100 Logged by: J.R. Bartolino

MONITORING WELL COMPLETION LOG USGS03T				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0	Concrete	GC	Poorly sorted clayey silt w/gravel and other fill material, nails, etc.	T II -1/8.0
1.0				CGI 0/0
2.0			Gravel to 1.5 in., light yellowish brown (10 YR 6/4), plastic.	RAD 0/0
3.0	Volclay grouttop			
4.0	3.5 top of 30/70	SC	Clayey silt, no gravel, water at ~3.5 ft, dark yellowish brown (10 YR 4/4), plastic.	
5.0	4.5 top of 10/20			T II 1/13 CGI 0/0
6.0	5.5 top of scrn			RAD 0/0
7.0				
8.0	8.0 btm of scrn		Auger refusal, limestone, light gray clay on bit (10 YR 7/2) to 8.5 ft, dry.	

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Hollow Stem Auger

Well no. USGS04T

Project: 464814700 NAS/AFP4 **Hole no.: T7**

Location: NW corner of Second & Boyos Ln.

Northing:	6968758.854	Easting:	2299177.893
Ground elevation (ft msl):	605.12	Lat/Long:	3246520972526
Hole depth (ft):	26.5	How determined:	Survey
MP height (ft):	604.88	Well depth (ft):	26
Hollow-stem auger size (in.):	4 1/4 ID X 8 5/8 OD	MP description:	Inside edge of casing
Auger head size (in.):	8 5/8 / 4 1/4 ID/OD	Slot size:	0.020
Coring bit size (in.):	N/A	Reaming bit size (in.):	8 5/8

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok		--	to	--
Blank casing: PVC flush joint Tri-Lok	10.0	N/A	to	N/A
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	15.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	15.5	to	25.5
End cap: PVC flush joint Tri-Lok	2.0	25.5	to	26
Surface seal: concrete	0.0	0	to	1
Upper seal: cement grout w/4-8% bentonite	0.0	1	to	8
Lower seal: volclay bentonite grout	0.0	8	to	11.5
Secondary sand pack: washed silica sand - 30–70	0.0	11.5	to	13
Primary sand pack: washed silica sand - 10–20	0.0	13	to	26.5

Date drilled: 11/09 to 11/10/93 at 1400 Logged by: J.R. Bartolino

MONITORING WELL COMPLETION LOG USGS04T				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0	Top of concrete	SC	Clayey to sandy silt, poorly sorted, <1% sand sized grains, reddish brown (5 YR 5/4), plastic.	T II 2/1.7
1.0	Top of cement			CGI 0/0
2.0	Bentonite grout			RAD 0/0
3.0				
3.5		SC	Clayey to sandy silt, poorly sorted, white med-sand sized grains (caliche, limestone?) and coarse sand to fine gravel <1%, yellowish red (5 YR 4/6), plastic.	
4.0				
5.0				T II 3/6.6
6.0				CGI 0/0
7.0				RAD 0/0
8.0	Top of volclay		Limestone, light gray clay on bit (10 YR 7/2) to 8.5 ft.	
9.0				
10.0				T II 0/25.3
11.0				CGI 0/0
11.5	Top of 30/70 sand			RAD 0/0
12.0				
13.0	Top of 10/20 sand			
14.0				
15.0		SC	Clayey silt w/2% sand and gravel.	T II 0/9.3
16.0	Top of scrn 15.5		As above, yellowish brown (10 YR 5/6), plastic.	CGI 0/0 RAD 0/0
17.0				
18.0				
19.0				
20.0				
21.0		GC	Gravel layer, poorly sorted subrounded gravel to 1 1/4 in., calcareous.	T II .9/0/8 CGI 0/0
22.0				RAD 0/0
23.0				
24.0				
25.0				T II 1.4/1.0
26	Bottom of screen 25.5			CGI 0/0 RAD 0/0
26.5	End cap, 10/20 sand	LST	Auger refusal, dry, marly limestone, light gray (10 YR 6/1).	

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Mud rotary

Well no. USGS05P

Project: 464814700 NAS/AFP4 **Hole no.: P7**

Location: Near Shoppette at Carswell AFB, Texas

Northing:	6965287.947	Easting:	2299736.320
Ground elevation (ft msl):	576.75	Lat/Long:	3246170972520
Hole depth (ft):	90	How determined:	Survey
MP height (ft):	576.80	Well depth (ft):	90
Surface bit size (in.):	9 7/8 OD	MP description:	Top of 2-in. riser
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):	N/A	Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok			to	
Blank casing: PVC flush joint Tri-Lok	6.0	0.5	to	22
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	79.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	79.5	to	89.5
End cap: PVC flush joint Tri-Lok	2.0	89.5	to	90
Surface seal: Pakmix concrete	0.0	0	to	3
Upper seal: Portland cement grout w/4–8% bentonite	0.0	.5	to	22
Lower seal: Volclay grout	0.0	.5	to	65
Secondary sand pack: washed silica sand - 30–70	0.0	65	to	71
Primary sand pack: washed silica sand - 10–20	0.0	71	to	90

Date drilled: 01/05 to 01/06/94 Logged by: G.A. Rivers

MONITORING WELL COMPLETION LOG USGS05P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0				
1.0		CL	Topsoil, dark brown (7 YR 3/3), clayey.	T II -0.6/-0.3
2.0				CGI 0/0
3.0		CL	Clay, dark brown (7 YR 3/3), sandy.	RAD 0/0
4.0				
5.0		LST	Limestone, light brown (7 YR 6/3), mottled, indurated, 1% vuggy porosity, contains microgastropods. (Possibly Goodland remnant ? E.L. Kuniansky 3–2–95)	
6.0				T II -0.6/-0.3
7.0				CGI 0/0
8.0				RAD 0/0
9.0				
10.0		CL	Clay, pinkish gray (7 YR 7/2), calcareous w/very fine quartz grains.	
11.0				
12.0				T II -0.7/-0.5
13.0		SM	Sand, clear quartz, med-fine grain, subangular to angular w/15% rose quartz and chert (5 YR 3/6) grains.	CGI 0/0 RAD 0/0
14.0				
15.0				
16.0				
17.0				T II -0.9/-0.8
18.0				CGI 0/0
19.0				RAD 0/0
20.0				
21.0		LST	Limestone, gray (2.5 YR N6/0) to dark gray (2.5 YR N4/0), hard w/fossil fragments.	
22.0			- TOP OF WALNUT at 20 ft 9 in. -	T II -1.0/-0.7
23.0				CGI 0/0
24.0				RAD 0/0
25.0		LST	Limestone, light gray to gray (2.5 YR N7/0 to 2.54 N5/0), lithographic, w/1% euhedral and subeuhedral calcite crystals. Interbedded w/clay lenses, 3–5 in. thick, gray (10 YR 5/1), sandy, calcareous.	
26.0				
27.0				T II -1.1/-0.9
28.0				CGI 0/0
29.0				RAD 0/0
30.0				

MONITORING WELL COMPLETION LOG USGS05P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
31.0				
32.0				T II -1.3/-0.8
33.0				CGI 0/0
34.0				RAD 0/0
35.0				
36.0		LST	Limestone, light gray to light brownish gray (10 YR 7/1 to 10 YR 6/2), w/2% black (10 YR 2/1) inclusions, hard.	T II -1.3/-2
37.0				CGI 0/0
38.0				RAD 0/0
39.0				
40.0		CL	Clay, pinkish gray (5 YR 6/2), w/very fine quartz sand grains.	
41.0			- TOP OF PALUXY at 40 ft -	
42.0				T II -1.5/-1.3
43.0				CGI 0/0
44.0				RAD 0/0
45.0				
46.0		CL	Clay, sandy, gray (10 YR 6/1), noncalcareous, very fine sand grains.	T II -1.6/-1.4
47.0				CGI 0/0
48.0				RAD 0/0
49.0				
50.0				
51.0		CL	As above, interbedded w/sandstone, white (10 YR 8/1), very fine to fine grained subangular to subrounded, indurated, calcareous cement.	T II -1.7/-1.4
52.0				CGI 0/0
53.0				RAD 0/0
54.0				
55.0				
56.0				
57.0		SS	Sandstone, pinkish gray (7 YR 6/2), fine grained, soft, w/large euhedral pyrite crystals (cubes).	T II -1.7/-1
58.0				CGI 0/0
59.0				RAD 0/0
60.0				
61.0		SS	As above, with 20–30% coal.	
62.0				T II -1.6/-1.3
63.0				CGI 0/0
64.0				RAD 0/0
65.0			Very poor returns 65–70 ft.	
66.0				

MONITORING WELL COMPLETION LOG USGS05P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
67.0				T II -1.5/-1
68.0				CGI 0/0
69.0				RAD 0/0
70.0		SS	Sandstone, light gray (7 YR N6/0), fine grained, well sorted, subrounded, very well cemented w/calcareous cement.	
71.0				
72.0				T II -1.0/-1.0
73.0				CGI 0/0
74.0				RAD 0/0
75.0			As above, but very fine grained.	
76.0				
77.0				T II 1.3/0.7
78.0				CGI 0/0
79.0				RAD 0/0
80.0		SC	Sand, light gray (7 YR N6/0), fine grained, clayey.	
81.0				
82.0				T II 0.9/0.8
83.0		SW	Sand, white (7 YR N8/0), very fine grained "sugar sand."	CGI 0/0
84.0				RAD 0/0
85.0				
86.0				
87.0				T II 0.8/0.7
88.0				CGI 0/0
89.0				RAD 0/0
90.0			TD at 90 ft	

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Mud rotary

Well no. USGS06P

Project: 464814700 NAS/AFP4 **Hole no.: T4–C**

Location: NW of Bldg. 1024, near the taxiway at Carswell AFB

Northing:	6963771.976	Easting:	2297557.639
Ground elevation (ft msl):	606.57	Lat/Long:	3246020972546
Hole depth (ft):	73.3	How determined:	Survey
MP height (ft):	606.47	Well depth (ft):	73.3
Surface bit size (in.):	9 7/8 OD	MP description:	Inside edge of casing
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):	N/A	Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok	6.0	0	to	24.3
Blank casing: PVC flush joint Tri-Lok	6.0	--	to	--
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	62.8
Screen: PVC slotted Tri-Lok, 0.020	2.0	62.8	to	72.8
End cap: PVC flush joint Tri-Lok	2.0	72.8	to	73.3
Surface seal: Pakmix concrete	0.0	0	to	3
Upper seal: Portland cement grout w/4–8% bentonite	0.0	--	to	--
Lower seal: volclay grout	0.0	3	to	50
Secondary sand pack: washed silica sand - 30–70	0.0	50	to	54
Primary sand pack: washed silica sand - 10–20	0.0	54	to	73.3

Date drilled: 12/13 to 12/16/93 Logged by: G.A. Rivers

MONITORING WELL COMPLETION LOG USGS05P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0		OL	Topsoil, very dark brown (10 YR 2/2), clayey and sandy.	
1.0				T II -0.4/-0.1
2.0		CL	Clay, strong brown (7.5 YR 5/8), w/very fine quartz grains, calcareous.	CGI 0/0 RAD 0/0
3.0				
4.0				
5.0				
6.0				
7.0			As above, w/2% fine quartz sand grains.	T II -0.3/0
8.0				CGI 0/0
9.0				RAD 0/0
10.0				
11.0				
12.0		CL	Clay, strong brown (7.5 YR 5/8), w/50% quartz sand grains (fine) and red (10 YR 4/8) sand grains; grains are subangular to rounded, some frosted.	T II -0.8/-0.1 CGI 0/0
13.0				RAD 0/0
14.0				
15.0				
16.0				
17.0		SP	Sandstone, coarse, poorly sorted, subangular to subrounded grains, contains grains of agate, chert, clear and rose quartz.	T II -0.7/-0.5 CGI 0/0
18.0				RAD 0/0
19.0				
20.0				
21.0			As above, w/few fine gravel grains.	
22.0				TI -0.7/-0.3
23.0				CGI 0/0
24.0			Top of Walnut at 24.3 ft -Limestone, mottled light gray (7.5 YR 7./0) to dark gray (7.5 YR N 4/0), dense, fossils.	RAD 0/0
25.0				
26.0				
27.0				T II 1.4/1.7
28.0				CGI 0/0
29.0				RAD 0/0
30.0			As above, well indurated, w/crystalline calcite inclusions.	
31.0				
32.0				
33.0				
34.0				
35.0				

MONITORING WELL COMPLETION LOG USGS06P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
36.0			Marl, very dark gray (7.5 YR N 3/0), calcareous; and shale, black (7.5 YR N 2/0), fissile, w/very fine pyrite grains.	T II 1.6/1.6
37.0				CGI 0/0
38.0				RAD 0/0
39.0				
40.0				
41.0				
42.0			Limestone, gray (7.5 YR N 7/0-N6/0), mottled, dense, w/microfossils, some fossils pyritized.	
43.0				
44.0				
45.0				
46.0			T. Paluxy? Sandstone, gray (7.5 YR N 6/0) very fine grained, well indurated to very soft, well sorted, pyrite nodules.	T II 1.3/1.7
47.0				CGI 0/0
48.0				RAD 0/0
49.0				
50.0				
51.0				
52.0			Marl, dark gray (7.5 YR N 4/0), slightly calcareous, w/15% very fine quartz sand grains.	T II 1.5/1.5
53.0				CGI 0/0
54.0				RAD 0/0
55.0				
56.0			Clayey sand, gray (7.5 YR N 5/0), very well sorted, very fine quartz sand grains.	T II 0.8/0.8
57.0				CGI 0/0
58.0				RAD 0/0
59.0				
60.0			As above, w/increase in grain size to fine and 1–5%. Pieces of coal and pyrite.	
61.0				
62.0				T II -0.2/0.2
63.0				CGI 0/0
64.0				RAD 0/0
65.0			Very poor return: Few very friable pieces of clean, moderately well sorted fine grained quartz sandstone.	
66.0				
67.0				T II -0.4/0
68.0				CGI 0/0
69.0				RAD 0/0

MONITORING WELL COMPLETION LOG USGS06P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
70.0			As above, w/coal and pyrite.	
71.0				
72.0				
73.0			TD 73.3 ft.	
74.0				
75.0				

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Hollow Stem Auger

Well no. USGS06T

Project: 464814700 NAS/AFP4 **Hole no.: T4–A**

Location: East side of taxiway

Northing:	6963763.623	Easting:	2297541.330
Ground elevation (ft msl):	606.64	Lat/Long:	3246020972546
Hole depth (ft):	21.5	How determined:	Survey
MP height (ft):	606.49	Well depth (ft):	22.5
Hollow-stem auger size (in.):	8 5/8 ID x 4 1/4 OD	MP description:	Inside edge of casing
Auger head size (in.):	8 5/8 / 4 1/4 ID/OD	Slot size:	0.020
Coring bit size (in.):	N/A	Reaming bit size (in.):	8 5/8

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok		N/A	to	N/A
Blank casing: PVC flush joint Tri-Lok	10.0	--	to	--
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	12
Screen: PVC slotted Tri-Lok, 0.020	2.0	12	to	22
End cap: PVC flush joint Tri-Lok	2.0	22	to	22.5
Surface seal: concrete	0.0	0	to	2.5
Upper seal: cement grout w/4–8% bentonite	0.0	N/A	to	N/A
Lower seal: bentonite grout	0.0	2.5	to	8
Secondary sand pack: washed silica sand - 30–70	0.0	8	to	11
Primary sand pack: washed silica sand - 10–20	0.0	11	to	22.5

Date drilled: 11/13/93 at 1215 Logged by: J.R. Bartolino

MONITORING WELL COMPLETION LOG USGS06T				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0		SC	Silty clay topsoil w/coarse sand, <1%, subrounded white limestone/caliche, very plastic, dark grayish brown (10 YR 4/2).	T II 0.1/0.5
1.0				CGI 0/0
2.0				RAD 0/0
2.5		SC	Same w/gravel-sized limestone/caliche as above to 0.75 in., gravel and sand 1–2%, grains subrounded to subangular, dark yellowish brown (10 YR 4/6) generally coarser, poorly sorted.	
3.0				
4.0				
5.0				T II 0.4/0.4
6.0				CGI 0/0
7.0				RAD 0/0
8.0		GS	Coarser, less clay. 1–2% sand-sized limestone/caliche grains, gravel ~5%, *Gryphaea* shells.	
9.0				
10.0				T II 0.2/0.8
11.0				CGI 0/0
12.0				RAD 0/0
13.0				
14.0			Water?	
15.0				T II 0.2/0.7
16.0		SW	Well sorted fine sand/silt, wet, semiclastic, yellowish brown (10 YR 8/2).	CGI 0/0
17.0				RAD 0/0
18.0				
19.0				
20.0				
21.0		LST	Weathered limestone, dry, white (10 YR 8/2).	T II 1.0/0.7
21.5		TD		CGI 0/0
				RAD 0/0
			Static WL at 17.9 ft.	

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Mud rotary

Well no. USGS07P

Project: 464814700 NAS/AFP4 **Hole no.: P6–C**

Location: East edge of taxiway east of main runway

Northing:	6960150.744	Easting:	2295249.942
Ground elevation (ft msl):	632.48	Lat/Long:	3245270972613
Hole depth (ft):	140	How determined:	Survey
MP height (ft):	632.06	Well depth (ft):	140
Surface bit size (in.):	9 7/8 OD	MP description:	Top of 2-in PVC riser
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):	N/A	Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok			to	
Blank casing: PVC flush joint Tri-Lok (surface)	6.0	0	to	17.5
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	117
Screen: PVC slotted Tri-Lok, 0.020	2.0	117	to	139.5
End cap: PVC flush joint Tri-Lok	2.0	139.5	to	140
Surface seal: Pakmix concrete	0.0	0	to	3
Upper seal: cement grout w/4–8% bentonite	0.0		to	N/A
Lower seal: volclay grout	0.0	3	to	102
Secondary sand pack: washed silica sand - 30–70	0.0	102	to	108
Primary sand pack: washed silica sand - 10–20	0.0	108	to	140

Date drilled: 12/16 to 12/18/93 Logged by: G.A. Rivers

MONITORING WELL COMPLETION LOG USGS07P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0				
1.0		CL	Clay, brownish yellow (10 YR 6/6), calcareous, w/very fine to coarse subangular to well-rounded quartz sand grains.	T II -0.2/0
2.0				CGI 0/0
3.0				RAD 0/0
4.0				
5.0				
6.0				
7.0		SP	Sand, brownish yellow to pale yellow brown (10 YR 6/6 to 10 YR 8/3), calcareous cement, poorly sorted, w/subangular to angular quartz and multicolored chert and agate grams.	T II 0.1/0.3
				CGI 0/0
8.0				RAD 0/0
9.0				
10.0				
11.0				
12.0				T II 0.6/0.9
13.0				CGI 0/0
14.0				RAD 0/0
15.0				
16.0				
17.0				
17.5		LST	Stop drilling and set surface casing at 17.5 ft—limestone, pale yellow brown (10 YR 7/3), dense—top of Walnut?	T II 0.7/0.8
18.0				CGI 0/0
19.0		CL	Clay, very dark gray (2.5 YN3), sandy, slightly calcareous, interbedded w/shale, dark gray, very friable, calcareous and clay, dark gray (2.5 YN4) w/pyrite.	RAD 0/0
20.0				
21.0				
22.0				T II 0.7/0.8
23.0				CGI 0/0
24.0				RAD 0/0
25.0				
26.0				T II 0.7/0.8
27.0				CGI 0/0
28.0				RAD 0/0
29.0				
30.0				
31.0				T II -0.6/-.
32.0				CGI 0/0

MONITORING WELL COMPLETION LOG USGS07P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
33.0				RAD 0/0
34.0				
35.0		CL	As above, w/limestone, pale yellow (2.5Y7/3), dense.	
36.0				
37.0				T II -0.6/-.
38.0				CGI 0/0
39.0				RAD 0/0
40.0			Marl, gray to dark gray (2.5YN6 to 2.5YN4), calcareous, w/pyrite.	
41.0				
42.0				
43.0				T II
44.0				CGI 0/0
45.0			TOP OF PALUXY	RAD 0/0
46.0		LST	Limestone, mottled, light brownish gray to very dark grayish brown (2.5Y 6/2 to 2.5Y 3/2), fossiliferous, w/pyrite and massive crystalline calcite.	
47.0				T II -1.4/-.
48.0				CGI 0/0
49.0				RAD 0/0
50.0				
51.0		LST	Limestone, dark gray (2.5YN4) w/microfossil fragments interbedded w/marl, gray to dark gray (2.54 N 6 to 2.54 N 4), calcareous, w/pyrite.	
52.0				TI -0.8/-0.9
53.0				CGI 0/0
54.0				RAD 0/0
55.0				
56.0				
57.0				T II -1.2/-1.0
58.0				CGI 0/0
59.0				RAD 0/0
60.0				
61.0				
62.0				
63.0				T II -1.5/-1.5
64.0				CGI 0/0
65.0		CL	Clay, calcareous, gray (7.5 R N/5), sandy, interbedded w/sandy clay, light gray (10 YR 7/1). Sand grains well rounded, well sorted, very fine.	RAD 0/0
66.0				T II -1.3/-.
67.0				CGI 0/0
68.0				RAD 0/0

MONITORING WELL COMPLETION LOG USGS07P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
69.0			Top Paluxy?	
70.0				
71.0				
72.0				T II -1.2/-.
73.0				CGI 0/0
74.0				RAD 0/0
75.0		SW	Sand, clayey, pinkish gray (5 YR 6/2), very fine grained, well rounded, well sorted.	
75.0				
76.0				
77.0				
78.0				T II -1.3/-.
79.0				CGI 0/0
80.0		CL	Clay, sandy, gray (7.5 R N/5), calcareous interbedded w/sand, clayey, dark gray (5 YR 4/1), very fine grained, well sorted, well rounded.	RAD 0/0
81.0				
82.0				T II -1.7/-1.5
83.0				CGI 0/0
84.0				RAD 0/0
85.0				
86.0				
87.0				T II -1.9/-1
88.0				CGI 0/0
89.0				RAD 0/0
90.0				
91.0			As above.	
92.0				T II -2/0/-1.
93.0				CGI 0/0
94.0				RAD 0/0
95.0				
96.0				
97.0				T II -2.0/-1
98.0				CGI 0/0
99.0				RAD 0/0
100.0				
101.0				
102.0				T II -2.0/-1
103.0				CGI 0/0
104.0				RAD 0/0
105.0				
106.0				

MONITORING WELL COMPLETION LOG USGS07P				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
107.0				T II -2.0/-1
108.0				CGI 0/0
109.0				RAD 0/0
110.0				
111.0				
112.0				T II -2.0/-1.8
113.0				CGI 0/0
114.0				RAD 0/0
115.0				
116.0				
117.0				T II -2.0/-1
118.0				CGI 0/0
119.0				RAD 0/0
120.0				
121.0				
122.0				T II -1.8/-1
123.0				RAD 0/0
124.0				CGI 0/0
125.0				
126.0				
127.0				T II -1.8/-1
128.0				CGI 0/0
129.0				RAD 0/0
130.0				
131.0			As above.	
132.0				T II -1.7/-1
133.0				CGI 0/0
134.0				RAD 0/0
135.0				
136.0				
137.0				T II -1.8/-1
138.0				CGI 0/0
139.0				RAD 0/0
140.0			TD at 140 ft.	

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Hollow Stem Auger

Well no. USGS07T

Project: 464814700 NAS/AFP4

Hole no.: P6–A (Terrace)

Location: East side of taxiway, near old radar range

Northing:	6960168.206	Easting:	2295245.799
Ground elevation (ft msl):	632.52	Lat/Long:	3245270972613
Hole depth (ft):	16.5	How determined:	Survey
MP height (ft):	632.45	Well depth (ft):	16.5
Hollow-stem auger size (in.):	8 5/8 ID X 4 1/4 OD	MP description:	Inside edge of 2-in. casing
Auger head size (in.):	8 5/8 / 4 1/4 ID/OD	Slot size:	0.020
Coring bit size (in.):	N/A	Reaming bit size (in.):	8 5/8

TYPE	DIA (In. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok		N/A	to	N/A
Blank casing: PVC flush joint Tri-Lok	10.0	N/A	to	N/A
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	11
Screen: PVC slotted Tri-Lok, 0.020	2.0	11	to	16
End cap: PVC flush joint Tri-Lok	2.0	16	to	16.5
Surface seal: concrete	0.0	0	to	3
Upper seal: cement grout w/4–8% bentonite	0.0	--	to	--
Lower seal: bentonite grout	0.0	3	to	6.5
Secondary sand pack: washed silica sand - 30–70	0.0	6.5	to	9.5
Primary sand pack: washed silica sand - 10–20	0.0	9.5	to	16.5

Date drilled: 11/12/93 at 1010

Logged by: J.R. Bartolino

MONITORING WELL COMPLETION LOG USGS07T				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0		SC	Sandy to silty clay, poorly sorted, <1% white subangular caliche/limestone, grains to coarse sand size, damp, very plastic, reddish yellow (7.5 YR 6/6).	T II 0/0.1
1.0				CGI 0/0
2.0				RAD 0/0
2.5				
3.0				
4.0				
5.0				T II 0/0.2
6.0				CGI 0/0
7.0				RAD 0/0
8.0				
9.0				
10.0				T II 0/0
11.0				CGI 0/0
12.0				RAD 0/0
13.0				
14.0				
14.5			Water?	
15.0		GC	Weathered limestone gravel, subangular to angular, gravel to 1 1/4 in. white (2.5 YR 2/2).	T II -0.1/0.1 CGI 0/0
16.0		LST	Competent limestone white (2.5 YR 2/2), dry.	RAD 0/0
16.5				

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Mud rotary

Well no. USGS08PL

Project: 464814700 NAS/AFP4 **Hole no.: P1–L**

Location: On Shoreview Dr. across intersection with Killdeer

Northing:	6968817.36	Easting:	2288965.88
Ground elevation (ft msl):	636.71	Lat/Long:	3246530972726
Hole depth (ft):	203	How determined:	Survey and P1–4
MP height (ft):	638.71	Well depth (ft):	203
Surface bit size (in.):	9 7/8 OD	MP description:	Top of 2-in. PVC riser
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):		Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok			to	
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	152.5
Blank casing: PVC flush joint Tri-Lok	2.0	182.5	to	202.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	152.5	to	182.5
End cap: PVC flush joint Tri-Lok	2.0	202.5	to	203
Surface seal: concrete	0.0	0	to	3
Upper seal: cement grout w/4–8% bentonite	0.0		to	N/A
Lower seal: bentonite grout	0.0	3	to	138
Secondary sand pack: washed silica sand - 30–70	0.0	138	to	144
Primary sand pack: washed silica sand - 10–20	0.0	144	to	203

Date drilled: 1/8/94 to 1/10/94 Logged by: G.A. Rivers

Depth to water 53.64 1/10/94

MONITORING WELL COMPLETION LOG USGS08PL				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0		LST	Limestone, gray (5 YR 6/1), fossiliferous.	
1.0			Dense.	
2.0			Clay, reddish brown (2.5 YR 6/4) moist.	
2.5				
3.0				
4.0		LST	Limestone, pinkish white to reddish yellow (5 YR 8/2 to 5 YR 6/8) dense.	
5.0				
6.0				
7.0		LST	Limestone, gray to very dark gray (2.5 YR N6/0 to 2.5 YR N3/0), dense, fossiliferous.	
8.0				
9.0				
10.0			Limestone, gray (2.5 YR N6/0), very dense with microscopic black (2.5 YR N2.5/0), inclusions.	
11.0				
12.0				
13.0				
14.0				
15.0				
16.0		LST	Limestone, white (10 YR 8/1) with 50% black (2.5 YR N2.5/0) inclusions and a few euhedral pyrite crystals.	
17.0				
18.0				
19.0				
20.0				
21.0				
22.0				
23.0				
24.0				
25.0				
26.0				
27.0				
28.0				
29.0		SS	Top of Paluxy, sandstone, light reddish brown (2.5 YR 6/4) with red inclusions (2.5 YR 5/8), very fine grained, well rounded, well sorted also lots of pyrite and dark reddish brown (2.5 YR 3/3) iron nodules.	
30.0		SW	Sand, light reddish brown (2.5 YR 6/4) very fine grained, well sorted, subrounded clear quartz grains.	

MONITORING WELL COMPLETION LOG USGS08PL				
Depth (ft)	Well construction	USCS symbol	Description	LEL - % OVA -ppm RAD -mR/hr
31.0				
32.0				
33.0				
34.0				
35.0		SW	Sand, light brown (7.5 YR 6/3), very fine grained, well sorted, subrounded to rounded clear quartz grains.	
36.0				
37.0				
38.0				
39.0				
40.0				
41.0				
42.0				
43.0				
44.0				
45.0		SW	Sand, white (7.5 YR N8/0), silty, very fine grained, well sorted, well rounded.	
46.0				
47.0				
48.0				
49.0				
50.0		SW	Sand as above with coal?? Fragments.	
51.0				
52.0				
53.0			Note: Hole bridging in this interval.	
54.0				
55.0		SW	Sand, light gray (7.5 YR N7/0), clayey, very fine grained, well sorted.	
56.0				
57.0				
58.0				
59.0				
60.0				
61.0				
62.0				
63.0				
64.0		SC	Sand, greenish gray (5 BG 6/1), clayey, very fine grained, noncalcareous.	
65.0				
66.0				
67.0				

MONITORING WELL COMPLETION LOG USGS08PL				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
68.0		SC	Sand, reddish brown (2.5 YR 5/4), clayey, iron stained, fine grained, well sorted.	
69.0				
70.0				
71.0				
72.0		SC	Sand, greenish gray (5 BG 6/1), clayey, hard, very fine grained, well sorted.	
73.0				
74.0				
75.0				
76.0		SM	Clay, sandy, pinkish gray (5 YR 7/2), with very fine sand grains.	
77.0				
78.0				
79.0				
80.0		SC	Sand, clayey, light gray (7.5 YR N7/0), very fine grained, well sorted.	
81.0				
82.0				
83.0				
84.0				
85.0				
86.0				
87.0		SC	Sand, clayey, gray (7.5 YR N6/0), very fine grained, with very fine black (7.5 YR N6/0) inclusions.	
88.0				
89.0				
90.0				
91.0		SC	Sand, clayey, gray (7.5 YR N6/0) subangular, with coal and round greenish gray (5G 6/1) inclusions.	
92.0				
93.0				
94.0				
95.0				
96.0				
97.0				
98.0				
99.0				
100.0				
101.0				
102.0				
103.0				

MONITORING WELL COMPLETION LOG USGS08PL				
Depth (ft)	Well construction	USCS symbol	Description	LEL - % OVA -ppm RAD -mR/hr
104.0				
105.0				
106.0				
107.0				
108.0				
109.0		SW	Sand, light gray (7.5 YR 7/0), fine to medium grained, subrounded to rounded.	
110.0				
111.0				
112.0				
113.0				
114.0				
115.0				
116.0				
117.0				
118.0				
119.0				
120.0		SW	Sand, light gray (7.5 YR 7/0), medium grained, subangular, with black (2.5 YR N2.5/0) grains.	
121.0				
122.0				
123.0				
124.0				
125.0		SW	As above with trace of coal and pyrite.	
126.0				
127.0				
128.0				
129.0				
130.0				
131.0				
132.0				
133.0			Clay, light blue gray (5 B 7/1), noncalcareous, with very fine sand grains.	
134.0				
135.0				
136.0				
137.0				
138.0				
139.0				
140.0		SS	Sandstone, pinkish gray (7.5 YR 7/2) very fine grain, indurated.	
141.0				

MONITORING WELL COMPLETION LOG USGS08PL				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
142.0				
143.0		SC	Sand, clayey, light greenish gray (5 YR 7/1), very fine grained, noncalcareous.	
144.0				
145.0				
146.0				
147.0		SC	Sand, clayey, light gray (2 YR N7/0), very soft, very fine grained.	
148.0				
149.0				
150.0				
151.0				
152.0				
153.0				
154.0				
155.0				
156.0				
157.0				
158.0				
159.0				
160.0				
161.0				
162.0				
163.0				
164.0				
165.0				
166.0		SS	Sandstone, light gray (2.5 YR N/7/0), very fine grained, indurated, with pyrite; interbedded with sandstone, white (2.5 YR N8/0), very fine grained, dense.	
167.0				
168.0				
169.0				
170.0				
171.0				
172.0				
173.0				
174.0				
175.0				
176.0		SC	Sand, clayey, gray (2.5 YR N/5), very fine grained, 2–3% pyrite.	
177.0				
178.0				

MONITORING WELL COMPLETION LOG USGS08PL				
Depth (ft)	Well construction	USCS symbol	Description	LEL - % OVA -ppm RAD -mR/hr
179.0				
180.0				
181.0				
182.0				
183.0				
184.0				
185.0				
186.0				
187.0				
188.0				
189.0				
190.0				
191.0				
192.0				
193.0				
194.0				
195.0				
196.0				
197.0				
198.0				
199.0				
200.0		SH	Top of Glenrose, shale, dark gray (2.5 YR N4/0), fissile.	
201.0		LST	Limestone, light gray (2.5 YR N7/0), dense, with oolites, pyritized microfossils, and large fossil fragments.	
202.0				
203.0			TD	
204.0				
205.0				

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Mud rotary

Well no. USGS08PM

Project: 464814700 NAS/AFP4 **Hole no.: P1–M**

Location: On Shoreview Dr. across intersection with Killdeer

Northing:	6968817.360	Easting:	2288944.883
Ground elevation (ft msl):	636.74	Lat/Long:	3246530972726
Hole depth (ft):	127	How determined:	Survey
MP height (ft):	638.57	Well depth (ft):	127
Surface bit size (in.):	9 7/8 OD	MP description:	Top of 2-in. PVC riser
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):		Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok			to	
Blank casing: PVC flush joint Tri-Lok	6.0		to	N/A
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	106.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	106.5	to	126.5
End cap: PVC flush joint Tri-Lok	2.0	126.5	to	127
Surface seal: Pakmix concrete	0.0	0	to	3
Upper seal: cement grout w/4–8% bentonite	0.0		to	N/A
Lower seal: volclay bentonite grout	0.0	3	to	91
Secondary sand pack: washed silica sand - 30–70	0.0	91	to	97
Primary sand pack: washed silica sand - 10–20	0.0	97	to	127

Date drilled: 1/11/94 to 1/12/94 Logged by: G.A. Rivers

Depth to water 44.10 1/12/94

MONITORING WELL COMPLETION LOG USGS08PM				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0		LST	Limestone, gray (5 YR 6/1), fossiliferous.	
1.0			Dense.	
2.0			Clay, reddish brown (2.5 YR 6/4), moist.	
2.5				
3.0				
4.0		LST	Limestone, pinkish white to reddish yellow (5 YR 8/2 to 5 YR 6/8), dense.	
5.0				
6.0				
7.0		LST	Limestone, gray to very dark gray (2.5 YR N6/0 to 2.5 YR N3/0), dense, fossiliferous.	
8.0				
9.0				
10.0			Limestone, gray (2.5 YR N6/0), very dense with microscopic black (2.5 YR N2.5/0), inclusions.	
11.0				
12.0				
13.0				
14.0				
15.0				
16.0		LST	Limestone, white (10 YR 8/1), with 50% black (2.5 YR N2.5/0) inclusions and a few euhedral pyrite crystals.	
17.0				
18.0				
19.0				
20.0				
21.0				
22.0				
23.0				
24.0				
25.0		SS	Top of Paluxy, sandstone, light reddish brown (2.5 YR 6/4) with red inclusions (2.5 YR 5/8), very fine grained, well rounded, well sorted also lots of pyrite and dark reddish brown (2.5 YR 3/3) iron nodules.	
26.0				
27.0				
28.0				
29.0				
30.0		SW	Sand, light reddish brown (2.5 YR 6/4) very fine grained, well sorted, subrounded clear quartz grains.	

MONITORING WELL COMPLETION LOG USGS08PM				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
31.0				
32.0				
33.0				
34.0				
35.0		SW	Sand, light brown (7.5 YR 6/3), very fine grained, well sorted, subrounded to rounded clear quartz grains.	
36.0				
37.0				
38.0				
39.0				
40.0				
41.0				
42.0				
43.0				
44.0				
45.0		SW	Sand, white (7.5 YR N8/0), silty, very fine grained, well sorted, well rounded.	
46.0				
47.0				
48.0				
49.0				
50.0		SW	Sand as above with coal?? Fragments.	
51.0				
52.0				
53.0			Note: Hole bridging in this interval.	
54.0				
55.0		SW	Sand, light gray (7.5 YR N7/0) clayey, very fine grained, well sorted.	
56.0				
57.0				
58.0				
59.0				
60.0				
61.0				
62.0				
63.0				
64.0		SC	Sand, greenish gray (5 BG 6/1), clayey, very fine grained, noncalcareous.	
65.0				
66.0				
67.0				

MONITORING WELL COMPLETION LOG USGS08PM				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
68.0		SC	Sand, reddish brown (2.5 YR 5/4), clayey, iron stained, fine grained, well sorted.	
69.0				
70.0				
71.0				
72.0		SC	Sand, greenish gray (5 BG 6/1), clayey, hard, very fine grained, well sorted.	
73.0				
74.0				
75.0				
76.0		SM	Clay, sandy, pinkish gray (5 YR 7/2), with very fine sand grains.	
77.0				
78.0				
79.0				
80.0		SC	Sand, clayey, light gray (7.5 YR N7/0), very fine grained, well sorted.	
81.0				
82.0				
83.0				
84.0				
85.0				
86.0				
87.0		SC	Sand, clayey, gray (7.5 YR N6/0), very fine grained, with very fine black (7.5 YR N6/0) inclusions.	
88.0				
89.0				
90.0				
91.0		SC	Sand, clayey, gray (7.5 YR N6/0) subangular, with coal and round greenish gray (5G 6/1) inclusions.	
92.0				
93.0				
94.0				
95.0				
96.0				
97.0				
98.0				
99.0				
100.0				
101.0				
102.0				
103.0				

MONITORING WELL COMPLETION LOG USGS08PM				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
104.0				
105.0				
106.0				
107.0				
108.0				
109.0				
110.0		SW	Sand, light gray (7.5 YR 7/0), fine to medium grained, subrounded to rounded.	
111.0				
112.0				
113.0				
114.0				
115.0				
116.0				
117.0				
118.0				
119.0				
120.0		SW	Sand, light gray (7.5 YR 7/0), medium grained, subangular, with black (2.5 YR N2.5/0) grains.	
121.0				
122.0				
123.0				
124.0				
125.0		SW	As above, with trace of coal and pyrite.	
126.0				
127.0			TD at 127 ft.	
128.0				
129.0				
130.0				

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Air rotary

Well no. USGS08PU

Project: 464814700 NAS/AFP4 **Hole no.: P1–U**

Location: On Shoreview Dr. across intersection with Killdeer

Northing:	6968826.038	Easting:	2288943.602
Ground elevation (ft msl):	636.82	Lat/Long:	3246530972726
Hole depth (ft):	70	How determined:	Survey
MP height (ft):	637.95	Well depth (ft):	70
Surface bit size (in.):	9 7/8 OD	MP description:	Top of 2-in. PVC riser
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):		Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok			to	
Blank casing: PVC flush joint Tri-Lok	6.0		to	N/A
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	49.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	49.5	to	69.5
End cap: PVC flush joint Tri-Lok	2.0	69.5	to	70.0
Surface seal: Pakmix concrete	0.0	0	to	3
Upper seal: cement grout w/4–8% bentonite	0.0		to	N/A
Lower seal: volclay bentonite grout	0.0	3	to	27
Secondary sand pack: washed silica sand - 30–70	0.0	27	to	39
Primary sand pack: washed silica sand - 10–20	0.0	39	to	70

Date drilled: 1/10/94 to 1/11/94 Logged by: G.A. Rivers

Depth to water 42.74 1/11/94

MONITORING WELL COMPLETION LOG USGS08PU				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0		LST	Limestone, gray (5 YR 6/1), fossiliferous.	
1.0			Dense.	
2.0			Clay, reddish brown (2.5 YR 6/4), moist.	
2.5				
3.0				
4.0		LST	Limestone, pinkish white to reddish yellow (5 YR 8/2 to 5 YR 6/8), dense.	
5.0				
6.0				
7.0		LST	Limestone, gray to very dark gray (2.5 YR N6/0 to 2.5 YR N3/0), dense, fossiliferous.	
8.0				
9.0				
10.0			Limestone, gray (2.5 YR N6/0), very dense with microscopic black (2.5 YR N2.5/0) inclusions.	
11.0				
12.0				
13.0				
14.0				
15.0				
16.0		LST	Limestone, white (10 YR 8/1) with 50% black (2.5 YR N2.5/0) inclusions and a few euhedral pyrite crystals.	
17.0				
18.0				
19.0				
20.0				
21.0				
22.0				
23.0				
24.0				
25.0		SS	Top of Paluxy, sandstone, light reddish brown (2.5 YR 6/4) with red inclusions (2.5 YR 5/8), very fine grained, well rounded, well sorted also lots of pyrite and dark reddish brown (2.5 YR 3/3) iron nodules.	
26.0				
27.0				
28.0				
29.0				
30.0		SW	Sand, light reddish brown (2.5 YR 6/4), very fine grained, well sorted, subrounded clear quartz grains.	

MONITORING WELL COMPLETION LOG USGS08PU				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
31.0				
32.0				
33.0				
34.0				
35.0		SW	Sand, light brown (7.5 YR 6/3), very fine grained, well sorted, subrounded to rounded clear quartz grains.	
36.0				
37.0				
38.0				
39.0				
40.0				
41.0				
42.0				
43.0				
44.0				
45.0		SW	Sand, white (7.5 YR N8/0), silty, very fine grained, well sorted, well rounded.	
46.0				
47.0				
48.0				
49.0				
50.0		SW	Sand as above with coal?? Fragments.	
51.0				
52.0				
53.0			Note: Hole bridging in this interval.	
54.0				
55.0		SW	Sand, light gray (7.5 YR N7/0) clayey, very fine grained, well sorted.	
56.0				
57.0				
58.0				
59.0				
60.0			Water at 60 ft, sandstone, white (7.5 YR N8/0), very hard, fine grained, well cemented, 3–4 in. thick. Has pyrite inclusions.	
61.0				
62.0				
63.0			Sand, clayey, greenish gray (5 YR 6/1), very fine grained, noncalcareous; interbedded with sand, reddish brown (2.5 YR 5/4), fine grained, well sorted.	
64.0				
65.0				
66.0				

MONITORING WELL COMPLETION LOG USGS08PU				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
67.0				
68.0				
69.0				
70.0			TD	

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Mud rotary

Well no. USGS09PL

Project: 464814700 NAS/AFP4

Hole no.: P2–L

Location: East of Texas Army National Guard Armory

Northing:	6967334.994	Easting:	2289687.935
Ground elevation (ft msl):	631.64	Lat/Long:	3246380972718
Hole depth (ft):	207	How determined:	Survey
MP height (ft):	631.49	Well depth (ft):	207; Depth to water 56.5
Surface bit size (in.):	9 7/8 OD	MP description:	Inside edge of 2-in. riser
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):		Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok	6.0	0	to	7.0
Blank casing: PVC flush joint Tri-Lok	2.0	.5	to	166.5
Blank casing: PVC flush joint Tri-Lok	2.0	186.5	to	206.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	166.5	to	186.5
End cap: PVC flush joint Tri-Lok	2.0	206.5	to	207
Surface seal: Pakmix concrete	0.0	0	to	3
Upper seal: cement grout w/4–8% bentonite	0.0		to	N/A
Lower seal: volclay grout	0.0	3	to	150
Secondary sand pack: washed silica sand - 30–70	0.0	150	to	156
Primary sand pack: washed silica sand - 10–20	0.0	156	to	207

Date drilled: 1/25/94 to 1/26/94

Logged by: G.A. Rivers

MONITORING WELL COMPLETION LOG USGS09PL				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0			0–0.5 ft topsoil, dark brown (7.5 YR 4/2), clayey, with 10% very fine quartz sand grains and 50% organics.	T II -0.3/-0.1
1.0				CGI 0/0
2.0				RAD 0
2.5				
3.0		LST	0.5–5 ft limestone, reddish yellow (7.5 YR 7/6), chalky to dense, and limestone, pinkish white (7.5 YR 8/2), mottled, dense.	
4.0				
5.0				
6.0				T II -0.01/-0.8
7.0		LST	Limestone, gray to light gray (7.5 YR N6/0 to N7/0), hard, fossiliferous, and limestone, dark gray (7.5 YR N4/0), hard.	CGI 0/0
8.0				RAD 0
9.0				
10.0		LST	Limestone as above interbedded with gray limestone (10 YR 6/1), dense, sandy, with euhedral calcite crystals.	T II -1.2/-1.0
11.0				CGI 0/0
12.0				RAD 0
13.0				
14.0				
15.0		SH	Shale, very dark gray (10 YR 3/1) fissile, sandy, calcareous.	
16.0				T II -1.4/-1.2
17.0				CGI 0/0
18.0				RAD 0
19.0		LST	Limestone, white to light gray (10 YR 8/1 to 7/1), very dense, with black (10 YR 2/1) inclusions.	
20.0				
21.0				T II -1.7/-1.5
22.0				CGI 0/0
23.0				RAD 0
24.0				
25.0				T II -1.6/-1.1
26.0				CGI 0/0
27.0			Bottom of Walnut.	RAD 0
28.0			Sand, gray (7.5 YR N5/0), fine to medium grain, rounded, calcareous matrix, clayey with pyrite nodules.	
29.0				
30.0				T II -1.6/-1

MONITORING WELL COMPLETION LOG USGS09PL				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
31.0		SS	Sandstone, light gray (7.5 YR N7/0), fine to medium grain, subrounded, calcareous cement; pyrite and coal.	CGI 0/0 RAD 0
32.0				
33.0				
34.0				
35.0		SC	Clayey sand, light gray (7.5 YR N7/0), very fine grain, noncalcareous matrix; contains euhedral pyrite crystals.	T II -1.8/-1 CGI 0/0 RAD 0
36.0				
37.0				
38.0				
39.0				
40.0		SC	Sand, gray (5 YR 6/1), fine grain, well sorted rounded interbedded with reddish yellow (5 YR 6/0), and weak red (7.5 YR 4/6) clayey noncalcareous sand.	T II -1.6/-1 CGI 0/0 RAD 0
41.0				
42.0				
43.0				
44.0				
45.0				T II -1.6/-1.1 CGI 0/0 RAD 0
46.0				
47.0				
48.0				
49.0				
50.0		SC	Sand, clayey, light gray (7.5 YR N7/0), very fine grain, subrounded, noncalcareous.	T II -1.7/-1.3 CGI 0/0 RAD 0
51.0				
52.0				
53.0				
54.0				
55.0		SC	Sand, clayey, light greenish gray (5 G 7/1), very fine grain, well sorted subrounded, noncalcareous; contains pyrite nodules.	T II -1.8/-1 CGI 0/0 RAD 0
56.0				
57.0				
58.0				
59.0				
60.0				
61.0		SC	Sand, clayey, weak red (10 YR 5/2), interbedded with dark red (10 YR 3/6), clayey sand, fine to medium grain, subrounded, noncalcareous.	T II -1.7/-1.2 CGI 0/0 RAD 0
62.0				
63.0				
64.0				

MONITORING WELL COMPLETION LOG USGS09PL				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
65.0				
66.0		CL	Clay, sandy, greenish gray (5 BG 6/1), noncalcareous; contains pyrite nodules.	T II -1.8/-1.5 CGI 0/0
67.0				RAD 0
68.0				
69.0				
70.0				
71.0		CL	As above interbedded with sand, clayey, light gray (7.5 YR N7/0), noncalcareous, fine grain, well sorted, rounded; 50% pyrite.	T II -1.8/-1 CGI 0/0
72.0				RAD 0
73.0				
74.0				
75.0				
76.0				T II -1.8/-1
77.0				CGI 0/0
78.0				RAD 0
79.0				
80.0		SC	Sand, quartz, fine to medium grain, poorly sorted, subangular to subrounded, friable, 1–2% clay matrix.	T II -1.9/-1.5
81.0				CGI 0/0
82.0				RAD 0
83.0				
84.0				
85.0				
86.0				T II -1.9/-1.4
87.0				CGI 0/0
88.0				RAD 0
89.0				
90.0				
91.0		SW	Sand, white (10 YR 8/1), medium grain subangular, well sorted, interbedded with nodular pyrite.	T II -1.8/-1 CGI 0/0
92.0				RAD 0
93.0				
94.0				
95.0				
96.0				T II -1.8/-1
97.0				CGI 0/0
98.0				RAD 0
99.0				
100.0			Very poor returns 100–130 ft.	T II -1.9/-1
101.0				CGI 0/0

MONITORING WELL COMPLETION LOG USGS09PL				
Depth (ft)	Well construction	USCS symbol	Description	LEL - % OVA -ppm RAD -mR/hr
102.0				RAD 0
103.0				
104.0				
105.0				
106.0				T II -1.9/-1
107.0				CGI 0/0
108.0				RAD 0
109.0				
110.0				
111.0				T II -1.8/-1
112.0				CGI 0/0
113.0				RAD 0
114.0				
115.0				
116.0				T II -1.9/-1
117.0				CGI 0/0
118.0				RAD 0
119.0				
120.0				
121.0				T II -1.0/-1
122.0				CGI 0/0
123.0				RAD 0
124.0				
125.0				
126.0				T II -0.3/-1
127.0				CGI 0/0
128.0				RAD 0
129.0				
130.0				
131.0		SC	Sand, clayey, light blue gray (5 B 7/1) to pale green 5 G 7/2), noncalcareous soft, very fine grain.	T II -0.4/-0.1 CGI 0/0
132.0				RAD 0
133.0				
134.0				
135.0				
136.0		SC	Sand, light gray (7.5 YR N7/0), very fine grain, noncalcareous, hard, interbedded with sand, clayey, light blue gray, fine grain, noncalcareous.	T II -0.5/-0.1 CGI 0/0
137.0				RAD 0
138.0				
139.0				
140.0				

MONITORING WELL COMPLETION LOG USGS09PL				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
141.0				T II 0/0.1
142.0				CGI 0/0
143.0		ML	Sand, greenish gray (5 BG 6/1) very fine grain, well sorted, rounded, noncalcareous matrix.	RAD 0
144.0				
145.0				
146.0				T II 0.9/0.7
147.0				CGI 0/0
148.0				RAD 0
149.0				
150.0				
151.0				T II 0.7/0.7
152.0				CGI 0/0
153.0				RAD 0
154.0				
155.0			Poor returns 152–160 ft.	
156.0				T II 0.7/0.5
157.0				CGI 0/0
158.0				RAD 0
159.0				
160.0		SS	Sandstone, light gray (7 YR N7/0), very fine grain, well sorted, subangular, very hard, calcareous cement.	T II -0.3/-3
161.0				CGI 0/0
162.0				RAD 0
163.0				
164.0				
165.0			No returns 165–180 ft.	T II LOW
166.0				CGI BATT
167.0				RAD SIGNS ON TD
168.0				
169.0				
170.0				
171.0				T II
172.0				CGI 0/0
173.0				RAD 0
174.0				
175.0				T II
176.0				CGI 0/0
177.0				RAD 0
178.0				

MONITORING WELL COMPLETION LOG USGS09PL				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
179.0				
180.0				
181.0		SL	Sand, light gray (7 YR N7/0) clayey, very fine to medium grain, subangular to rounded, poorly sorted, noncalcareous, pyrite nodules.	T II CGI 0/0 RAD 0
182.0				
183.0				
184.0				
185.0				
186.0		SC	Sand, white to gray (7.5 YR N8/0 to N6/0), very fine grain, rounded, noncalcareous, interbedded with clay, sandy, gray (7.5 YR N6/0), noncalcareous.	T II CGI 0/0 RAD 0
187.0				
188.0				
189.0				
190.0				
191.0				T II CGI 0/0 RAD 0
192.0				
193.0				
194.0				
195.0				
196.0				T II CGI 0/0 RAD 0
197.0				
198.0				
199.0				
200.0		CL	Clay, dark greenish gray (5G 4/1), dry, with very, very, fine sand grains, noncalcareous.	T II CGI RAD 0
201.0				
202.0				
203.0				
204.0				
205.0		LST	Limestone, gray (7.5 YR N5/0) very hard.	
206.0				T II
207.0			TD 207 ft.	CGI
208.0				RAD
209.0				
210.0				

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Mud rotary

Well no. USGS09PM

Project: 464814700 NAS/AFP4 **Hole no.: P2–M**

Location: East of Texas Army National Guard Armory

Northing:	6967336.210	Easting:	228678.015
Ground elevation (ft msl):	631.82	Lat/Long:	3246380972718
Hole depth (ft):	117	How determined:	Survey
MP height (ft):	631.75	Well depth (ft):	117
Surface bit size (in.):	9 7/8 OD	MP description:	Top of 2-in. riser
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):		Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok			to	
Blank casing: PVC flush joint Tri-Lok	6.0	0	to	7
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	116.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	96.5	to	116.5
End cap: PVC flush joint Tri-Lok	2.0	116.5	to	117
Surface seal: Pakmix concrete	0.0	0	to	3
Upper seal: cement grout w/4–8% bentonite	0.0		to	N/A
Lower seal: volclay grout	0.0	3	to	82
Secondary sand pack: washed silica sand - 30–70	0.0	82	to	90
Primary sand pack: washed silica sand - 10–20	0.0	90	to	117

Date drilled: 1/25/94 to 1/27/94 Logged by: G.A. Rivers

Depth to water 58.42 1/27/94

MONITORING WELL COMPLETION LOG USGS09PM				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0			0–1 ft topsoil, dark brown (7.5 YR 4/2), clayey, with 10% very fine quartz sand grains and 50% organics.	T II
1.0				CGI 0/0
2.0				RAD 0
2.5				
3.0		LST	1–5 ft limestone, reddish yellow (7.5 YR 7/6) chalky to dense, and limestone, pinkish white (7.5 YR 8/2) mottled, dense.	
4.0				
5.0				
6.0			Top of Walnut.	T II
7.0		LST	Limestone, gray to light gray (7.5 YR N6/0 to N7/0), hard, fossiliferous, and limestone, dark gray (7.5 YR N4/0), hard.	CGI 0/0 RAD 0
8.0				
9.0				
10.0		LST	Limestone as above interbedded with gray limestone (10 YR 6/1), dense, sandy, with euhedral calcite crystals.	T II
11.0				CGI 0/0
12.0				RAD 0
13.0				
14.0				
15.0		SH	Shale, very dark gray (10 YR 3/1), fissile, sandy, calcareous.	
16.0				T II
17.0				CGI 0/0
18.0				RAD 0
19.0		LST	Limestone, white to light gray (10 YR 8/1 to 7/1), very dense, with black (10 YR 2/1) inclusions.	
20.0				
21.0				T II
22.0				CGI 0/0
23.0				RAD 0
24.0				
25.0				
26.0				
27.0			Top of Paluxy.	T II
28.0			Sand, gray (7.5 YR N5/0), fine to medium grain, rounded, calcareous matrix, clayey with pyrite nodules.	CGI 0/0 RAD 0
29.0				

MONITORING WELL COMPLETION LOG USGS09PM				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
30.0				
31.0		SS	Sandstone, light gray (7.5 YR N7/0), fine to medium grain, subrounded, calcareous cement; pyrite and coal.	T II CGI 0/0 RAD 0
32.0				
33.0				
34.0				
35.0		SC	Clayey sand, light gray (7.5 YR N7/0), very fine grain, noncalcareous matrix; contains euhedral pyrite crystals.	T II CGI 0/0 RAD 0
36.0				
37.0				
38.0				
39.0				
40.0		SC	Sand, gray (5 YR 6/1), fine grain, well sorted rounded interbedded with reddish yellow (5 YR 6/0) and weak red (7.5 YR 4/6), clayey noncalcareous sand.	T II CGI 0/0 RAD 0
41.0				
42.0				
43.0				
44.0				
45.0				
46.0				T II CGI 0/0 RAD 0
47.0				
48.0				
49.0				
50.0		SC	Sand, clayey, light gray (7.5 YR N7/0), very fine grain, subrounded, noncalcareous.	T II CGI 0/0 RAD 0
51.0				
52.0				
53.0				
54.0				
55.0		SC	Sand, clayey, light greenish gray (5 G 7/1), very fine grain, well sorted subrounded, noncalcareous; contains pyrite nodules.	T II 0.8/1.0 CGI 0/0 RAD 0
56.0				
57.0				
57.5			Note: Very hard drilling 57.5–57.9 ft; recovered few pieces of: sandstone, pinkish gray (7.5 YR 7/2), very hard, calcareous cement, very fine grained.	
57.9				
58.0				
59.0				

MONITORING WELL COMPLETION LOG USGS09PM				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
60.0		SC	Sand, clayey, weak red (10 YR 5/2), interbedded with dark red (10 YR 3/6), clayey sand, fine to medium grain, subrounded, noncalcareous.	T II -0.2/-.
61.0				CGI 0/0
62.0				RAD 0
63.0				
64.0				
65.0				
66.0				T II -0.6/-5
67.0				CGI 0/0
68.0				RAD 0
69.0				
70.0				
71.0		CL	As above interbedded with sand, clayey, light gray (7.5 YR N7/0), noncalcareous, fine grain, well sorted, rounded; 50% pyrite.	T II -0.8/-
				CGI 0/0
72.0				RAD 0
73.0				
74.0				
75.0				
76.0				T II -0.8/-.
77.0				CGI 0/0
78.0				RAD 0
79.0				
80.0		SC	Sand, quartz, fine to medium grain, poorly sorted, subangular to subrounded, friable, 1–2% clay matrix.	T II -1.7/
81.0				CGI 0/0
82.0				RAD 0
83.0				
84.0				
85.0				
86.0				T II -1.7/-1
87.0				CGI 0/0
88.0				RAD 0
89.0				
90.0				
91.0		SW	Sand, white (10 YR 8/1), medium grain subangular, well sorted, interbedded with nodular pyrite.	T II -1.8/-1
92.0				CGI 0/0
93.0				RAD 0
94.0				

MONITORING WELL COMPLETION LOG USGS09PM				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
95.0				
96.0				T II -1.7/-1
97.0				CGI 0/0
98.0				RAD 0
99.0				
100.0			Very poor returns 100–117 ft.	
101.0				T II -1.5/-1
102.0				CGI 0/0
103.0				RAD 0
104.0				
105.0				
106.0				T II -1.2/-1
107.0				CGI 0/0
108.0				RAD 0
109.0				
110.0				
111.0				T II -1.5/-
112.0				CGI 0/0
113.0				RAD 0
114.0				
115.0				
116.0				T II
117.0			TD at 117 ft.	CGI 0/0
118.0				RAD 0
119.0				
120.0				
121.0				
122.0				
123.0				
124.0				
125.0				
126.0				
127.0				
128.0				
129.0				
130.0				

MONITORING WELL COMPLETION LOG

Driller: U.S. Geological Survey
Method: Air rotary

Well no. USGS09PU

Project: 464814700 NAS/AFP4 **Hole no.: P2–U**

Location: East of Texas Army National Guard Armory

Northing:	6967337.726	Easting:	2289668.015
Ground elevation (ft msl):	632.08	Lat/Long:	3246380972718
Hole depth (ft):	78.0	How determined:	Survey
MP height (ft):	631.81	Well depth (ft):	78
Surface bit size (in.):	9 7/8 OD	MP description:	Top of 2-in. PVC riser
Below surface (in.):	5 7/8 OD	Slot size:	0.020
Coring bit size (in.):		Reaming bit size (in.):	

TYPE	DIA (in. OD)	INTERVAL (ft)		
Outer casing: PVC flush joint Tri-Lok			to	
Blank casing: PVC flush joint Tri-Lok	6.0	0	to	7
Blank casing: PVC flush joint Tri-Lok	2.0	0	to	57.5
Screen: PVC slotted Tri-Lok, 0.020	2.0	57.5	to	77.5
End cap: PVC flush joint Tri-Lok	2.0	77.5	to	78
Surface seal: Pakmix concrete	0.0	0	to	3
Upper seal: cement grout w/4–8% bentonite	0.0		to	N/A
Lower seal: volclay grout	0.0	3	to	36.5
Secondary sand pack: washed silica sand - 30–70	0.0	36.5	to	43
Primary sand pack: washed silica sand - 10–20	0.0	43	to	78

Date drilled: 1/25/94 to 1/28/94 Logged by: G.A. Rivers

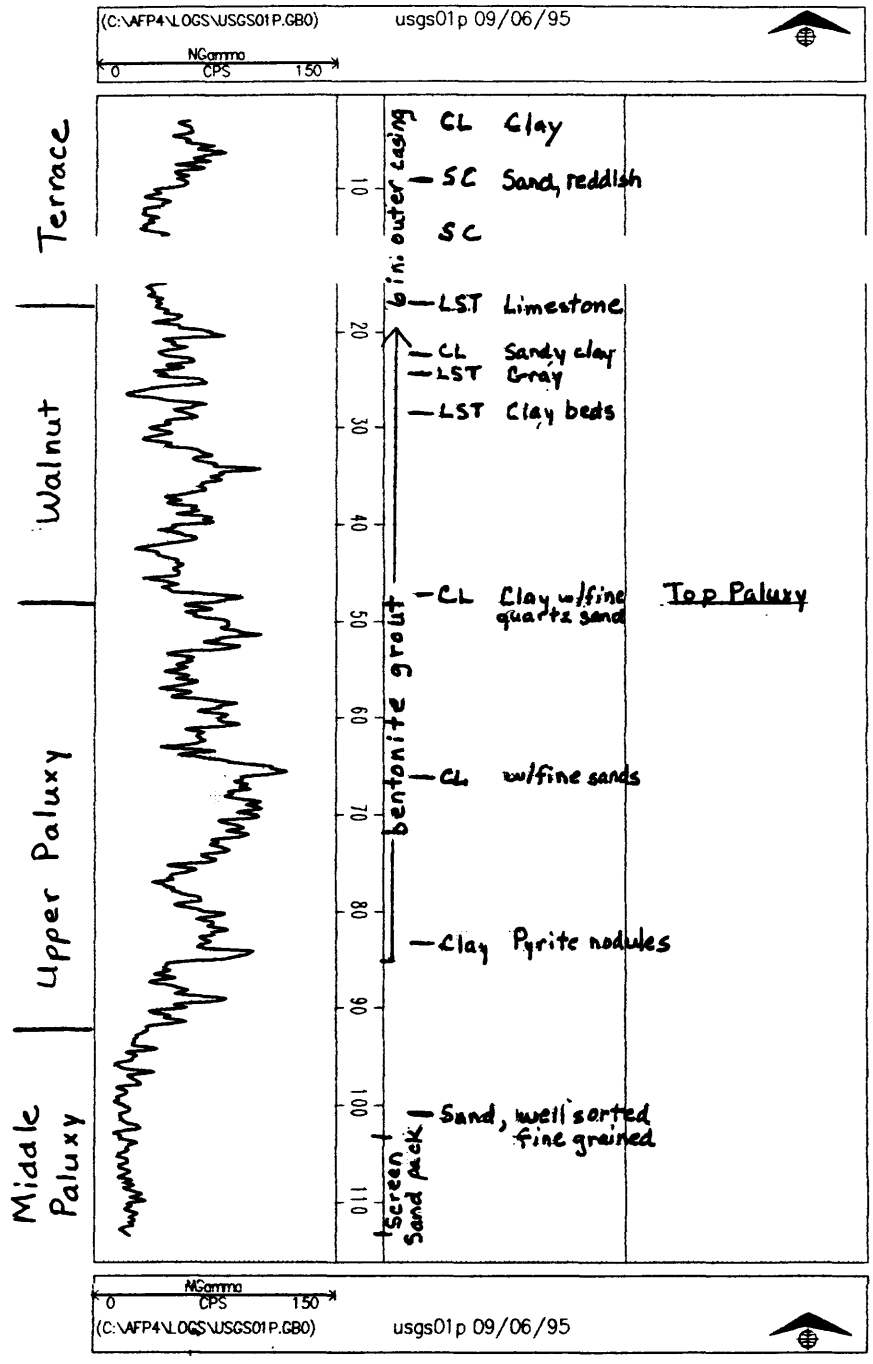
Depth to water 45.07 1/28/94

MONITORING WELL COMPLETION LOG USGS09PU				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
0.0			0–1 ft topsoil, dark brown (7.5 YR 4/2), clayey, with 10% very fine quartz sand grains and 50% organics.	
1.0				T II CGI 0/0 RAD 0
2.0				
2.5				
3.0		LST	1–5 ft limestone, reddish yellow (7.5 YR 7/6), chalky to dense, and limestone, pinkish white (7.5 YR 8/2), mottled, dense.	
4.0				
5.0				
6.0			Top of Walnut.	
7.0		LST	Limestone, white to dark gray (7.5 YR N8/0 to 7.5 YR N4/0), mottled, dense to chalky with fossil fragments and some euhedral calcite crystals.	T II -2.2/-2 CGI 0/0 RAD 0
8.0				
9.0				
10.0		LST	Limestone as above interbedded with gray limestone (10 YR 6/1), dense, sandy, with euhedral calcite crystals.	
11.0				
12.0				T II -3.9/-2
13.0				CGI 0/0
14.0				RAD 0
15.0		SH	Shale, very dark gray (10 YR 3/1), fissile, sandy, calcareous	
16.0			T II not working—will not hold calibration	T II
17.0				CGI 0/0
18.0				RAD 0
19.0		LST	Limestone, white to light gray (10 YR 8/1 to 7/1), very dense, with black (10 YR 2/1) inclusions.	
20.0				
21.0				T II
22.0				CGI 0/0
23.0				RAD 0
24.0				
25.0				
26.0				T II
27.0			Top of Paluxy.	CGI 0/0
28.0			Sand, gray (7.5 YR N5/0), fine to medium grain, rounded, calcareous matrix, clayey with pyrite nodules.	RAD 0
29.0				

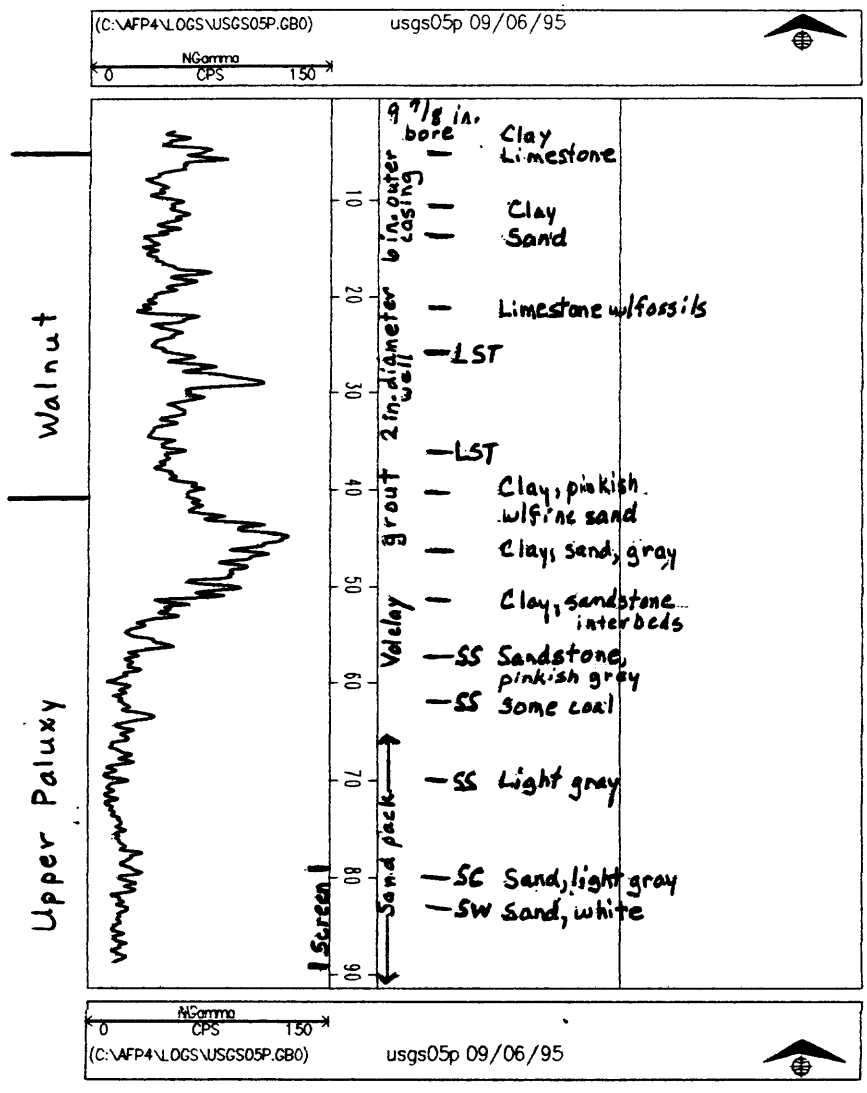
MONITORING WELL COMPLETION LOG USGS09PU				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
30.0				
31.0		SS	Sandstone, light gray (7.5 YR N7/0), fine to medium grain, subrounded, calcareous cement; pyrite and coal.	T II CGI 0/0
32.0				RAD 0
33.0				
34.0				
35.0		SC	Clayey sand, light gray (7.5 YR N7/0), very fine grain, noncalcareous matrix; contains euhedral pyrite crystals.	T II
36.0				CGI 0/0
37.0				RAD 0
38.0				
39.0				
40.0		SC	Sand, gray (5 YR 6/1), fine grain, well sorted rounded interbedded with reddish yellow (5 YR 6/0) and weak red (7.5 YR 4/6) clayey noncalcareous sand.	T II
41.0				CGI 0/0
42.0				RAD 0
43.0				
44.0				
45.0				
46.0				T II
47.0				CGI 0/0
48.0				RAD 0
49.0				
50.0		SC	Sand, clayey, light gray (7.5 YR N7/0), very fine grain, subrounded, noncalcareous	
51.0				T II
52.0				CGI 0/0
53.0				RAD 0
54.0				
55.0		SC	Sand, clayey, light greenish gray (5 G 7/1), very fine grain, well sorted subrounded, noncalcareous; contains pyrite nodules.	T II 0.8/1.0
56.0				CGI 0/0
57.0				RAD 0
57.5			Note: Very hard drilling 57.5 to 57.9 ft; recovered few pieces of: sandstone, pinkish gray (7.5 YR 7/2), very hard, calcareous cement, very fine grained.	
57.9				
58.0				
59.0				

MONITORING WELL COMPLETION LOG USGS09PU				
Depth (ft)	**Well construction**	**USCS symbol**	**Description**	**LEL - % OVA -ppm RAD -mR/hr**
60.0		SC	Sand, clayey, weak red (10 YR 5/2), interbedded with dark red (10 YR 3/6) clayey sand, fine to medium grain, subrounded, noncalcareous.	T II -0.2/-. CGI 0/0 RAD 0
61.0				
62.0				
63.0				
64.0				
65.0				T II -0.6/-5 CGI 0/0 RAD 0
66.0				
67.0				
68.0				
69.0				
70.0				
71.0		CL	As above, interbedded with sand, clayey, light gray (7.5 YR N7/0), noncalcareous, fine grain, well sorted, rounded; 50% pyrite.	T II -0.8/- CGI 0/0 RAD 0
72.0				
73.0				
74.0				
75.0				T II -0.8/-. CGI 0/0 RAD 0
76.0				
77.0				
78.0				
79.0				

APPENDIX B.
NATURAL GAMMA RAY LOGS



B–2 Locations and Monitoring Well Completion Logs of Wells Surveyed by U.S. Geological Survey at Air Force Plant 4 and Naval Air Station, Joint Reserve Base, Carswell Field, Fort Worth Area, Texas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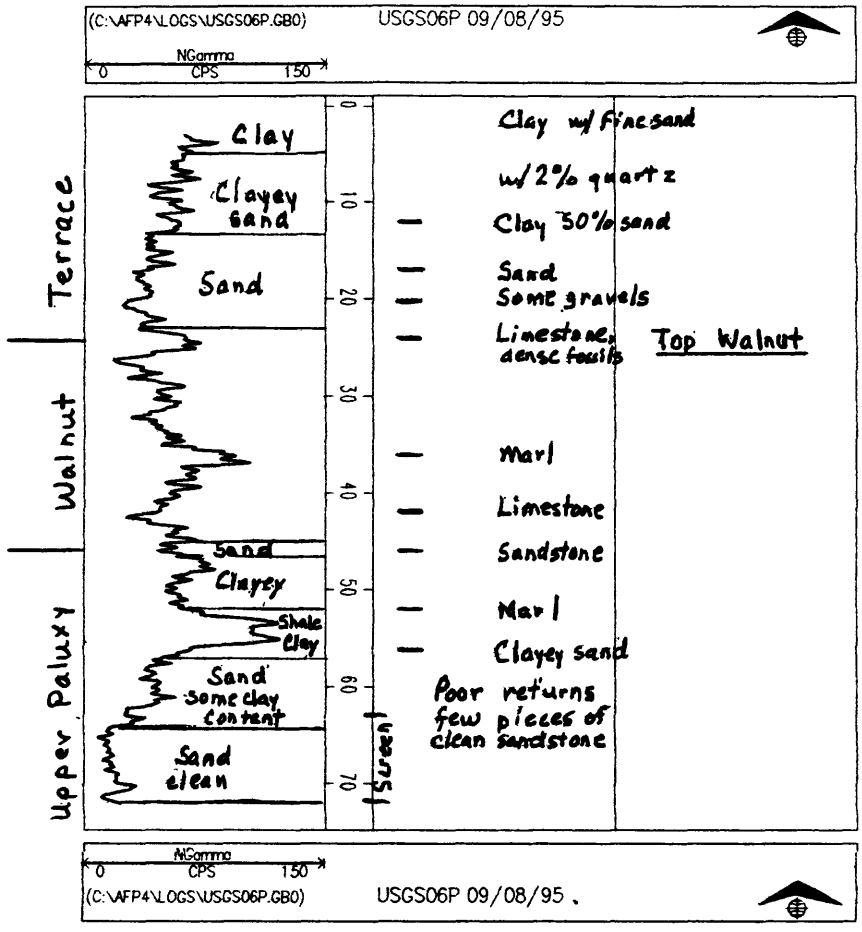
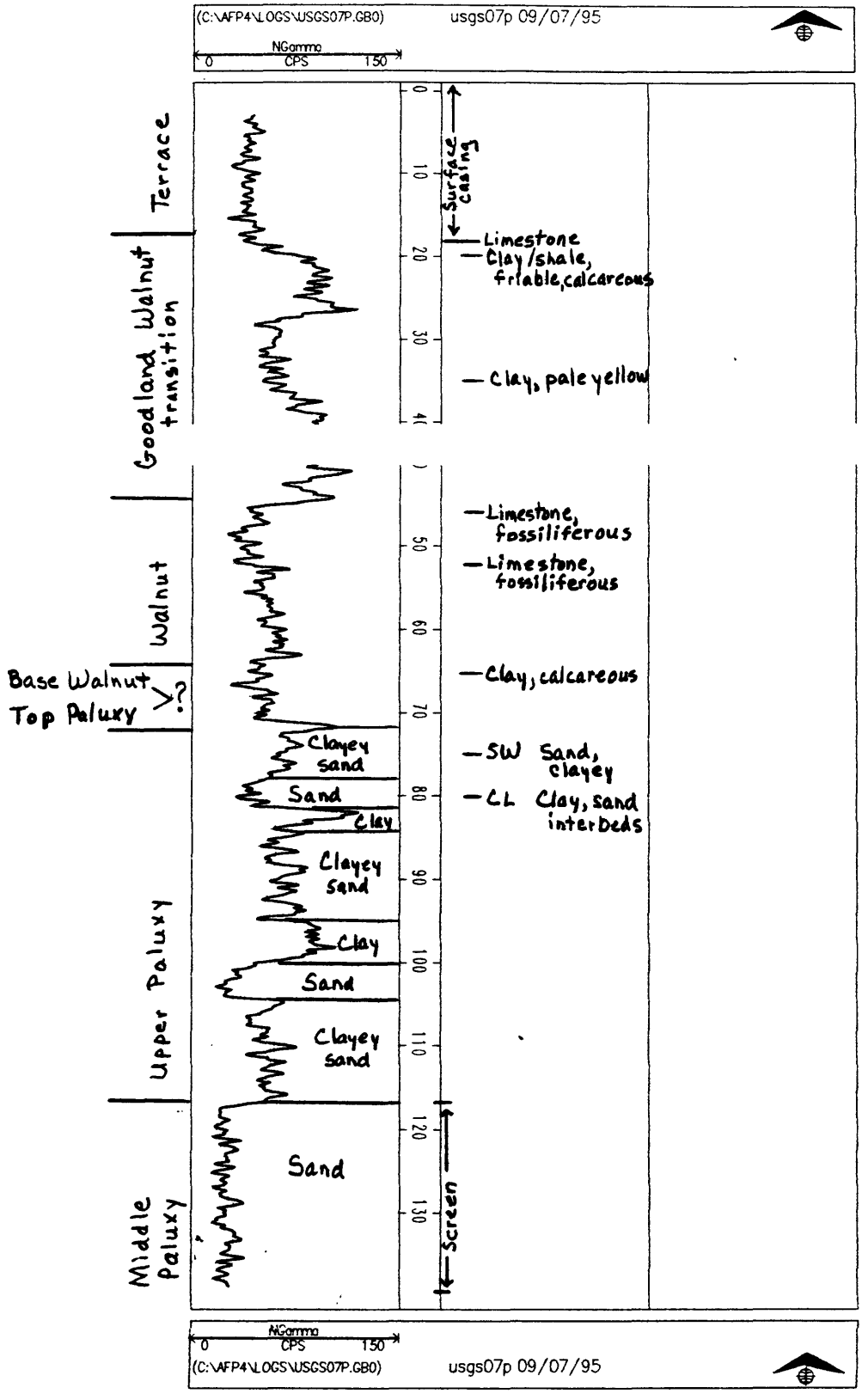
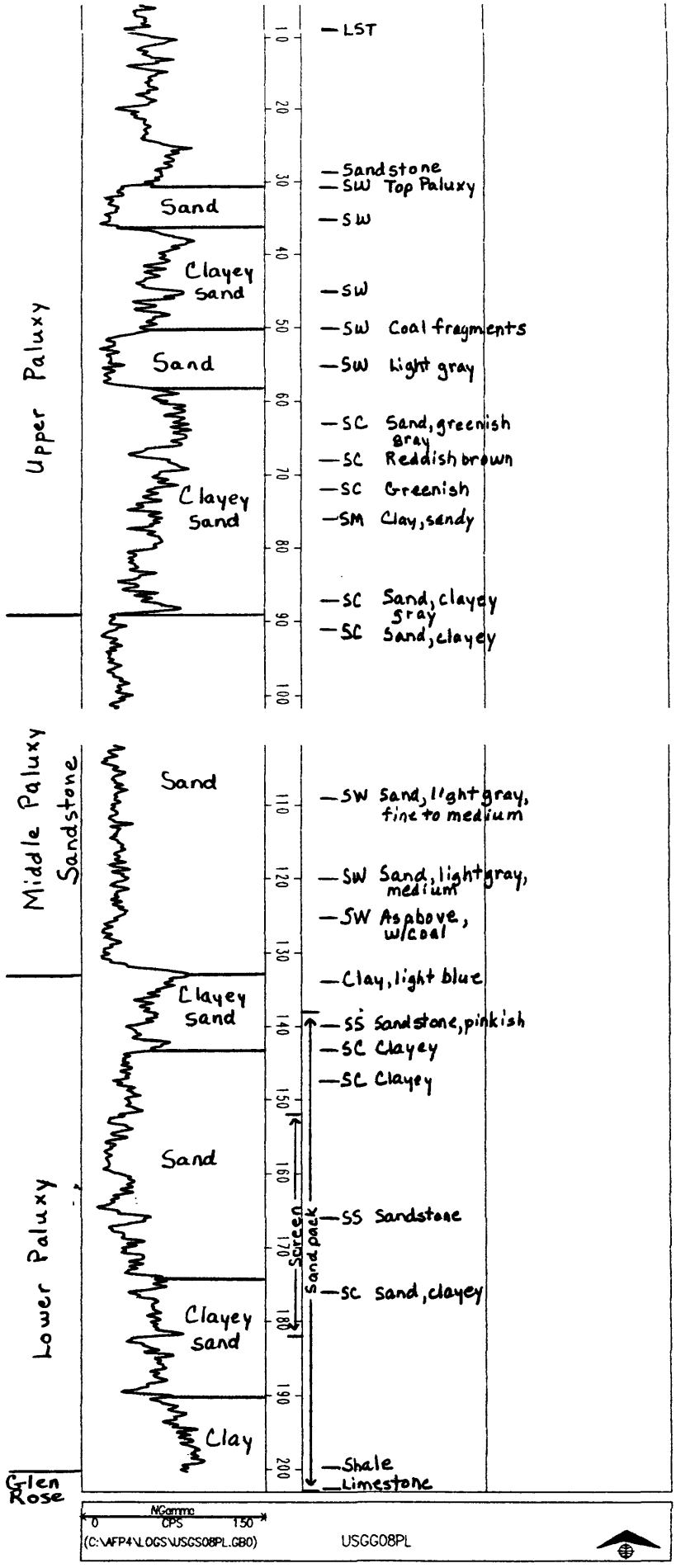
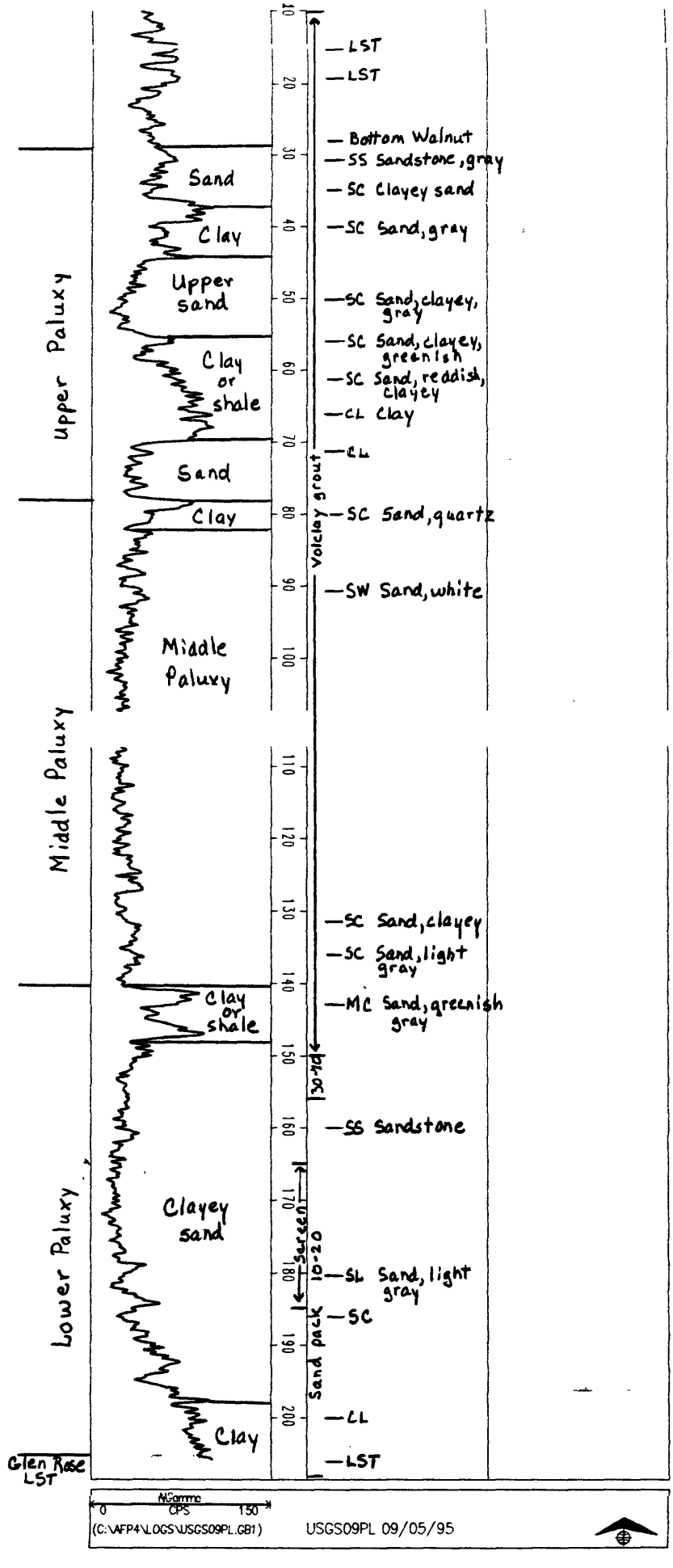
usgs05p 09/06/95
NGamma
0 CPS 150
9 7/8 in. bore
6 in. outer casing
2 in. diameter well
grout
Valley
Sand pack
Screen
Walnut
Upper Paluxy
Clay
Limestone
Clay
Sand
Limestone w/fossils
LST
LST
Clay, pinkish w/fine sand
Clay, sand, gray
Clay, sandstone interbeds
SS Sandstone, pinkish gray
SS some coal
SS Light gray
SC Sand, light gray
SW Sand, white
10
20
30
40
50
60
70
80
90


(C:\AFP4\LOGS\USGS06P.GB0)
USGS06P 09/08/95
NGamma
0 CPS 150
Clay
Clayey sand
Sand
Sand Clayey
Shale Clay
Sand some clay content
Sand clean
Terrace
Walnut
Upper Paluxy
Screen
Clay w/ Fine sand
w/ 2% quartz
Clay 50% sand
Sand
Some gravels
Limestone, dense fossils
Top Walnut
Marl
Limestone
Sandstone
Marl
Clayey sand
Poor returns
few pieces of
clean sandstone
0
10
20
30
40
50
60
70
NGamma
0 CPS 150
(C:\AFP4\LOGS\USGS06P.GB0)
USGS06P 09/08/95


(C:\AFP4\LOGS\USGS07P.GB0)
usgs07p 09/07/95
NGamma
0 CPS 150
Terrace
Goodland Walnut transition
Walnut
Base Walnut
Top Paluxy ?
Upper Paluxy
Middle Paluxy
Surface casing
Limestone
Clay/shale, friable, calcareous
Clay, pale yellow
Limestone, fossiliferous
Limestone, fossiliferous
Clay, calcareous
Clayey sand
SW Sand, clayey
Sand
CL Clay, sand interbeds
Clay
Clayey sand
Clay
Sand
Clayey sand
Sand
Screen
0 10 20 30 40 50 60 70 80 90 100 110 120 130
MGamma
0 CPS 150
(C:\AFP4\LOGS\USGS07P.GB0)
usgs07p 09/07/95


Upper Paluxy
Middle Paluxy Sandstone
Lower Paluxy
Glen Rose
Sand
Clayey sand
Sand
Clayey sand
Sand
Clayey sand
Sand
Clay
LST
Sandstone
SW Top Paluxy
SW
SW
SW Coal fragments
SW light gray
SC Sand, greenish gray
SC Reddish brown
SC Greenish
SM Clay, sandy
SC Sand, clayey gray
SC Sand, clayey
SW Sand, light gray, fine to medium
SW Sand, light gray, medium
SW As above, w/coal
Clay, light blue
SS Sandstone, pinkish
SC Clayey
SC Clayey
SS Sandstone
SC sand, clayey
Shale
Limestone
Screen
Sand pack
NGamma
0 CPS 150
(C:\AFP4\LOGS\USGS08PL.GB0)
USGG08PL


Upper Paluxy
Middle Paluxy
Lower Paluxy
Glen Rose LST
Sand
Clay
Upper sand
Clay or shale
Sand
Clay
Middle Paluxy
Clay or shale
Clayey sand
Clay
LST
LST
Bottom Walnut
SS Sandstone, gray
SC Clayey sand
SC Sand, gray
SC Sand, clayey, gray
SC Sand, clayey, greenish
SC Sand, reddish, clayey
CL Clay
CL
SC Sand, quartz
SW Sand, white
SC Sand, clayey
SC Sand, light gray
MC Sand, greenish gray
SS Sandstone
SL Sand, light gray
SC
CL
LST
Volclay grout
30-rd
Screen
10-20
Sand pack
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
MGamma
0
CPS
150
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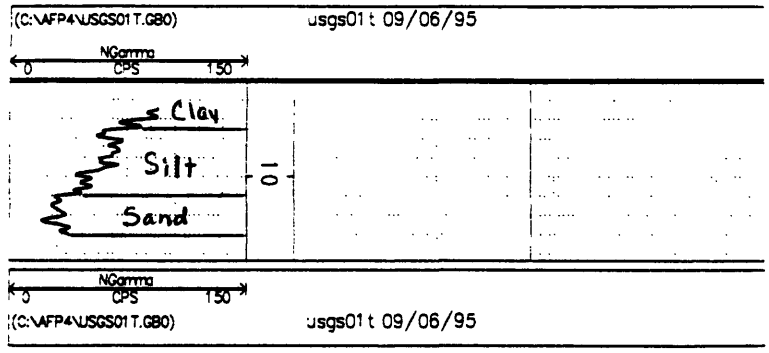
USGS09PL 09/05/95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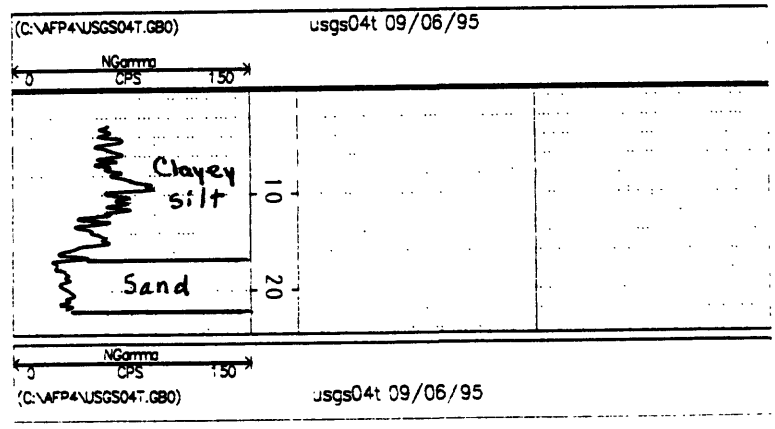
usgs01t 09/06/95
NGamma
0 CPS 150
Clay
Silt
Sand
10
NGamma
0 CPS 150
(C:\AFP4\USGS01T.GB0)
usgs01t 09/06/95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usgs04t 09/06/95
NGamma
0 CPS 150
Clayey
silt
Sand
10
20
NGamma
0 CPS 150
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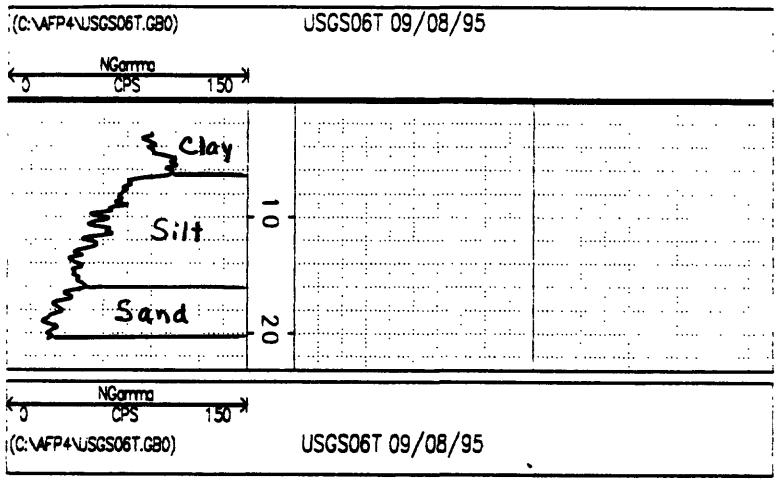
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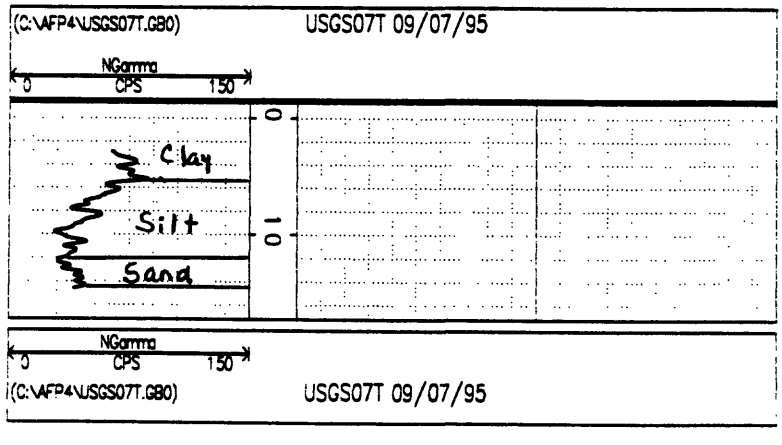
USGS06T 09/08/95
NGamma
0 CPS 150
Clay
Silt
Sand
10
20
NGamma
0 CPS 150
(C:\AFP4\USGS06T.GB0)
USGS06T 09/08/95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USGS07T 09/07/95
NGamma
0 CPS 150
Clay
Silt
Sand
0
10
NGamma
0 CPS 150
(C:\AFP4\USGS07T.GB0)
USGS07T 09/07/95